

PROCEEDINGS OF THE 10th
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INNOVATION AND MANAGEMENT

December 2-4, 2013

Chief Editors

Arnoldo de Hoyos, Ken Kaminishi, Geert Duysters

Associate Editor

Wang Yingming, Ye Jianmu

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【Summary】

The proceedings include informatization, operation management and manufacturing innovation, product, industrial and regional Innovation, organizational, institutional and management innovation, environmental innovation and sustainable development, S&T policy, intellectual property and knowledge, university-industry collaboration and strategic alliance, and miscellaneous.

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The Common Integration: The Group Operation of Petrochemical Complexes in Japan*

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Abstract: Oil and petrochemical companies are in the severe situation where they should deal with various problems. In Europe, America, the Middle East, and East Asia (China, Taiwan, and South Korea), one company usually builds a large-scale factory, and consistently produces oil and petrochemical goods in the system of one company. Differently from it, two or more companies are concentrated in the coast landfills in Japan, and generally manufacture in the system of groups. The system of production in a petrochemical complex would be a medium-scale level if it sees worldwide. After World War II, capital was insufficient in Japan. Many companies advanced to the oil and petrochemical industry which seemed to have a big future. Small and medium scale factories were constructed. As a result, petrochemical complexes have been formed with the system of groups.

After the defeat of World War II, many oil companies excluding Idemitsu Kosan Co., Ltd. were organized for the supply of crude oil from European and American oil majors. They were devoted to refining oil and selling it only in Japan. Moreover, the oil market in Japan had been defended by restriction of the government. Such a system continued for years. Therefore, domestic oil companies had been aiming at improvement and efficiency of refining capacity. Their concentrating on technological development, cost reduction, and domestic share fought in the same industry had become a main activity. The construction of global competitiveness had been postponed for a while. However, after repealing protected laws, the import liberalization of petroleum product had been taken since 1996, and cheap petroleum products had flown in from foreign countries. The sales price had not become the same, and free competition under market mechanism had started. As a result, the movement of industry reorganization had been accelerated.

In such a severe situation, oil and petrochemical companies came up with the idea of business cooperation in the same region in order to acquire global competitiveness. 20 companies in oil industry and chemical industry gathered round at first. Under the Research Association of Technology Law, Research Association of Refinery Integration for Group-Operation (RING) was established in 2000. In order to gain global competitiveness, RING has acted group-operation programs in the industrial complexes in Japan. In this paper, I describe the historical formation and development of petrochemical complexes in Japan. And I consider and analyze the approach to and ways of the high-level integration for group operation. And I will explain the meaning of the plans, and the economies arising from the group operation business.

Key words: Petrochemical complex; Oil and petrochemical industry; Group operation; Sustainable development; Business cooperation; Energy conservation; Environmental measures; Industrial complex; Management of sustainability

1 Introduction

The circumstances that surround the oil and petrochemical industry recently have been severe. Oil and petrochemical companies are in the situation where they should deal with various problems. These subjects are global competitiveness setting between oil and petrochemical companies, sudden rise of price of raw material, response to environmental issues, minimization of resource energy consumption, security of safety technology, employment and economical contribution to the region, requirement to satisfy severe product quality standard, further upgrade and cost reduction in system of production, and construction of system of production to share at sustainable development etc.. In Japan, oil and petrochemical companies have taken up matters of energy saving measure, actions on environmental problems, security of global competitiveness, and restructuring of system of production etc..

In Europe, America, the Middle East, and East Asia (China, Taiwan, and South Korea), one company usually builds a large-scale factory, and consistently produces oil and petrochemical goods in

* This paper is written, based on my presentation paper in ICIM 2010, 2011 and EBHA-BHSJ Paris 2012, and I added retouches and corrections to it.

the system of one company. Differently from it, two or more companies are concentrated in the coast landfills in Japan, and generally manufacture in the system of groups. The system of production in a petrochemical complex would be a medium-scale level if it sees worldwide. There is the reason by which this system was generated.

After World War II, capital was insufficient in Japan. Many companies advanced to the oil and petrochemical industry which seemed to have a big future. Small and medium scale factories were constructed. As a result, petrochemical complexes have been formed with the system of groups. They had competed and cooperated at times, and fought for the share with repeating excessive competition.

After the defeat of World War II, many oil companies excluding Idemitsu Kosan Co., Ltd. were organized for the supply of crude oil from European and American oil majors. They were devoted to refining oil and selling it only in Japan. Moreover, the oil market in Japan had been defended by restriction of the government. Such a system continued for years. Therefore, domestic oil companies had been aiming at improvement and efficiency of refining capacity. Their concentrating on technological development, cost reduction, and domestic share fought in the same industry had become a main activity. The construction of global competitiveness had been postponed for a while.

However, Provisional Law on Importation of Specific Petroleum Products and Revision of volatile oil sales were abolished in 1996; the self-service gas station was permitted in 1998; and the Petroleum Act Law was abolished in 2001. After repealing these laws, the import liberalization of petroleum product had been taken, and cheap petroleum products had flown in from foreign countries. The sales price had not become the same, and free competition under market mechanism had started. As a result, the movement of industry reorganization had been accelerated.

On the change of oil and chemical industry in the world and domestic deregulation, the reorganization and integration of oil companies was done in Japan. The Nippon Oil group came into existence from a merge of Nippon Oil and Mitsubishi Oil Co., Ltd. and the purchase of Koa Oil Co.¹ in the refinement section. The megamerger of Nippon Oil Corp. and Japan Energy Corp. is scheduled in 2010. According to the flow of internationalization and deregulation, they carried it out to have global competitiveness. In Japan, oil enterprises have been reorganized and integrated other than mobile Exxon and Idemitsu Kosan Co., Ltd..

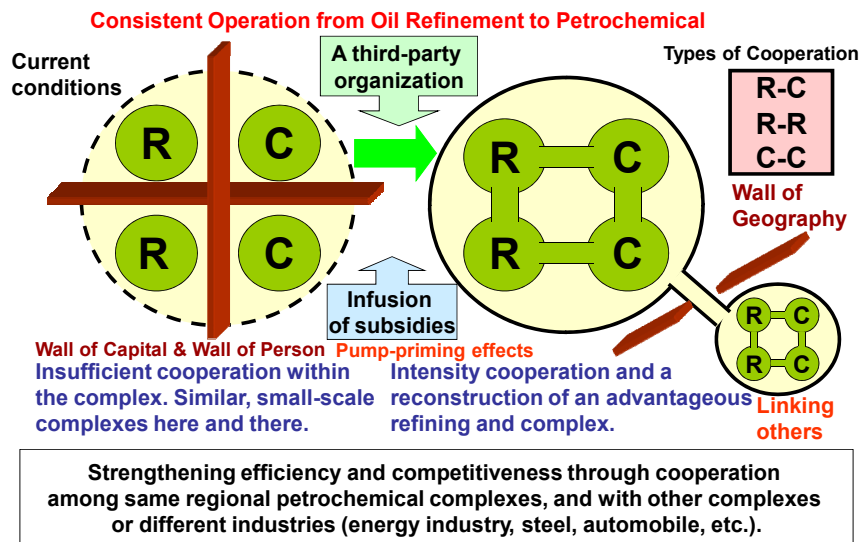
In such a severe competitive situation, oil and petrochemical companies came up with the idea of business cooperation in the same region in order to acquire global competitiveness. In this paper, the approach and ways of the high-level integration for group operation in petrochemical complex are analyzed, the meaning of the plan is declared, and the economy that arises from the group operation business is considered. Cooperation with some businesses would be effective for energy conservation and environmental measures, and would advance the possibility to achieve economies of social interests. Also, group operation would break the stoppage and promote innovations of manufacturing technology one after another.

2 Strengthening Competitiveness of Petrochemical Complex and Establishment of RING

Strengthening cost competitiveness is requested in oil and petrochemical enterprises in Japan. In the latter half of the 1990's, the merge and reorganization had advanced, and cost reduction had been attempted with efficiency improvement of production facilities. They had pulled out of unprofitable businesses. Positive investments in core business and growth business and participation in foreign complexes had made the business integration and competition stronger. However, the reorganization and integration of oil and petrochemical companies in Japan, if it is seen in the scale, is internationally the medium-scale one. It has faults that many operational companies are independent and production facilities have been distributed to many places. The equipment of oil and petrochemical companies in petrochemical complexes are widely distributed to eight places in the whole country. One company has production facilities in some complexes. The consolidation and expansion of manufacturing scale, efficiency improvement in manufacturing process, and reduction in cost of manufacturing are more necessary to obtain global competitiveness. But one company can't do them alone.

¹ Kazuya, Inaba., "Sengoki ni okeru Kowa Sekiyu no Kigyo Katudo - Gaisi Teikei kara Shin Nippon Sekiyu Seisei heno Gappei made - [The Enterprise Activities of Koa Oil after World War II - From Foreign Capital Alliances to Merge of Nippon Oil]", *Tiiki to Kigyo - Yamaguchiken Combinat Kanren Kigyo wo tyusin ni* [The Region and the Enterprise - Concerning the Enterprises related to Petrochemical Complex in Yamaguchi Prefecture -], Tokuyama University Economic Research Institute Library, 2004, pp.1-33.

It has been said that weak points of oil and petrochemical companies in Japan are halfway of cost reduction in medium-scale production, excessive competition, surplus of production scale, low degree of rate of profit. Petrochemical complexes of Japan have production facilities at a medium-scale level. It is in the situation in which economies of scale cannot be requested. And the equipment of one company is distributed to two or more districts. It is also difficult to consolidate these in one place. Many enterprises, concentrated in the same district, often belong to different capital groups. There are examples of producing same products by different manufacturing methods in the same district, too. In such a system, each company respectively has continued to conduct business actions, making decisions independently. Unfortunately, if the company is different, the organizational culture is also different and the spoken jargon tends to be dissimilar. There was an assumption not to communicate with each other easily in the situation. They has called these things "Wall of person", "Wall of capital", and "Wall of geography".



Looking at the technical side, oil and petrochemical companies in Japan had some problems and subjects. These were response to pollution and environmental issues, measures to conserve energy in the two Oil Crises, shift from general-purpose to high value-added product¹, and cost reduction. They had dealt with them, and historically developed and accumulated technologies for them. Also, recycling technologies have been developed². Environmental and saving resources technologies of Japanese enterprise have been evaluated throughout the world. These technologies in oil and petrochemical business are especially important.

To solve the problems, 20 companies in oil industry and chemical industry gathered round at first. Under the Research Association of Technology Law, Research Association of Refinery Integration for Group-Operation (RING) was established in 2000. RING has acted group-operation programs in complex, which the Ministry of Economy, Trade and Industry has supported since 2000. In RING projects, they have tried to find new methods of integrated management, exceeding types of business and a frame of capital, developing some latest technologies, aiming at efficiency improvement and optimization. It is important that one complex is thought of as virtual one factory. If it is so, the integrated management could be practiced. As a result, new effects, economies and innovations by new technological development would be achieved. These practices are difficult for one company to do alone.

In RING, the research and development business, related to advanced united management, has been done between different types of business such as oil and petrochemical factory, etc. The first R&D

¹ This had the purpose to evade domestic excessive competition and pursuit of petrochemical manufacturers in East Asian nations.

² Kazuya Inaba 'The Upgrade of petrochemical industry by recycling business -Concerning the Case of the Chemical Recycling for Polyester in Teijin Limited-', PROCEEDINGS OF PRESENTATION PAPERS, The 4th International Conference on Innovation & Management, The Organizing Committee of ICIM2007, Yamaguchi University, 2007, pp265-70.

project (RING 1) had got good results of the proof of R&D in the each district. It had resulted that strong unity was caused among complex enterprises through these activities. Following this, the second R&D project (RING 2) was executed in 2003. Development of advanced, highly integrated technologies for reducing environmental burdens was performed there. In addition, the action to optimize entire petrochemical complex and carry out advanced function unification was executed in the third R&D project (RING 3) in 2006. At present, such a business has been accomplished in most complexes in Japan, that is, in Kashima, Chiba, Kawasaki, Chita, Sakai Senboku, Mizushima, and Shunan.

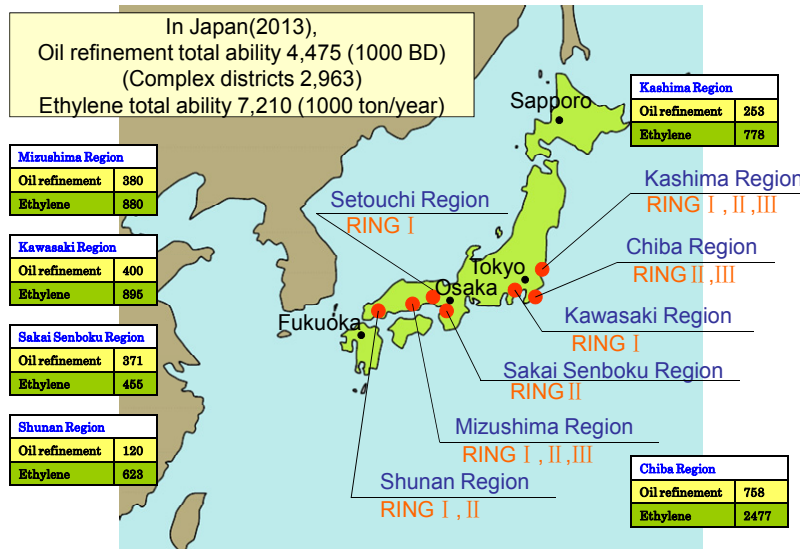


Figure 2 Development of RING 1,2,3 Projects

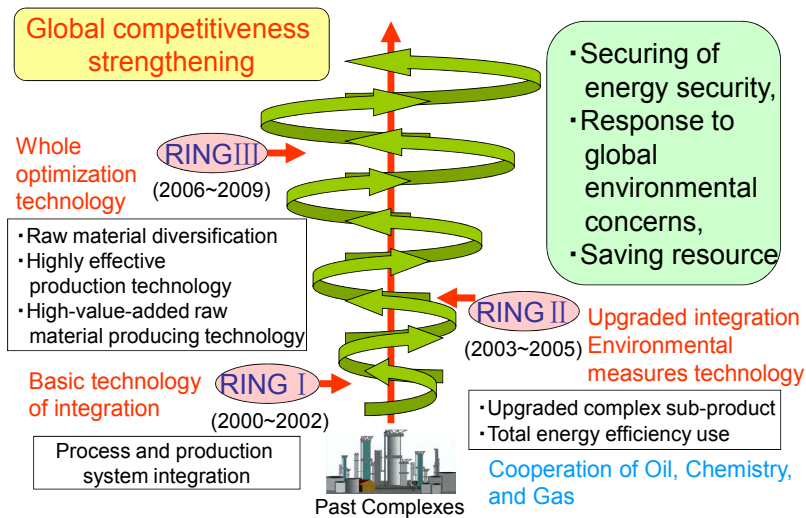


Figure 3 The Spiral-up Innovation in Group Operation

One company perhaps tends to attempt single survival and optimization. Even if it notices the importance of cooperation, the priority level might be low. There are only two choices whether to execute it or not in one enterprise. Therefore, the government needs to put out a subsidy at first as a trigger, and it is necessary to establish the third-party institution in order to give the motivation to business cooperation. It is important to build the organization to adjust common interest. The support of the government for RING projects is a pump-priming policy. And the enterprises have recognized new possibilities in business cooperation. They would begin to mix well with them, and come to analyze a system of production with each other. They would examine construction of system of production and technological development accommodating wasted gas, heat, and energy etc. And profits between enterprises, which one company cannot conceive, would begin to be recognized, and their interest would

spread various contents such as treatment of waste, contribution to the region, joint power generation etc. Innovations have progressed in an upward spiral through cooperation between enterprises beyond the limit of single company business. The new idea of business cooperation has arisen one after another.

3 Economies of Combination

Strengthening cost competitiveness is requested in oil and petrochemical enterprises in Japan. The consolidation and expansion of manufacturing scale, efficiency improvement in manufacturing process, and reduction in cost of manufacturing are more necessary to obtain global competitiveness. To solve the problems, RING was established. The RING project is an attempt of joint operation and business cooperation in oil and petrochemical business. The project assumes current production facilities, capital tie, and business activities. On that assumption, it is necessary for two or more enterprises to cooperate and work on reduction of environmental burdens facing the world. Different from the strategy that one company pursues productivity and efficiency, same kind of effects may be achieved by cooperation between enterprises and different types of business. Whole optimization will be achieved by the system in group operation. And they can implement simultaneously two strategies, Cost Leadership and Product Differentiation.

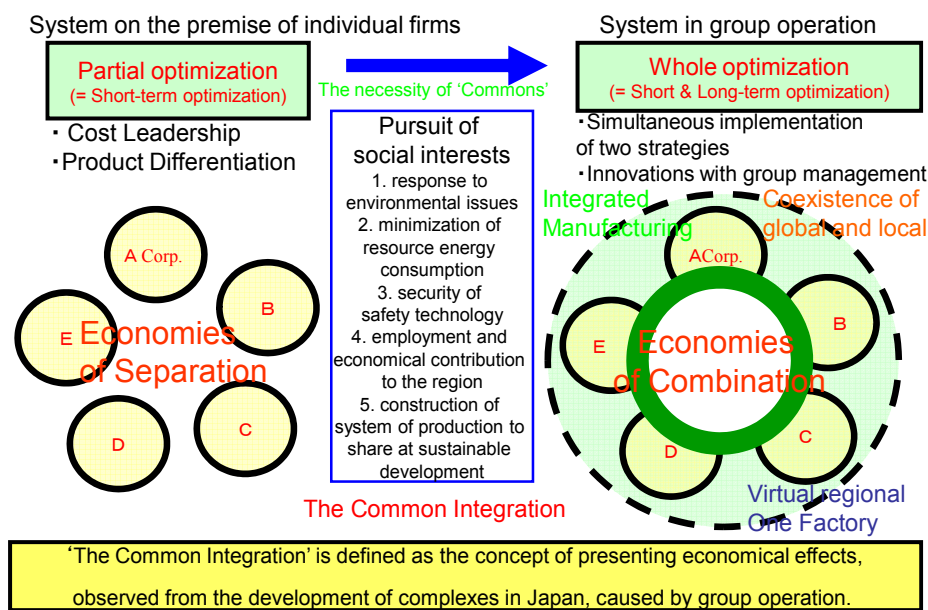


Figure 4 Concepts of the Common Integration

The results of business based on the premise of one company

- Partial optimization and efficiency
- Alternative strategies; Cost Leadership or Product Differentiation

The results of business in cooperation with two or more companies

- Whole optimization and efficiency
- Simultaneous implementation of two strategies
- Pursuit of social interests
- Innovations with group management
- Management of Sustainability

“Kombinat” is a Russian word, means “combination”, and is used instead of “complex” in Japan

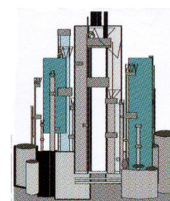


Figure 5 Economies of Combination(комбинат)

In addition to economies of scale and economies of scope, some social interests will be pursued.

When collaboration with many enterprises is achieved, ‘commons’ will be necessary for cooperation. Therefore, the aspects to social interest will arise: joint energy use, efficiency improvement, regional contribution, establishment of safety technology, positive commitment to environmental measures, and cooperative treatment of waste etc. And enterprises will pay more attention to practices of social activities: greening of the complex, ownership of joint power generating equipment, security cooperative relationship etc. In this paper, economies of combination is defined as some economic effects which group operation produces; whole optimization and efficiency, simultaneous implementation of two strategies, pursuit of social interests, innovations with group management, management of sustainability. The common integration is defined as the concept of presenting social and economical effects, observed from the development of complexes in Japan, caused by group operation.

4 Conclusion

The RING project began from easy business collaborations. It is said that participating companies had not expected the result to joint operation too much at first. However, as RING projects have advanced, most enterprises have come to notice potentiality in the effect of group operation and business cooperation. The circle of RING extends through RING 1, 2, and 3. The speed of technological development in cooperating businesses has increased with acceleration. Innovations have occurred in an upward spiral. And, as time passes, reduction of CO₂, energy conservation, and environmental measures have been paid attention to, and they have been involved in RING projects. If one company does it by itself, only the optimization for one company would be realized. Actions on these problems would be postponed when thinking from the priority level. However, in group operation and business cooperation, these would be problems to undertake first of all.

The goal of the RING project is to obtain global competitiveness in oil and petrochemical companies. When all technological developments are completed, much of reduction of energy use in oil refinement equipment etc. will be achieved, and it will be expected to increase production efficiency by the best flexibility of raw material and semi-finished products between oil refinery plants and different type of factories. And it is forecasted that they greatly contribute to reduction of CO₂ exhaust. As a result of experimental studies that have been done up to now in RING projects, the amount of CO₂ exhaust reduction is expected to reach 500,000 tons/year or more. In addition, the developed technology will be applied to other domestic industrial complexes, and therefore reduce CO₂ further.

Oil and petrochemical companies in Japan come up with the idea of integrated manufacturing to gain global competitiveness. In addition, this way has various effects and the meanings. Especially, there is an important meaning that this would ease control by market mechanism.

The headquarters one-sidedly draw up neither the business plan nor the production plan. Neither the price nor production might be controlled by an international market. The cooperative relationship by group operation is a method of pursuing for such a new economy. It is the management separating system, though businesses are integrated. Various resources would be used by negotiations through the network of the producer, the consumer, the local government, and the resident, etc. It contains the policy of the overall distribution of various resources, the growth rate, investments, the energy consumption, transportations, and the plans of sustainable development and environmental protection. Definite variables of economic activities are systematically decided by the decision making organizations adapting to the level of district, local, national, and international. Detailed plans are decided at each level based on discretion. In the process of all the discussions, the idea of whole optimization will occupy the center of business plans and policies. As a result, the whole optimization is prior to the partial optimization. And social necessities may decide the plans that what and how much they produce. On competition by individual firm and requests of international market, enterprises will be deprived of the authority to make decisions that what and how much they produce. In pursuing the common integration, the decisions can be regularly exercised. In such a meaning, the regional, joint manufacturing body has the right to make decisions of the investment. It is not a top-down type from the headquarters in each company, but a bottom-up type from the agglomeration of factories in regional zones. In the same way, the price will be set not by decision in headquarters, but the unit cost of production based on inputs from consumers, customer, and regional profit groups etc. However, such a production method doesn't adjust to all industries. This should adjust to the goods, close to the employment and development of regions, such as food, health, medical treatment, medicine manufacture, education, transportation, energy, product necessary for living etc. On the contrary, consumer goods,

luxury goods etc. should be controlled by market mechanism. The joint production of many interests firms seems to require the complicated and troublesome administration and organization. But the scheme of joint business operation would be used, if the form of administration and organization is constructed once. In doing so, actual complication of interests adjustment could be standardized.

Which system would be superior in the cost and time spent on administration and organization? There might be more wasteful spending in system on the premise of individual firms than system in group operation, when individual firms, which are influenced by market, would be aimed at partial optimization. There is no evidence that the system in group operation would spend in the cost and time more than the system on the premise of individual firms.

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Construction Organization and Management Based on Virtual Reality System

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Abstract: Currently, the combination of virtual reality technology and civil engineering construction is becoming increasingly close, and the informatization of its organization and management has been improved significantly. This article discusses the application of virtual reality technology in the control and management of the construction process, as well as in the selection and optimization of the construction scheme. This article also analyses some examples to illustrate that the application of the virtual technology in civil engineering will be even more in-depth and universal. It will turn a new page of the traditional construction management.

Key Words: Virtual Reality; Construction Management; 4D

1 Introduction

Virtual reality is to monitor a three-dimensional virtual world in the aid of a computer where users can feel personally on the scene, and can freely observe any item in the three-dimensional space in time. VR is a comprehensive integrated technology involving computer graphics, interactive technology, sensor technology, artificial intelligence and other fields. It can generate three-dimensional vision, hearing, smell and other feelings through computers. It can involve people through appropriate means in experiencing and interacting in the virtual world naturally (Figure 1).



Figure 1

The technology integrates the latest achievements of the computer graphics (CG) technology, computer simulation technology, artificial intelligence, sensor technology, display technology and the network parallel processing technology. It is a high-tech simulation system generated in the aid of computers, and is a new way through which people can visualize and exchange complex data operations. Compared with the traditional man-machine interface and the popular windows operating, virtual reality has achieved a qualitative leap in terms of technological ideology.

2 Construction Organizations and Management Based on Virtual Reality System

2.1 Application in Control and Management of the Construction Process

Virtual reality is primarily a visualization interface technology that can effectively create a virtual environment (Figure 2). It mainly focuses on two aspects. First, virtual environment can accurately represent the state model of the objects. Second is the visualization and rendering of the environment.

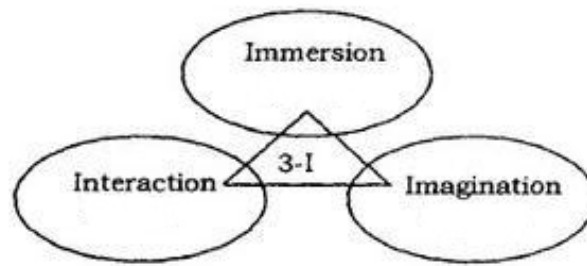


Figure 2

Construction management and control of civil and architectural engineering is a dynamic, complex and integrated process which penetrates throughout the life cycle of each project, in particular those modern large-scale projects which boast large work amount and long duration. It is involved with large capital, materials scheduling, construction machinery, equipment management and the co-ordination of various types of building grades. How to guarantee the quality, schedule and cost of the project, manage its information, and implement the contract effectively is difficult to achieve by usual engineering experiences. The 4D project management information system effectively collects and integrates information of the whole project, and realizes the informatization, integration, visualization and intellectualization in construction management and control. The so-called 4D model takes into account the additional time / cost factors on the basis of architectural CAD three-dimensional (3D) model. The synarticle of this technique is not only a visual medium that enables users to see the graphic simulation of the objects' changing process, but it can also optimize and control the whole vivid changing process. In this way, it will be conducive to the safety of field operations. Chronological simulation of the construction schedule can do a more precise calculation and control of the project's duration, and is conducive to the co-ordination and scheduling of people, materials, and objects, thus realizing the interactive visualization and informatization of the building operations(Figure 3).



Figure 3

2.2 Application in Selection and Optimization of the Construction Plan

The virtual environment created by virtual reality is integrated by the digital model based on the real data. It strictly follows the standards of the project design and requires to establish a realistic three-dimensional scene, thus achieving "representation" of the construction project.

Designing a reasonable construction plan is the core of the construction organization. It includes identifying construction flow and construction program, selecting construction methods and machinery, arranging the construction sequence and so on. In terms of some large projects with complex structure, the choice of the construction plan is a bit difficult, but virtual reality system can allow each branch to conduct virtual construction and demonstration of the construction plan. This provides tremendous convenience to the selection of the construction plan. In this way, many subtle design flaws can easily

be found, thus reducing the irreparable loss and regret caused by half-baked planning, and greatly improving the quality and progress of the construction process.

3 Case Study on Application of Construction Organization and Management Based on Virtual Reality System

3.1 Project Overview

The project is the main building tower of a certain district. The building is 137 meters high and 50 meters wide (the chassis of the annex is 243 meters wide). The project covers a total land area of 601,653 square meters, of which the total construction area occupies 71,690 square meters with 56,225 square meters above ground, 15,465 square meters underground, and 27,012 square meters of sandwiching construction areas. There are 11 floors above ground and 1 basement. The podium building has 1 floor above ground and 1 basement. In terms of the entire project, it has the characteristics of "difficult, high and tight"(Figure 4).



Figure 4

3.2 Organization and Management Based on Virtual Reality System

(1) Selection and Optimization of Construction Plan

The project is divided into the basement, the main structure and the decoration. Among them, the main tower is the most complex in terms of construction sequence and plan selection due to its new and special structure. Through the virtual construction project and a number of demonstrations, a reasonable solution is ultimately determined: in the case of ensuring the progress of the main tower, the construction of podium can be interspersed. The podium will first be constructed to less than two floors. The 25 meters in the middle range, as the hoisting steel structural, transporting and disposal site, will not be constructed temporarily. In terms of arranging the schedule, the main tower's concrete construction and steel construction should keep 3-meter difference in height. The mechanical and electrical engineering piping and equipment construction will be started when the main tower is 50 meters high; interior decoration interspersed when 60 meters high; outdoor decoration started when 70 meters high; after the completion of the main tower, the 22-meter-high skirt floor will be constructed after the removal of the tower crane. The identification of this plan has reduced a lot of time of the construction progress and avoided the transport of equipments, so as to reduce the cost for the project.

(2) The Layout of the Construction Plant

Traditional construction floor plan, drawn in the form of blueprint, cannot give people an intuitive three-dimensional effect. Even in the diagram form of 3D effect, it is not easy to timely reflect the dynamic changes of the site layout when it needs to be modified. In such circumstance, construction layout can be conducted only according to the construction experience. In the virtual reality system, the 3D model of the project's entire existing and proposed buildings, construction equipments, entities in each sites, temporary facilities, warehouse processing plants, pipelines and other entities, both above and below ground, will firstly be established. Then, VRML (virtual reality modeling language) will endow every 3D entity with dynamic properties to realize real-time interaction and timely dynamic changes to form the 4D site model. In 4D site model, the shape and location of each entity can be modified whenever you like(Figure 5). In this way, it has greatly accelerated the speed and quality of program design, improved the efficiency of program design and correction, and saved a large amount of capital.

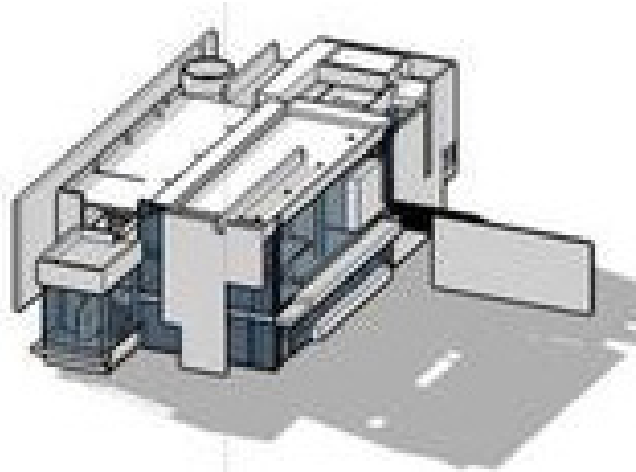


Figure 5

In the system, through the establishment of a unified entity attribute database, the coordinate position, existing time and equipment model of each entity, including the floor space, storage capacity and other information of the temporary facilities, materials stacked space, materials processing zones, warehouses, living and cultural areas is stored in. The roaming virtual space not only allow people to get an intuitive understanding of the site layout, use the mouse to scan the related information of each entity which provides great convenience in laying out the sites according to the specification, but it can also correct the unreasonable elements by modifying the information in the database. The system can also assist the organization to determine a more reasonable site location, transportation routine and transportation programs according to the normative information and site optimization program stored in the database.

(3) Dynamic Management of the Construction Project

The management of the construction project is fundamental to ensure the schedule, quality and safety of the construction process. Traditional management mainly relies on prior design of the construction organization in arranging material, manpower and equipment relying on governors' rich experience. But it may not be able to meet the actual needs, since in this way, future risks of the project are also only able to be predicted by governors' experience, letting alone the timely reflection of potential risks.

In the virtual reality system, through issuing the multiple optimized and pre-identified virtual construction process and synchronising it with the schedule, governors can watch construction progress that should be achieved at any time whenever they like. Through the information stored in the database, they can comprehend the real-time construction equipments, materials and conditions of the site in order to prepare the relevant materials and facilities in advance, and take a timely and accurate control of the construction progress. By demonstrating virtual construction of future conditions, they can discover the construction problems and safety hazards that may arise in the future in advance, and take a timely control to ensure the safety of personnel and to avoid unnecessary losses. Through presentations, they can also find the inadequacies of the construction program in order to modify them and ensure the quality of the project. Virtual construction demo of the system provides a virtual training for constructors, and allows people to understand the condition of the whole project. Due to its strong interactivity, it can be also used in virtual construction which can greatly enhance the experience of the constructors and to improve engineering efficiency. Virtual reality technology has very broad application prospects in the aspect of project management and construction. Stable database information can be placed in the backstage so that the audience can get real-time access to each technical index. Surrounded by a variety of media information, such as engineering background, tenders profiles, technical data, cross-sectional, electronic maps, sound, images, and animation, by interacting with the core of the virtual technology, the virtue reality technology can demonstrate the navigation and positioning on scene, introduce background information and realize many other useful and convenient functions.

4 Conclusions

Construction organization and management based on the virtual reality system can greatly improve

the efficiency of project management and construction, save its costs, ensure the progress of the schedule, reduce the risk of the project and improve its security. Further development in the application of virtual technology will turn over a new page of the traditional construction and management.

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A Study of the Process Quality Control Based on Internal Customer Satisfaction

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Abstract: Edition 2000 ISO 9000 newly defines “Process”, making an abundant denotation of the word “Customer”, thus proving a new way of thinking and new method for quality control in enterprise quality management. Nevertheless, how to use the new thinking mode and method in quality control is paid little attention. In view of this, specific strategies of process quality control in the process of material procurement, manufacturing and employees work in all the departments are discussed.

Key words: Customer Satisfaction; Process; Quality Control; Discuss

1 Introduction

Edition 2000 ISO 9000 Family Quality Control System Standard issued by ISO requires the adoption of “Process” in quality management to control quality. The adoption of term “Process” makes an abundant denotation of “Customer”, including external customer and internal customer, thus proving a new way of thinking for process quality control on the condition of “Customer Satisfaction”. The new thinking mode will change the currently ubiquitous situation “I have to control” to “I must control”. It is no exaggeration to say that it is a revolutionary change of process control method. But unfortunately, though Edition 2000 ISO 9000 Family Quality Control System Standard has been issued for 8 years, many enterprises still use the old operation approach in specific process quality control and few people pay more attention to this new method. This is probably due to a lack of recognition of “Internal Customers” and their satisfaction, and how internal customer is based to conduct process quality control. From Customer Focus, the quality management principle, and based on customer satisfaction, the thesis discussed the strategies of conducting process quality control.

2 Understanding Of “Customer” and Terms Related To “Customer”

2.1 Process

Process is a group of interrelated or interacting activities that can convert input to the output. In China, the term of the process appears early on, but belongs to a general word. Due to the emergency and promotion of ISO9000, this term is gradually into the management field, and become the foundation term of the management. Process can also refer to a method of doing or making something. Procedure is described as the content of process in the past, but we generally choose the process instead of procedure now. The concept of process is very wide, any of a set of interrelated or interacting activities can be identified as a process. The process consists of the input, the implementation of the activities and output the three links. The output of a process is often the input of the other (next) process. The process of all activities of the employees can be grouped into two categories: production or manufacturing process (including procurement process), the work process of departments (including the marketing process). The most important and widespread processes are material procurement process, manufacturing process and the working process of the functional departments.

2.2 Product

Product is the result of the process. The definition of the product is very simple, but it's wide because the definition of process is wide. Product includes four categories: service, software, hardware, processed material. The product can be either one of the above four categories, also can be the composition of the several different types of products. Besides, the same category of products in the different stages has a variety of names, such as the hardware products of the manufacture of the same class, is classified by in process or intermediate products, final products; another example is that the products of R&D department have drawings, parameters, requirements, etc. In the service industry, service itself is a kind of product. The result of the process is good one (expected result) or bad one (unexpected results, such as contaminants). However, the result of process refers to the expected one in the quality management.

2.3 Customer

The customer is the organization or individual that accepts products. If the above three terms are

linked together, the customer can be expressed as follows: the organization or individual which can accept a group of interrelated or interacting activities that can convert input to the output. It's not difficult to find from the statement: due to the wide concept of process and product, the concept of the customer is not just limited to external customer, the organizations or individuals are customers as long as they accept products, it not only contains the customers out of organization, the client, the end user, retailer, beneficiary and purchaser, but also refers to the next process operator within the organization, the next team of the same equipment (i.e., the process, post and personal accept the output of previous process in the production, services and activities), even including all of staff in the same position and in the same work (the staff within the organization are collectively referred to as internal customers hereinafter). Therefore, the concept is very important that customers exist in staff, department, the relevant position, process and even yourself. Enterprises implement the principle of quality management that is "Be focused on customer", not only pay attention to external customers, but also want to pay attention to internal customers; every staff, process, post is not only as a supplier, but also as a customer, firmly establish the concept that "internal customer is the same first", the needs of internal customers should be fully considered and concerned as external customer, in order to satisfy internal customer. Based on this recognition, each process and each link can be controlled in customer-focused aspect, and it also provides a theoretical basis for the organization to conduct quality control in customer-focused aspect.

3 Quality Control of the Process Based on Internal Customer Satisfiof

Modern enterprises conduct quality management, whether apply overall theory of quality management, or establish and organize the system of quality management, an ultimate goal is to satisfy customer. So, if it want to satisfy internal customer in the process quality control, staff should obedience to the idea of internal customer anywhere and anytime which is "the next process is customer", and remember the purpose of "Take the customer as central point" or "Customers First" no matter which position they stay and which procedure they do, and what work they are engaged in, then try their best to conduct their own work and task.

3.1 Quality control in procurement process

Substance (contains equipment, material, fittings, cooperation parts etc.) acquisition process, is the basic process of production and operation of enterprise, the internal customer contain all organizations or staffs work in the procedure of using, management and repair of equipment, and the production of product, the diary work of all departments. If the process control is not right, it will effect directly the management of enterprise, or emerge bad effect to the production and operation and internal customer. For example, using the unqualified equipment, material, component etc, can leave behind permanent hidden danger to the process after and the inherent characteristic of product.

In order to consider the effect of acquisition and the satisfaction of internal customer, completely eradicate unqualified products, the procurement department must be strictly pay attention to procurement procedures in the acquisition process:

First, many substances respond to the need of enterprise, classified according to their quality of processes and the effect of products, are focused managed divided generally into three categories: Class A may bring the direct and significant effect to the process and the quality of products in the use of the process of production and operation; Class B may bring the indirect or more important to the process and the quality of products in the use of the process of production and operation; Class C is general for auxiliary parts and bring general or slight effect to the follow-up process and product quality.

Second, suppliers should be respectively inspected and evaluated according to the classification. For the evaluation of Class A material supplier, it should be on the spot inspected in the operation condition of the system of the quality management, supply situation, the ability of the processing and corrective the quality abnormal of the supply, the ability of delivery on time and quantity, the cost performance of products, the technological development ability and the capacity of providing technical service and its effect, the after-sales service capacity (including service attitude, timeliness and effect), etc. At the same time, also through consulting the material suppliers provide, investigate and know from the supplier's other customers, and compare to the other provided material sample and the trial situation, evaluate the analysis results on a regular of the quality. The evaluation of the Class B and C suppliers don't need investigation on-the-pot, generally through consulting the materials suppliers provide, test and trial the material sample, statistics the results of the regular analysis of the provided material quality, in order to achieve the purpose of control of suppliers. The evaluation of Class B supplier, put forward

by the procurement department Class B supplier evaluation list and related material, or previous Class B material inspection, usage, service, price, etc, send technology, manufacturing, quality, financial and other related department to sign (review) for approval, report to top managers for record; the evaluation of the competence of Class C supplier, put forward by the procurement department Class C supplier evaluation list, send quality, financial (logistics if it is necessary) department to sign for approval, implement after signing by procurement department manager.

Third, choose and determine the qualified supplier. The selection and determination of the purchasing supplier, depends on the results of the above all suppliers quality assurance ability evaluation, and the satisfaction of internal customer, the price, the prestige and other factors. But the satisfaction of internal customer is the focused factors of the selection and determination of the qualified supplier. If the internal customer satisfaction and the supplier quality assurance ability is basic quite, should select more appropriate suppliers in the same material to compare, and finally to adjust, determine supplier (the optimizing of supplier).

3.2 Quality control in production process

A production process is not only an internal customer of the last process, but also a supplier of the next process. This process is mainly controlled in the people, equipment, materials, method, environment and measuring six elements. The above has discussed generally the control of "Material", here no longer give unnecessary details.

3.2.1 Human control in production process

In order to meet the requirements of the process on the people, ensure the production and the quality, the following are necessary in the human management: for manager, it should have certain requirements in the individual qualifications, experience, technology, capacity and the knowledge of quality management, consciousness; for operator, it mainly has specific provision in the operating skills, quality consciousness, etc; the staff engaged in special trades and key process must be certified. At the same time, it must be considered comprehensively in the physical disability, mental activities, error behavior, violate discipline and other aspects, and be careful in selection of staff.

3.2.2 The control of using equipment maintenance in production process

The control of equipment is mainly in two aspects of maintenance and repair.

Based on the idea that the next shift is customer or personal on duty is the customer in another work day, the control of equipment maintenance should be finished in three "should" and six "without" on duty. Three "should" are: the trough should be cleaned; the axis should be oiled and the equipment should be kept its true qualities. Six "without" are: without wiping the equipment won't we leave; without clearing up the work piece won't we leave; without keeping the tools in order won't we leave; without filling in the Shift Book won't we leave; without shutting off the Power Supply won't we leave; without cleaning up the floor won't we leave.

3.2.3 The control of method in production process

The control of method is the control of mainly technical solutions, process flow, process parameters and operating rules, detection means and other technical documents, and is the control of conformity, suitability, adequacy of these documents. In order to ensure the conformity, suitability and adequacy of these documents, the research personnel of enterprise should have a full understanding of internal customer quality, production process, quality, equipment, materials, environmental requirements, design intent and other afferent information before developing documentation. After formulating the documents, review as the procedure and perform as the approval. After distributing documents to related manufacturing procedure, timely trace the conformity, suitability, adequacy of document and satisfaction of internal customer in the process after using. If the document doesn't match the actual situation found in the production process, it should be modified in accordance with the regulated program.

3.2.4 The environmental monitoring in production process

Environmental factors in production process have a significant and direct effect on the product quality. Therefore, in production process, it is necessary to continue to improve and maintain the production environment and operating environment. Based on the satisfaction of internal customer, when in off work or discontinued, downtime, clean production environment and operating environment, and create a well environment to start for others next of yourself. Generally to do a flat (flat ground), two net (net of glass of doors and windows, net of floors and walls) or three clean (ground is clean, glass of doors and windows are clean, equipment is clean).

3.2.5 The production inspection and the control of nonconforming product in production process

In order to be responsible to the internal customers in the subsequent process, there must be strict implementations of "self-test", "cross-test", "special test" (three tests system) and other inspection

systems in production process. After the completion of the inspection, it should be the testing of completion. After the inspection, it can only be transferred to the next process (commonly known as “turn sequence”) for using. Otherwise, it can’t be transferred to “turn sequence”. To prevent the combination, misuse by internal customer in the subsequent process, defective goods should be placed in the designated area, be kept in strict isolation control and identity, no person shall change in the area of nonconforming product and remove the identification of nonconforming product. After maintenance or repairing of the nonconforming product, it must be rechecked and record, qualified and available to order. Otherwise, not “turn sequence”.

3.3 The quality control of working process in various departments of the enterprise

As mentioned above, in the same position, San Zhang and Si Li tomorrow respectively is San Zhang and Si Li today; work and activities between departments are often mutual input and output, and are reciprocal causation, and also are the each other’s internal customers. The control of department personnel work quality in process, mainly contains not something goes wrong, shuffle, transfer contradiction; “do today until tomorrow”, make every job reach “four satisfactions”: their own satisfaction, higher satisfaction, colleague satisfaction, department related satisfaction. To do this, the staff in addition to being educated in the sense of quality about internal customer satisfaction, “quality in my hands”, still be required to do every concrete work in accordance with the idea of PDCA, namely all have plan, all have implemented and treated, everyone often have introspection, and not left problems and regrets to others, not left contradictory to other relevant departments.

4 Conclusions

The customer satisfaction-based process quality control mode is a brand new quality management mode. It will change the passive “I have to control” situation that was and even today existing in enterprise quality management, and will turn the concept of total control management, i.e. “total involvement, entire process, full range, multi-method control” into reality. There are many “activities” in an organization, and the recognition processes will involve no less than the “process” stated above. Several important processes are discussed in the thesis simply to open the subject for discussion.

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A Study on the Evolution of Knowledge Management in Enterprise Production Process

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Abstract: This paper discusses the process of evolutionary stages about knowledge management in enterprise production, the influence of the two important factors market and technology on the enterprise knowledge management. In enterprise production, market and technology is the power for the development of the enterprise production. The essence of market and technical is to show the basic problem of what enterprise product and how enterprise to produce. The development and evolution of knowledge management is unfolded around the market and technology. The evolution of the knowledge management process through three stages that the product orientation, market orientation and knowledge orientation.

Key words: Knowledge management; Knowledge; Market; Technology; Enterprise production

1 Introduction

Enterprise is an independent economic organization, but this kind of independence does not mean that enterprise develops independently, the comprehensive effect of the social environment play an important role in the development of the enterprise. The development of the enterprise production has its inherent laws, which is the inevitable result of social development. In social life, people will produce some material needs along with the progress of civilization ,and then hope to have such a product to meet demand. So the enterprise produce products to meet the demand of people. First, the enterprise must be clear about that what products can satisfy people's needs; Second, the enterprise should consider that what method will be used to produce the product. These two problems, one is what to produce, one is how to produce, which is actually the two important aspects: market and technology that enterprise needs to face. The power for the development of the enterprise production comes from these two factors: market and technology. Therefore, in the process of production, the market and technology's problem is the basic problem. The development of knowledge management unfolded around these two problems.

2 The Evolution of The Knowledge Management Process

The evolution of the knowledge management in the enterprise production experienced a process from scratch. Of course, this does not mean that knowledge in enterprise production is also out of nowhere. In fact, knowledge is already exists in enterprises ,which starts from the enterprise as a economic entity, knowledge always affects the development of the enterprise^[1].What knowledge management do is just that: explore the knowledge that uncovered in the enterprise, change the influence of knowledge from concealment to obvious, the enterprise accept knowledge passively into enterprise seek knowledge initiativly, enterprise's knowledge can be used more effectively through the knowledge management^[2]. From the simple to the complex, from discovery to application, knowledge management gradually play a role in enterprise production. The evolution of the knowledge management can be divided into three stages. Each stage oriented a typical production as the goal. The first stage is the product oriented bud stage, the second stage is the market oriented development period, the third stage is the knowledge oriented mature stage. From figure 1, we can see three stages stepped up step by step, the prior stage is the foundation of the backward stage, the backward stage is deepening of development of the prior stage.

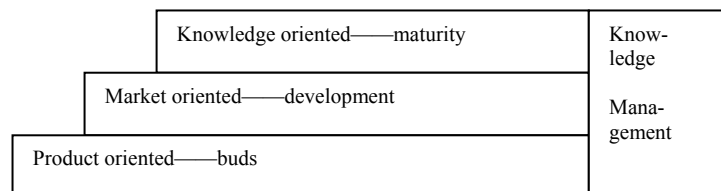


Figure 1 The evolution of Knowledge Management in the Enterprise Production

The above is the analysis of evolution phase of enterprise knowledge management in the production; the following will discuss the two important factors: market and technology of development of knowledge management.

3 Market Factors

Market is one of the important factors that influence the enterprise production. The enterprise production is inextricably linked with the market demand. Enterprises should make clear above all strategic positioning before the production. That is clearing what market demand the enterprise can meet, and what product the enterprise should provide to the market. Strategic positioning is the goal of the enterprise production.

Market demand pulls enterprise production, at the same time the enterprise management theory also become more and more perfect timely following the production practice. Such as automobile manufacturing, in the early 20th century, the way of the car production has characteristics that includes a single piece of small quantities, high cost, low productivity. High cost and low productivity, make the market's car price on a high level, and influence the further spread of the car. The requirements of the market for cars is cheap bulk, which requires the production of automotive must meet the low-cost high-efficiency. America's Ford invented the assembly line production, make the machine and the operating personnel arranged by the detailed planning of the sequence of operations. In the moving assembly line, the production of a car time is much shorter, the production cost reduced, the output also increased. Pipelined mode of production meet the demand of the market, and get a great deal of success, opened a modern production sequence Curtain. Pipeline, as a new mode of production, promote the development of enterprise management theory. After World War II, the market demand became more complex and demanding, in the market, with vehicle production increased, demand for cars is not only the number, the car's performance, quality, price, delivery time are all factors must be considered. Goal of enterprise competition in the market began to expand from the production to more areas. Toyota-time (JIT) production can providing customers with products in accordance with the needs of customers, in the time required. This mode of production soon helps Toyota to gain an advantage in the market. The market demand for cars has changed; the enterprise production will make corresponding reaction. Only follow closely the market changes, the enterprise will not washed out by the market. And the enterprise production change will bring the corresponding development of production theory.

Enterprise products' market behavior is in fact the sales activities. The traditional mode of enterprise production has effects on sales, this is the so-called product orientation, and namely production decides to sell. In knowledge management, market factors gradually get attention, sales is counterproductive to production, this is the so-called market orientation, is also called sales affect production. Use knowledge management in the enterprise production, reversed the traditional way, through reverse thinking, bold innovation, struck to the nature of the core problem. Production target, is product on the appearance, but the essence is making the production of products sold. In other words, the production goal is to be able to product the products that can be sold, rather than the production simply. Only the production taking market factors of production into account is closer to essential production.

4 Technical Factors

The technology is also an important factor to affect the production. Especially in knowledge management, the application of the technology indeed promote the development of knowledge management^[3]. When the enterprise clear strategic positioning, clear what products to product, then it is necessary to consider how to product. The enterprise need to consider use what forms of production organization and technical means to manufacture products, to achieve strategic objectives. Technology is the important factor to promote the development of production.

The production technology includes two aspects: Manufacturing technology and management technology. Manufacturing technology is the operation type, is the direct manufacture technical means of the product. Management technology is a concept model, is the arrangements of production organization forms. Manufacturing technology focus on improvement of operational microscopic level, management technology focus on the change of macroscopic level idea. The two technologies are all production need. For example, in the Ford's assembly line production, machines and personnel in arrangement in accordance with the sequence of operations. Production uninterrupted in line, which need two premise condition to ensure: the parts are standard and can be switched; Production line producted according to the time, TAKT time sequence can plan. The first condition requires manufacturing techniques to

support. When machine tools' machining accuracy has reached a certain level, can make machining parts in certain permissible error range, thus the exchange can be realized. The second condition requires the management technology to meet.

Work quota and standardization are part of Taylor's scientific management theory, that provides theoretical support for the Ford assembly line production. In support of manufacturing technology and management techniques, production lines become more and more perfect in practice. Manufacturing technology and management techniques jointly promote the development of the mode of production.

Influence of technology can be seen from the enterprise production changes direction. As shown in Figure 2, three thumbnail, A, B, C stand for each direction of the development of the production. Small box in the figure indicates the basic elements of production or strength. The combination of the small box says the development of the production.

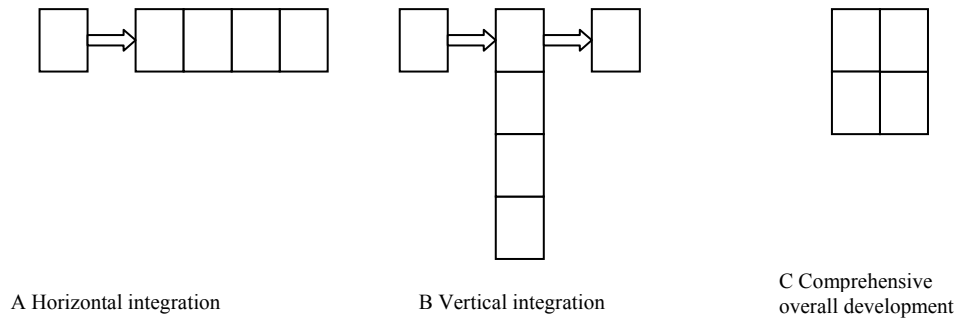


Figure 2 The Direction of Development of the Production

A figure shows the development of horizontal integration. Let a small square on behalf of the enterprise's basic elements, Let a small square on behalf of the enterprise's basic elements, the development of enterprise is the horizontal expand. Transverse integration said enterprise expand the existing similar resources, such as machinery, plant, personnel, etc. In the initial stage of a enterprise, its size restricts the production. Under the product guide, produce more products, the more income. Therefore, the enterprise larger, more machines, factory building, personnel, can have more yield, get more income. In the transverse integration development, small businesses develop into big business mean copying and increasing the small business's machines, factories and other resources, which is a kind of the fastest and easiest way to be effective and implement in production development initial period. Enterprise transverse integration's growth direction indicates that idea of the enterprise development is still in a traditional old framework, except a slight change of scale.

B figure shows the development of vertical integration, Small square shows that essential element of enterprise production is the longitudinal accumulated. That is to say, enterprise production extends to both suppliers and distributors directions, longitudinal extended enterprise production. Enterprise can not only pay attention to production, production should not only for production, only expand the look to two direction before and after the production, production can be more in line with the actual market. Vertical integration is the choice of market orientation. Vertical integration is the choice of market orientation. Only by the way of adding machine, expand production, cannot meet the enterprise's demand of market, and can't win competitive advantages in the market. If combine the production and supply together, the products will be more competitive. The development of the enterprise vertical integration shows that the enterprise began to break the traditional framework, change to close the nature of the market competition direction.

C figure shows the comprehensive overall development, Small Square on behalf of the enterprise strength, this small square together in order to produce force, promote enterprise development together. The comprehensive development is that whole enterprise mine internal and external resources fully, integrate resources and use of resources effectively. The resources including the knowledge resources. The integration of resources is to generate technical force, or is to use the power of technology to let the resources in the best cases when get used. This development process is the process of knowledge management. Enterprise's advantages of production scale, production number, the change of the amount have reached a certain threshold, difficult to have great change. So the changes of enterprises need a qualitative change so as to attain a higher level. The qualitative change's realizing should rely on technology. Whether manufacturing technology or management technology, the transformation in the enterprise is all innovation. Technology

plays a leading role in innovation. With the knowledge management, the enterprise production technology can produce force, promote enterprise production development.

From horizontal integration to vertical integration, and then to the development of comprehensive whole, this process is a typical enterprise development. When a small businesses trying to develop itself, they will general consider buying more machine equipment so as to increase production. The scale of the enterprise is expanding in a replication of similar resources transverse integration process. When the size of the enterprise are big enough, the enterprise will also hope takes supply and distribution process into the enterprise internal account, then the enterprise began the development of vertical integration. The enterprise mining internal and external resources, use technology to produce innovation then make the enterprise produce essential change^[4]. The essential change comes from the enterprise knowledge management.

The development of production, after transverse and longitudinal later, step on a knowledge management way depends on technology innovation. From the production process of development view, the role of technology in the production has two levels: passive and active. Passive refers to that is the objective environment let the technology play a role in production. When the enterprise have obtained development in the transverse and longitudinal aspects, and need to find a new direction, the enterprise will begin to pay close attention to the power of technology. In the enterprises' transverse and longitudinal development process, enterprise also has understanding for technology, but this understanding did not deep in comprehensive whole, the function of technology also is not obvious. Technology is pushed to the center of the stage of the enterprise in passive, the developing technology is gradually put effect actively to the enterprise. Knowledge management is the performance that the technology take the initiative to change enterprise.

It is a change that technology change enterprise passively to change enterprise actively Even in the enterprise's horizontal and vertical development, the enterprise also has active application technology behavior. However, after all, in the transverse and longitudinal development, enterprise's core development power is not the technology. Technologies truly become the core of enterprise development when in the comprehensive overall development stage. At this time, knowledge management gradually matures because the role of technology highlights.

5 Conclusion

The evolution of knowledge management in the enterprise production has experienced three stages of the product-oriented, market-oriented and knowledge-oriented. From a product-oriented infancy to market-oriented development stage, until the mature stage of the knowledge-driven, this three stage reflecting the expansion of knowledge in breadth and depth. From the enterprise internal to the enterprise external, from the current to the future, knowledge management respectively extension in space and time. The market is an important factor in the enterprise production, the market also has an important role in guiding the development of knowledge management. Market demand drive knowledge management to seek new solutions actively. Technology promotes the development of knowledge management and knowledge management promotes technology development, these two processes is a complementary process. Technology provides the basis for achieving some of the ideas of the knowledge management. Whether the evolutionary stages of the knowledge management, or the role of market and technology factors, shows the market and technology play an important influential role deep in the enterprise production process, market and technology also pointed out the development direction of knowledge management in enterprise production.

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Early-Warning Study of Heavy Deficit Based on Financial and Non-Financial Characteristics in Listed Companies of China

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Abstract: 42 heavy deficit companies and 42 non-deficit companies from listed companies in Shanghai & Shenzhen Stock Exchange of China are selected as samples for study, and non-financial variables such as corporation governance, etc. are introduced on the basis of the financial data. Then this paper use principal components analysis to find out the cause of companies loss, and binary *Logit* model is established to predict the probability of heavy deficit. The result reveals that five factors are of significance statistically to predict the probability of heavy deficit.

Key words: Heavy deficit; Financial indicators; Non-financial variables; Prediction

1 Introduction

The latest statistics from China Securities Regulatory Commission show that the number of domestic listed companies by 2012 is estimated to be 178 times the amount of 1991. And the total market capitalization of Shanghai & Shenzhen Stock Exchange of China reaches 23.04 trillion ranking second in the world. But in the face of market competition and challenges brought about by the expansion of securities market, the performance of listed company operating in China is not optimistic. The most prominent problem is the range and amount of deficit has increased year by year, and many companies even have huge deficit, which would make company run into trouble and erode benefit of investors and other stakeholders in different degree, and even waste social resource and affect the development of securities markets. According to research, the company's financial crisis or heavy deficit is not formed overnight, but during a long process of incubation, development and eruption. Therefore it's useful to establish early-warning model monitoring its financial condition on the basis of analyzing financial and non-financial characteristics of listed companies in China for stakeholders and companies themselves.

Throughout the results of previous researches, it's found that the Euramerican researches mainly focus on insolvent, bankrupt and defaulted financial predicament, and their early-warning. The typical model are Z-Score (Altman, 1968)^[1] and upgraded ZETA (Altman and Hardeman, 1977)^[2], which updated the financial indicators for interest protection multiples, cash flow ratio, etc. and they are reference indexes for later researches. For example, Roberto and Nicolas (Roberto Mariano Garcia and Nicolas Emanuel Manti 2010)^[3] used some indicators including them for financial distress early-warning. Comparatively speaking, most of the scholars in China focus on characteristics of ST company, like principal component analysis (Yuan Kanglai, 2010)^[4] is constructed with financial indicators. In recent years, non-financial indicators are taken in for valid and precise estimates. Non-financial information (Wang Yanning, 2012)^[5] is introduced to forecast the financial potential risk from different perspectives. And some scholars begin to pay attention to problems of financial crisis caused by the listed company deficit, but the research needs to be further completed and developed. Based on the relatively former studies, this paper makes a special research on the field of deficit early-warning through summarizing its financial and non-financial characteristics to enrich the relative theories and provide some reasonable suggestions for practice.

2 Definition and Influential Factors of Heavy Deficit

Some researchers believe that deficit is a special state of company financial distress, as well as default of preferred stock dividend and other debts, insolvency and liquidation. And some scholars put forward three stages of company failure, which are financial crisis, financial imbalance and bankruptcy. The domestic research use exceeding a certain limit losses to define for heavy deficit or some indicators as definition standard. In this paper, return on net assets less than the first quartile (-17%) of deficit companies is used to define heavy deficit, which turns out a unified criterion of classification and offers possibility of distinguishing and contrast for different companies in different scale, industry or background.

In the actual case, it's found that many listed companies get a sudden and unexpected big loss, and even accumulated profits are not worth one big loss. That is mainly because the listed company itself has some problem, expect for restriction and influence of specific macro environment. There are 6 internal factors mainly affecting company deficit. First, corporate governance and ownership structure is not perfect, which distort the division of responsibility and allocation of right, and restrict business development. Second, seeking for scale economic and financial lever benefit blindly results in irrational and imbalance structure of capital and cash flow. Third, the company is not performing well due to low management level and administrators' lack of honesty and credit. Forth, the main business is weak for support profit levels because of pursuing short term or ancillary profit. Fifth, blind expansion and excessive investment in the process of diversification strategy increase managerial risk and cost. Sixth, there are so many bad debts that the problem of cash turnover appears on blindly seeking for sales, poor search and verification for customers' credit.

3 Research Hypothesis

3.1 Financial factor

The financial condition of enterprises mainly depends on the solvency, operating, profitability and development ability in modern management theory, so most domestic studies are using this multiple financial index system to analyze and judge of financial affairs state of a company. In general, the stronger a company's solvency ability is, the more secure. And operating reflects the level of the ability of corporate business management and asset profits, therefor the stronger the better. Profitability is important to ensure capital appreciation, so stronger profitability explains the investment and operating decisions more effectively. Development ability mainly considers the possibility of future company appreciation, but blind expansion and excessive investment would lead to other problems. So this paper presents the hypothesis that the solvency, operating, profitability and development ability have negative correlation to the probability of company heavy deficit considering its particularity.

3.2 Non-financial factor

Non-financial factors should also be considered in the research of company heavy deficit affecting factors and early-warning model in view of imperfection of external market and internal governance environment. First, corporate governance and equity structure are important factors for strategy development, decision-making, operation and management, which have a great relationship with whether or not directors' role of supervision can develop effectively. In this paper managerial shares ratio and floating shares ratio are chosen as indicators standing for corporate governance and equity structure respectively. Second, cost of equity agency measures whether every penny spends valuable and dividend payout can monitor if there is something wrong with the cash flow and modified profit. Third, as the credit assurance organizations have confronted with many problems in china, outward guarantee behavior of listed companies, in particular, related parties guarantee contains huge financial risk, and becomes the primary method of control shareholders encroaching on company property. Therefore the hypothesis is presented that managerial shares ratio, floating shares ratio and dividend payout have negative correlation to the probability of company heavy deficit, and cost of equity agency and outward guarantee ratio have positive correlation.

To sum up, in order to describe and forecast objectively and accurately, financial and non-financial indicators should be comprehensively considered on the study of listed companies, and an early-warning model is established using non-financial information and financial information in this paper.

4 Empirical Analysis

4.1 Data sources and sample selection

According to the definition of heavy deficit in the previous section, this paper selects 42 heavy deficit companies, the first quartile (-17%) of deficit companies, and non-deficit companies as the matched sample from listed companies in Shanghai & Shenzhen Stock Exchange for study. Two sample groups are in the same industry and have similar size of capital. Without no-matching and low-margin companies, there are 84 samples.

4.2 Indicators and variables selection

There are 14 financial indicators selected referring to indicators with significant effect in previous studies, and 5 non-financial variables selected. Detail information is in Table 1 as bellow.

Table 1 List of Financial Indicators and Non-Financial Variables

Financial Indicators			
Solvency	1	Current ratio(X_1)	= current assets/current liabilities
	2	Cash flow ratio(X_2)	= net operating cash flowing/current liabilities
	3	Debt ratio(X_3)	= total liabilities/total assets*100%
	4	Tangible debt ratio(X_4)	= total liabilities/(total equity- net intangible assets)
Operating	5	Accounts receivable turnover ratio(X_5)	= sales/accountant receivable
	6	Inventory turnover ratio(X_6)	= sales/inventory
	7	Total assets turnover ratio(X_7)	= sales/total assets
	8	Assets operating cash flow turnover ratio(X_8)	= net operating cash flowing/total assets
Profitability	9	Profit on total assets(X_9)	= profit before tax/total assets*100%
	10	Operating profit margin(X_{10})	= operating profits/operating revenue*100%
	11	Major business profit margin(X_{11})	= major business profit/prime operating revenue*100%
Development	12	Growth rate of net assets(X_{12})	= Y-o-Y change of net assets/net assets in last period*100%
	13	Growth rate of profit(X_{13})	= Y-o-Y change of total profit/total profit in last period*100%
	14	Growth rate of major business income(X_{14})	=Y-o-Y change of major business income/major business income in last period*100%
Non-financial Variables			
Governance	15	Managerial shares ratio(K_1)	=managerial shares/total shares
Equity	16	Floating shares ratio(K_2)	=floating shares without sales limit/total shares
Agency	17	Cost of equity agency(K_3)	=general and administrative expenses/total assets
Dividend	18	Dividend payout ratio(K_4)	=cash dividend per share/earning per share
Guarantee	19	Outward guarantee ratio(K_5)	=total amount of outward guarantee in last period/total assets in this period

4.3 Index screening and data processing

4.3.1 Mean value test method

In order to effectively distinguish between deficit and non-deficit companies, mean value t-test is used to analyze the data of financial indicators and non-financial variables. The data is divided into two groups. Group one is from deficit companies, recorded as 1, and the other one is from non-deficit companies which is recorded as 0. Null hypothesis is that there are significant differences between the two groups. When Sig. (2-tailed) is less than 0.05 in 95% confidence level, null hypothesis is accepted. There are 12 indexes passing the test by SPSS 19.0, including X_1 , X_2 , X_3 , X_8 , X_9 , X_{10} , X_{11} , X_{12} , X_{13} , X_{14} , K_4 and K_5 .

4.3.2 Principal components analysis

For improving multicollinearity, principal components analysis is used to find out common factors from the 12 standardized indexes, and the factor scores enter the binary *Logit* model as the independent variables. The following table is eigenvalue and contribution rate for each factor.

Table 2 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums id Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.857	23.807	23.807	2.857	23.807	23.807	1.887	15.723	15.723
2	1.641	13.673	37.479	1.641	13.673	37.479	1.811	15.094	30.816
3	1.492	12.431	49.910	1.492	12.431	49.910	1.476	12.304	43.120
4	1.111	9.261	59.171	1.111	9.261	59.171	1.126	9.380	52.500
5	1.036	8.634	67.805	1.036	8.634	67.805	1.121	9.340	61.840
6	.905	7.542	75.347	.905	7.542	75.347	1.044	8.697	70.536
7	.753	6.276	81.622	.753	6.276	81.622	1.028	8.568	79.104
8	.723	6.029	87.652	.723	6.029	87.652	1.026	8.548	87.652

From table 2, it's found that the cumulative contribution rate of the eight factors reaches 87.652%, and that means the eight factors contain so much information of original 87.652% that they can replace the original indexes. According to the rotated component matrix, which abbreviates with length of be confined to, six results are summarized. First, the absolute values of X₂ and X₈ are high in F₁ which is defined as the main factor of the listed company solvency ability and operation ability. Second F₂ is defined as the main factor of the listed company solvency ability including high absolute values of X₁ and X₃. Third, the absolute values of X₁₅, X₁₄ and X₁₃ are high in F₃, F₇ and F₈ which are defined as the main factor of the listed company development ability. Forth, F₄ is defined as the main factor of the listed company dividend payout including high absolute values of K₄. Fifth, the absolute value of X₉ is high in F₅ which is defined as the main factor of the listed company profitability ability. Sixth, F₆ is defined as the main factor of the listed company outward guarantee including high absolute values of K₅. So the above 8 factors reflect the the financial condition and operating status of heavy deficit listed company from different aspects.

After these factors economic significance clear, the linear expression of each factor on the original index is established on the basis of component score coefficient matrix and the factor scores of each sample are calculated by SPSS 19.0. They are FS1, FS2, FS3, FS4, FS5, FS6, FS7 and FS8, as the independent variables in early-warning model.

Table 3 Component Score Coefficient Matrix

	1	2	3	4	5	6	7	8
Current ratio(X ₁)	-.113	.564	.012	-.128	-.050	.020	-.121	.138
Cash flow ratio(X ₂)	.415	.163	-.130	-.078	-.043	-.076	-.014	.076
Debt ratio(X ₃)	.087	-.474	.009	-.114	-.006	-.049	-.028	.123
Assets operating cash flow turnover ratio(X ₈)	.581	-.185	-.114	-.023	-.003	.021	.021	-.033
Profit on total assets(X ₉)	-.047	-.008	-.166	-.111	.988	.113	-.065	.058
Operating profit margin(X ₁₀)	.192	-.168	.235	.171	.227	-.150	-.102	-.062
Major business profit margin(X ₁₁)	.103	.059	.375	.253	-.115	.196	.130	-.096
Growth rate of net assets(X ₁₂)	-.007	.025	-.011	.043	.039	.064	-.008	.965
Growth rate of profit(X ₁₃)	.011	-.065	-.048	-.077	-.075	-.013	.996	-.004
Growth rate of major business income(X ₁₄)	-.230	.042	.780	-.214	-.189	.080	-.055	.056
Dividend payout ratio(K ₄)	-.027	-.010	-.072	.857	-.070	-.039	-.076	.059
Outward guarantee ratio(K ₅)	-.016	.034	.095	-.020	.106	.989	-.014	.058

4.4 Model building and empirical results

4.4.1 Model building

Whether company has heavy deficit in 2012 is a categorical variable, so binary *Logit Regression* model can be used to identify the influence factors, which has some advantages compared with *Linear Regression* model. First, it does not require variables to meet the normal distribution. Second, more explanatory variables can be chosen to enhance the prediction accuracy of the model. The binary *Logit* model is used in this paper as followed.

$$P = \frac{e^{a + \sum_{i=1}^m x_i b_i}}{1 + e^{a + \sum_{i=1}^m x_i b_i}} \quad (1)$$

Above model in, *P* denotes the probability of heavy deficit depending on independent variable *X_i* (*i*=1, 2, ..., *m*). When heavy deficit is happened, *P* is one, otherwise is zero. And *a*, *b_i* (*i*=1, 2, ..., *m*) are on behalf of estimated parameters. Economic significance of this model is that the probability of heavy deficit can be measured by a set of descriptive variables and regarded as chance variable estimated.

4.4.2 Regression results and discussion

This paper uses SPSS 19.0 to estimate regression parameters of *Logit* model, with forward-conditional method eliminating variables. Through 24 iterations, the final statistical variables turn out FS1, FS3, FS5, FS7 and FS8 as followed.

Table 4 Variables in the Equation

	B	S.E.	Wals	Df	Sig.	Exp (B)	5.0% C.I. for EXP(B)	
							Lower	Upper
FS1	-2.132	1.160	3.379	1	.066	.119	.012	1.151
FS2	-2.235	1.447	2.387	1	.122	.107	.006	1.823
FS3	-2.484	1.373	3.273	1	.070	.083	.006	1.230
FS4	-4.582	3.199	2.051	1	.152	.010	.000	5.413
FS5	-2.732	1.296	4.446	1	.035	.065	.005	.825
FS7	-6.893	3.107	4.923	1	.027	.001	.000	.448
FS8	-11.573	5.852	3.911	1	.048	.000	.000	.902
Constant	-.416	1.230	.115	1	.735	.659		

Assessing fit. From table 5, it' found that -2log likelihood changes from 104.143 to 20.858 and Nagel kerke R² increases from 0.182 to 0.906, which means fit of the model is great, after 7 times of regression analysis.

Table 5 Model Summary

Step	-2log likelihood	Cox & Snell R Square	Nagel kerke R Square
1	104.143 ^a	.136	.182
2	88.073 ^b	.287	.382
3	80.106 ^b	.351	.468
4	65.087 ^b	.457	.610
5	51.476 ^c	.539	.718
6	37.855 ^d	.608	.810
7	20.858 ^e	.680	.906

The results show that FS5, FS7 and FS8 are significant in 95% confidence level, as well as FS1, FS3 in 90% confidence level. As mentioned before, FS1, FS3, FS5, FS7 and FS8 are scores of F₁, F₃, F₅, F₇ and F₈. F₁ is mainly composed of X₂ and X₈, which interprets solvency ability and operation ability. And F₅ is mainly composed of X₉ and defined as the main factor of the listed company profitability ability. F₃, F₇ and F₈ are mainly composed of X₁₅, X₁₄ and X₁₃, which interprets development ability. It's proved that these indictors significantly predict heavy deficit, and explanatory variables are all negative consistent with priori symbol. All the factors are based on the positive index extraction, which means the higher score, the lower probability of heavy deficit in the next year. FS2, FS4 and FS6 can't pass the test in 90% confidence level. So the early-warning model is established as followed.

$$P = \frac{e^{-0.416-2.132FS1-2.484FS3-2.732FS5-6.893FS7-11.573FS8}}{1 + e^{-0.416-2.132FS1-2.484FS3-2.732FS5-6.893FS7-11.573FS8}} \tag{1}$$

4.4.3 Predictive capability analysis

This study is based on 1:1 pairing, so prediction threshold values 0.5 taken into antecedent prediction model to inspect original data. If the P value is greater than 0.5, then determine heavy deficit of these samples, otherwise un-deficit. Table bellowed is the result.

Table 6 Classification Table

Observed		0 Un-deficit	1 Heavy deficit	Percentage Correct
Financial Status	0 Un-deficit(n=42)	40	2	95.2
	1 Heavy deficit(n=42)	4	38	90.5
Overall Percentage				92.9

It's showed there are only 2 un-deficit companies and 4 deficit companies determined inconsistent with the facts. And the overall percentage reaches 92.9%, which means predictive model is appropriate.

5 Conclusions

Through empirical research, there are three results. First, current ratio, cash flow ratio, debt ratio, assets operating cash flow turnover ratio, profit on total assets, operating profit margin, major business profit margin, growth rate of net assets, growth rate of profit, growth rate of major business income, dividend payout ratio and outward guarantee ratio have significant differences between heavy deficit and non-deficit companies. Second, the factors on behalf of solvency, operating, profitability and development ability have negative correlation to the probability of company heavy deficit. And they are mainly reflected in cash flow ratio, assets operating cash flow turnover ratio, profit on total assets, growth rate of major business income, growth rate of profit and growth rate of net assets. Therefore, constructing a reasonable capital structure to determine the optimal scale of assets, and developing the main business and controlling cost, at the same time accelerating the turnover of assets and improving cash management are all good methods to realize profit growth and avoid heavy deficit for listed companies.

As for the limitation and shortcomings of this paper, to a certain extent the conclusion of the paper would be affected by the cross-section data of 2012. Although the influence of non-financial variables are taken into account, the differences of the 3 indicators between heavy deficit and non-deficit companies are not obvious, and further research is not made to get to the bottom of the reason. In the future study it should be improved.

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Analysis of Internal Management of Chinese Banking Information System*

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Abstract: In order to make the analysis of information system in Chinese banks' internal management, confirmatory factor analysis (CFA) is used in this paper. By system design, model validation, data collection and certification result, the CFA can effectively conduct empirical research on information system in Chinese banks' internal management. For illustration, the collected copies are 90, and the effective rate of collection is 90%, which has satisfied the requirement that the questionnaire returns-ratio is not lower than 20% in the data investigation. The empirical results show that most factor loading values are relatively high, and are significant. Therefore, in the implementation process of Chinese banking information system internal management, the subject of internal control functions have been effectively implemented and achieved significant results. Furthermore, the role clarity needs to be further strengthened, and bank information systems functions should be clear to enhance the binding strength. Finally, test results of this study can provide realistic and theoretical references for deep implementation for information system internal management.

Key words: Information system; Internal management; Confirmatory factor analysis (CFA); PDCA circulation

1 Introduction

Informationization strategy is a fundamental strategy of Chinese banking industry. It is an effective means to promote the development of banking and is the nature demand of the development of modern commercial banks. Banking is one of the industries which have most effective application of information technology. The improvement of information technology has greatly changed the operation mode of modern commercial banks. Banking is a typical information management industry which provides a natural application space for the information technology^[1]. Banking operations informationization has become the dominant way of banking operations^[2].

In the two decades, Chinese banking industry achieved a great success in financial informationization establishment, which accelerated the transformation from traditional banks to modern banks and enhanced the international competitiveness of Chinese banks. At present, Chinese banking information technology has entered the stage of stable development. At this stage the banking industry generally has entire information system facilities and completes the upgrading of traditional business process by information technology. The function of information technology can be fulfilled steadily. Infrastructure investment has been no longer the focus of banking informationization establishment. Business process reengineering has become a top priority of the banking informationization development.

However, information technology operations have not only brought significant performances of banking operation, but also sped up the banking operation uncertainty^[3]. Particular in the steady development stage of the banking information system, this uncertainty greatly grows and involves every aspect of banking operation, which increased risks faced by banking operation. One hand, financial informationization changed the traditional working way of the banking industry to realize automation of business processes, electronic service delivery, management informationization and decision-making scientific. So, it can provide customers with fast and convenient services and greatly improve the banking business performance. On the other hand, the informationization development has made some degree of uncertainty to the banking business operation. Informationization establishment has led the banking technologic risk, and thus reduced the banking operation efficiency in appropriate time and space.

In recent years, operational risks caused by information technology show multiple features

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within Chinese banking internal system. Among them, computer crime is a typical risk form which has caused high concern of Chinese banking internal control administrations. Computer crime refers to unscrupulous stuff with the purpose of illegally obtaining money by using computer programs and loopholes in management work to embezzle, steal, swindle and divert the huge amount of money from banks, which is a criminal activity brings enormous economic losses to the state and the banking sector. The perpetrators take computer physical security, software security and data security weaknesses as the main targets, illegal landing, modifying data and stealing information to realize the criminal purposes^[4]. The common means of computer crime includes forging bankbook and watermark to defraud deposit, illegally logging on the computer system and modifying the account, stealing the depositor's information and breaking the depositor's code and grafting.

Therefore, the implementation of information system internal control has become an urgent demand of banking informationization establishment. The internal control is a basic function of banking. However, in the information technology environment, the goal and task of this management functions will gradually turn into the direction of information system control. Once Chinese banking energetically strengthens the information system internal management, it can deeply improve the operation efficiency of informationization. The design and analysis of information system internal management is the fundamental prerequisite of Chinese banking information system internal management.

2 Design of Banking Information System Internal Management

Banking information system internal management is a highly technical and complex issue. Along with the extensive use of computer in the financial industry, commercial banks internal control has undergone tremendous changes. Manual operation has turned into the combination of manual control and computer control, or full automatic manipulation all by computer. Chinese commercial banks information system internal management can be generally divided into three aspects of system control, application technical control and inspection & supervision control. System control is the key of computer risk control. It has been proved to be a very effective method to regulate and restrain the behavior of people on the basis of the system and control mechanism. System control includes the organization control, management control, system development control, operation control, equipment control, documents & data control and some other aspects. The goal of application technical control is to ensure the timeliness, accuracy and completeness of data processing, and to prevent all ultra vires through technical and administrative means. The major technical control methods are password control, access control and background monitoring. Monitoring computer risk is a scientific and effective risk control, restrain and supervision system in order to effectively achieve the business objectives, maintain asset security and ensure timely and accurate accounting information. Major contents of inspection & supervision control on information systems are audit and examination to system development process, monitoring the implementation during the computer application and inspection of special circumstances^[5].

This study closely connects with the basic requirements of Chinese information system internal management. It designs information system internal management measurement system on PDCA principles. PDCA is a cutting-edge management concept, which is a cyclic process of plan (Plan), do (Do), check (Check) and (Act). Plan means establishing necessary objects and processes according to the business requirements and organizational policies. Do means acting the plan. Check means testing and evaluating the internal control according to the objects and policies. Act means taking measurements to improve the business performance continuously.

Chinese banking information system internal management is divided into four elements: the internal control design, the implementation of internal control, internal control evaluation and internal control improvement. Internal control design refers to the detailed design of the internal control information system, which provides goals and direction for the implementation of the system. The implementation of internal control refers to strict implementation of designed information system internal management in order to give full play to the internal control system functions. Internal control evaluation refers to evaluating the efficiency and effectiveness of information system internal management implementation, to determine the effectiveness of internal control system. Internal control refers to improving the internal control system according to the evaluation results, so as to achieve the upgrading and improvement of the internal control system.

Table 1 Information System Internal Management System

Ingredient	Index	Index definition
Internal management design	General control X1	Control the whole life cycle of the banking information system
	Systematic control X2	Control banking entire information system
	Risk-based control X3	Internal management design is good to enhance the risk management efficiency
	Technology-based control X4	Internal management design is able to make full use of the function of information technology
Internal management execution	Mode of internal management execution X5	Banks can select the executive methods scientifically
	Supervision of internal management execution X6	The internal actions of the information system can be supervised reasonably
	Encouragement of internal management execution X7	There is a effective encouragement inside the information system
	Efficiency of internal management execution X8	Internal management execution significantly reduces operation risks
Internal management evaluation	Strategic adaptability evaluation X9	The implementation of information system internal management coincides with the banks' strategic object
	Environmental adaptability evaluation X10	The implementation of information system internal management coincides with the change of the banks' environment
	Duty clearnessX11	The duties of department and administration inside the information system are divided clearly
	Internal management timeliness X12	The loopholes of information system can be solved immediately by the relation department
Internal management improvement	Technological improvement X13	Optimize internal information system continually along with the promotion of information technology
	Environmental improvement X14	Optimize internal information system continually along with the promotion of environment
	Customer requirement improvement X15	Optimize internal information system continually along with the change of customer requirement
	Information feedback improvement X16	Optimize internal information system continually along with the information feedback

3 Model Validation

This study has divided Chinese banking information system internal management into a structural model with 4-element and 16-indicator. Therefore, it can make use of confirmatory factor analysis to verify the model convergence and to verify the significance of factor loadings, factor correlation coefficient and indicators variance, and the overall fit of the model. So the structural model can be tested reasonably and realistically.

Table 2 Factor Loading Parameter List

Factor	X1	X2	X3	X4	X5	X6	X7	X8
Factor loading	.36	.43	.38	.11	.41	.28	.14	.22
SE	.09	.10	.11	.08	.08	.09	.10	.07
T	4.0	4.3	3.7	1.4	5.1	3.1	1.4	3.1
Factor	X9	X10	X11	X12	X13	X14	X15	X16
Factor loading	.33	.26	.19	.34	.44	.33	.30	.31
SE	.07	.09	.13	.09	.11	.11	.08	.08
t	4.7	2.9	1.6	3.7	4.0	3.0	3.8	3.8

This study made use of 7-point Likert Scales on the 16 indexes for data collection. The sample units were from city branches of the state-owned joint-stock banks, provincial branches of joint-stock commercial banks and city banks. 100 questionnaires were sent out and 90 available questionnaires were returned. The recovery rate was 90% which met the requirement that survey response rate should be higher than 20%. In the returned questionnaires, the study selected 84 high quality samples and the ratio of the sample number to index was 7:1, which can meet the requirement of the exploratory factor

analysis and confirmatory factor analysis. Among these, 15 samples were from Industrial and Commercial Bank of China. 14 were from China Construction Bank. 10 were from Agricultural Bank of China. 12 were from Bank of China. 13 were from joint-stock commercial banks. 20 were from city banks. Therefore, these databases can represent the general character of Chinese banking system. The respondents were executive officers in the banking information technology sectors or internal control departments. Therefore, the results had high credibility. The investigation dated from April 29th, 2013, to May 28th, lasted 30 days.

Making use of confirmatory factor analysis, this study obtained factor loading parameter list which was shown in Table 2 through SPSS11.5 and LISREL8.7.

The covariance matrix was showed in Table 3.

Table 3 Covariance Matrix

	Internal management design	Internal management execution	Internal management evaluation	Internal management improvement
Internal management design	1.0			
Internal management execution	0.25	1.0		
Internal management evaluation	0.19	0.26	1.0	
Internal management improvement	0.29	0.21	0.26	1.0

Then the fit index was showed in Table 4.

Table 4 Fit Index

<i>Df</i>	<i>CHI-Square</i>	<i>RMSEA</i>	<i>NNFI</i>	<i>CFI</i>
36	57	0.065	0.982	0.914

4 Conclusion

Results of the fit index show that the fitting effects of the model are good. Therefore, it is reasonable of the model which is designed for the study. The model can effectively reflect micro mechanism of the banking information system internal management.

According to Table 2, most factor loading values are relatively high, and are significant. Therefore, in the implementation process of Chinese banking information system internal management, the subject of internal control functions have been effectively implemented and achieved significant results. Meanwhile, the factor loading values of index X4, X7 and X11 are low and lack of significance. Therefore, there are still some weak links in banking information system internal management for improvement and perfection. First, the information technology should be given full play in the process of information internal control system, so as to gradually increase the intensity of the information internal control. This is the highest state of information system internal management. Second, Chinese banking industry should further strengthen incentives for the implementation of internal control to ensure that internal control strategies can be effectively implemented. There existed a wealth of incentive experiences of information of the internal control system in developed countries commercial banks, which can be references for Chinese banking industry. Finally, in the process of information system internal management, the role clarity needs to be further strengthened, and each position and responsibilities of bank information systems functions should be clear to enhance the binding strength of the job functions.

Known from the factor covariance matrix, the correlation between the internal control elements is generally low in information systems, which explains lacking of effective support between elements, functional elements presenting isolated state. The ingredients have not formed effective performance mechanism. Thus, Chinese banking information system internal management has achieved initial progress, but many functions need further development and improvement. Test results of this study can provide realistic theoretical references for deep implementation for information system internal management.

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Research on Measurement of Network Bandwidth Based on Adaptive Packet Pair Algorithm

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Abstract: Packet Pair (PP) algorithm is the primary method for measurement of network bandwidth bottleneck. Due to the limitations of clock granularity, the traditional PP algorithm has connatural measure error; and the precision of measurement can not be guaranteed when the clock resolving is larger than the interval between detecting packets. This paper proposes a PP algorithm for adaptive network bandwidth environment. The algorithm can adjust the size of detecting packets dynamically according to practical bandwidth, and reduce the impact of clock resolution on the measurement accuracy. The experimental results show that Adaptive Packet Pair (APP) algorithm can achieve higher veracity and stability than traditional PP algorithm.

Key words: Bandwidth measurement; Packet pair algorithm; Clock resolution; Adaptive bandwidth

1 Introduction

Network bandwidth is an important resource of the network. It is very important to estimate the network bandwidth accurately for optimizing the network configuration, enhancing network performance, improving service quality. However, owing to the size, structure, load changing and other factors of the Internet network, it is not easy to measure the network bandwidth accurately. People need to practice their own algorithms to adapt to different network environments^[1-2]. For example, the number of hops from source end to destination end, link multi-channel, background traffic and congestion, the end system clock resolution and synchronization etc. have increased the complexity of the algorithm; people need to make their own algorithm's load to the network as small as possible in order to avoid the impact of communications volume to the application data communication caused by the measurement^[3-4].

Bandwidth measurement method^[5-7] of the current study is mainly divided into two categories: one is Variable Packet Size (VPS) measurement method, a single packet-based measurement model, the typical algorithms Pathchar, Clink and Pchar; and the other is generally optimistic about the method, the package measurement method, based on Packet Pair (PP) measurement model, the typical algorithms are Bprobe, Nettimer, Pathrate and so on. A single package measurement model measurement tool is used to measure the link bandwidth of a path segment link, the link bandwidth is measured, and the minimum bandwidth value of that link bandwidth is the bottleneck bandwidth. Single package measuring method can also measure the bottleneck bandwidth of the path, but if you are only interested in bottleneck bandwidth, using this method is not worth the candle, not only the measurement speed is slow, the measurement accuracy is low, but it will also consume large amounts of network resources^[5]. The package measurement methods has changed this situation, it measure the network bottleneck bandwidth than a single package measuring algorithm has a clear advantage. However, in the actual bandwidth of the measurement process, the measurement system clock resolution often affects the estimation accuracy of the results^[8]. This paper proposes an Adaptive Packet Pair (APP) algorithm, which can effectively reduce the impact of clock resolution on the measurement accuracy and stability through dynamically adjusting the probes on the size.

2 The Measuring Principle of Package Pair Model

Packet pair (PP) model was first used in network congestion control, later it was improved and developed by R. Carte, V. Paxson and C. Dovrolis and others, the PP model become the most effective model of measuring network path bottleneck bandwidth^[9-10].

The PP transmission model was shown in Figure 1. Send a probe packet back from the source peer to back length, along path $P = \{a_0, a_1, a_2 \dots a_{i-1}, a_i, \dots, a_n\}$ to the same destination end, the probe packet length is S , the path followed nodes are $a_0, a_1, a_2 \dots a_{i-1}, a_i \dots a_n$, the link from a_{i-1} to a_i is L_i .

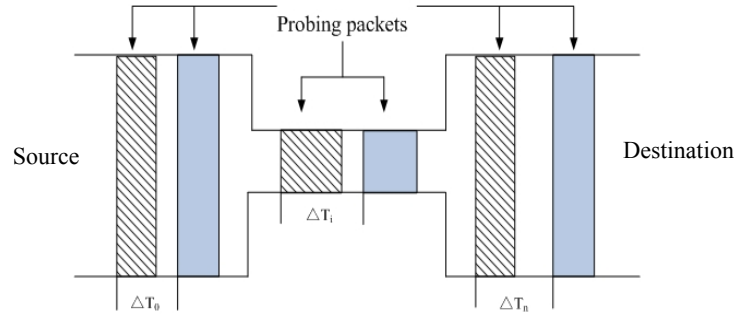


Figure 1 Packet Pair Transmission Model

If there is no other traffic on the link section, namely on the link two consecutive probe packets awaiting transmission, then the time interval after the two probes being transmitting on the link is:

$$\Delta T_i = S/B_i, \text{ Where } B_i \text{ is the link bandwidth of } L_i \quad (1)$$

Assuming the time interval through link L_{i-1} 's transmission is ΔT_{i-1} , and then the two probes time interval through transmission of link L_i is:

$$\Delta T_i = \max \{ \Delta T_{i-1}, S/B_i \} \quad (2)$$

Suppose the source sends the interval ΔT_0 is small enough, you can easily prove by induction that the time interval of the probe packet through the entire path is:

$$\Delta T_n = \max \{ \Delta T_0, S/B_{bn} \} = S/B_{bn}, \text{ Where } B_{bn} = \min \{ B_i, i=1, 2, \dots, n \} \quad (3)$$

So you can get the bottleneck bandwidth measuring expression based on the PP algorithms:

$$B_{bn} = S / \Delta T_n \quad (4)$$

This could measure the bottleneck bandwidth of the end to end path by sending back-to-back data packet pair with equal length.

3 The Impact of Clock Resolution

Clock resolution refers to the smallest unit of the clock change. The bandwidth estimation's (located at the destination) clock resolution is defined as R , assuming its true value of the package time interval is ΔT_n , the relation between estimating time interval $\Delta T_n'$ and ΔT_n as follows:

$$|\Delta T_n - \Delta T_n'| \leq R, \max(\Delta T_n - R, 0) \leq \Delta T_n' \leq \Delta T_n + R \quad (5)$$

The bandwidth estimation results got from $\Delta T_n'$ is:

$$B_{bn}' = S / \Delta T_n' \quad (6)$$

According to (5), (6), the bandwidth estimation error caused by R is:

$$B_{bn}' - B_{bn} = S / \Delta T_n' - S / \Delta T_n \quad (7)$$

The bandwidth estimation offset coefficient caused by the clock resolution R is defined as Ω ,

$$\Omega = (B_{bn}' - B_{bn}) / B_{bn} \quad (8)$$

$$\text{According to (7)、(8), } \Omega = \Delta T_n / \Delta T_n' - 1 \quad (9)$$

$$\text{According to (5)、(9), } \begin{cases} -\frac{R}{\Delta T_n + R} \leq \Omega & R \geq \Delta T_n \\ -\frac{R}{\Delta T_n + R} \leq \Omega \leq \frac{R}{\Delta T_n - R} & R < \Delta T_n \end{cases} \quad (10)$$

$$\text{So } \begin{cases} |\Omega| < \infty & R \geq \Delta T_n \\ |\Omega| \leq \frac{R}{\Delta T_n - R} & R < \Delta T_n \end{cases} \quad (11)$$

According to (11), when $R \geq \Delta T_n$, bandwidth measurement offset coefficient cannot be expected ; when $R < \Delta T_n$, the $|\Omega|$ within the range $[0, R/(\Delta T_n - R)]$, $R/(\Delta T_n - R)$ is the maximum deviation factor, denoted as Ω_{\max} .

For a given computer system, because R is constant, the maximum Offset coefficient bandwidth of different bandwidths' target path will be different^{[2][9][10]}. With the actual bandwidth of the target path B_{bn} increases, the maximum offset coefficient Ω_{\max} caused by clock resolution will increase. When B_{bn} increases to a certain extent, Ω_{\max} will rapidly increase, the algorithm estimation results have become unstable.

4 The Adaptive Packet Pair Algorithm for Measurement of Network Bandwidth

According to the above error analysis, in the PP algorithm, the offset coefficient Ω caused by bandwidth estimation's clock resolution only limited within a certain range in order to ensure the stability, effectiveness and accuracy of the algorithm.

According to (4) and (11), for the bandwidth estimation with a fixed clock resolution, offset coefficient Ω will depend on the actual bandwidth B_{bn} of the target path and the probe packet length S . In the case of large B_{bn} , properly increasing S can improve the accuracy of the measurement results, and the probe packets do not have a big disturbance to the path. To this end, we propose a packet measurement improved algorithm based on the bandwidth adaptive i.e. algorithm of packet pair (APP). For convenience, first define the reference bandwidth and the current maximum offset coefficient.

Reference Bandwidth: selected a bandwidth value as the basis for evaluation of the current offset coefficient by estimating the bandwidth historical data, saying that bandwidth as the reference bandwidth, expressed with B_{bn-ref} . The selection of the reference bandwidth influences the offset coefficient calculation, so the selected reference bandwidth should be able to better reflect the actual bandwidth B_{bn} .

Current maximum offset factor: according to the current probe packet length S , the reference bandwidth B_{bn-ref} and clock resolution R , the calculated maximum offset coefficient in (11) is called the current maximum offset coefficient, denoted as $\Omega_{max-cur}$, the offset coefficient caps denoted Ω_0 . Obviously, $\Omega_{max-cur} \leq \Omega_0$, according to (11) and the definition of $\Omega_{max-cur}$, there

$$R/(\Delta T_n - R) \leq \Omega_0 \tag{12}$$

$$\text{According to (4), } S \geq (1/\Omega_0 + 1) RB_{bn} \tag{13}$$

$$\text{Because } \Omega_0 \ll 1, \text{ so formula (14) is expressed as: } S \geq RB_{bn} / \Omega_0 \text{ approximately.} \tag{14}$$

In formula (14), for a determining measurement end system, clock resolution R is constant. Formula (14) shows that, for a given measurement result offset coefficient accuracy Ω_0 , the probe data packet length S of the measuring system should have a linear relationship with the capacity B_{bn} of network actual path, ie the length of the probe data packets to change adaptively with the path capacity's dynamically change, in order to improve the accuracy and stability of the measurement system. Therefore, the core of the bandwidth adaptive packet pair is dynamically adjusts the size of the probe packets S to satisfy formula (14).

5 The Algorithm Test

In order to investigate the influence of APP on improving clock resolution, this section will use the basic packet pair (PP) algorithm and bandwidth adaptive packet pair (APP) algorithm to estimate the two target paths' bandwidth. One is a bandwidth of 10Mbps; the other is a bandwidth of 100Mbps.

Firstly, we use the basic packet pair (PP) algorithm to estimate two paths bandwidth, and get two sequences. Using the policy based on the source end, the clock resolution of bandwidth estimation $R=1ns$, defining $\Omega_0=1\%$. In procedure, the measured data packet length is 500B (ie .4000b).

Through the previous formula $\Omega_{max} = R/(\Delta T_n - R)$, and $\Delta T_n = S/B_{bn}$, for the 10M links, $\Omega_{max} = 0.25\%$ is calculated, the result $\Omega_{max} < \Omega_0$ indicates that the offset coefficient estimated meets the requirement; for 100M link, we calculate $\Omega_{max} = 2.56\%$, the result $\Omega_{max} > \Omega_0$ indicates that the offset coefficient is too large, the result is not stable and accurate .

Table 1 The Obtained Bandwidth Estimation Sequence Table of PP Algorithm

Path type	Min(bps)	Mean(bps)	Max(bps)	Stddev(bps)
10M	7,732,165	9,055,060	9,876,543	304,835
100M	4,798,212	76,042,418	98,291,535	13,850,576

Table 2 The Comparison Table of two Algorithms' Bandwidth Estimation Sequence

Path algorithm	Min(bps)	Mean(bps)	Max(bps)	Stddev(bps)
100M PP	4,798,212	76,042,418	98,291,535	13,850,576
100M APP	38,1201,246	81,017,266	94,605,831	10,072,062

Table 1 shows the statistical results of two estimation sequence, the sequence length is 1000 (1000 times each test). the estimation sequence's accuracy of 10M Link can reach an average of 90.55%,the standard deviation of the sequence is 304,835bps,poor deviation is 2.144Mbps,which indicate the

sequence very stable; the estimation sequence's accuracy of 100M Link can only reach an average of 76.04% ,the standard deviation of the sequence is 1.385 bps, poor deviation is 93.50Mbps.

Then we use adaptive packet pair (APP) algorithm to optimize the 100M link bandwidth estimation. The policy based on the source end is still used, and selecting the average estimate bandwidth as reference bandwidth. According to formula (14), defining the adjustment formula of the measurement data packet's length:

$$S_0 = \frac{RB_{bn-ref}}{\Omega_0} \quad (15)$$

Adjusting S to an integer multiple of $(100 * 8) b$, the final adjustment formula S is:

$$S = \left[\left(\frac{1}{\Omega_0} RB_{bn-ref} + s' \right) / 800 \right] * 800 \quad (16)$$

S' is the packet length to obtain a certain degree of measurement accuracy margin additional, $[]$ indicates integer.

For the tested link 100 M, if the clock resolution $R=1ns$, requires $\Omega_0 \leq 1\%$, according to the formula (15) $S_0=10000b$, $s'=400b$, by the formula (16), in this case S is adjusted to 1300B, ie 10400b.

The Statistical results of Table 2 shows the optimized estimation sequence's average accuracy rose to 81.02%, while the standard deviation of the sequence reduced to 10.072Mbps, poor deviation reduced to 56.50Mbps. Through test comparison it can be seen that APP algorithm has more accuracy and more stability.

6 Conclusions

This paper analyzes the principle of the packet pair (PP) measurement model, and proposes a bandwidth adaptive packet pair (APP) measurement algorithm with improved measurement performance against the influence of clock resolution on measurement results. Based on the basic packet pair measurement algorithm, the algorithm meets the bandwidth measurement accuracy requirements according to the size of the tested path's bandwidth capacity dynamic adjustment probe packets. Bandwidth adaptive packet pair (APP) algorithm has more accuracy and more stability than the basic packet pair (PP) algorithm, but further exploration in reducing the impact of background traffic is still needed.

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A Programming Model of Air Routing Problems with Hard Time Window

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Abstract: Regarding the air routing problems of logistics express delivery industry, we considered increasing cost so as to completely meet the delivery time requirement, a programming model of air routing problems with hard time window, which was solved by parallel genetic algorithm, was presented. Meanwhile, the soft time window model was constructed to compare with the result of the hard window's, by building and applying satisfaction function. Numerical contrast analysis showed that the hard time window is of high cost as well as a greater satisfaction degree. This planning is more suitable for the character and requirement of the mid-market logistics.

Key words: Hard time window; Soft time window; Vehicle routing problem; Desirability function, Mid-market logistics; Parallel genetic algorithm

1 Introduction

Vehicle Routing Problem (VRP) is widely used in the area of transportation, logistics distribution, etc., to solve the combinatorial optimization problem. This kind of problem can be described as follow: a vehicle departures from one or more sites, visits the customer and completes the corresponding handling requirement. The goal is to get the feasible distribution path to minimize the total cost, which is also called the optimal objective function, by satisfying certain constraints. The optimal objective is always measured by the least number of vehicles, the total distribution distance and time. Vehicle Routing Problem with Time Window (VRPTW) is extended from the traditional VRP by adding a Time Window, which can be divided into hard Time Window (HTW) and soft Time Window (STW). Fabri and Recht^[1], David^[2] has made some detailed summary to the VRP, VRPTW and its deformation. Zhang Jian^[3] has studied the STW model, which can reach the minimal cost by taking more time. Ali^[4] has constructed a semi-soft time window, just constraining delivery time. Tas et al.^[5] has studied VRP with stochastic travel times including soft time windows and service costs. Tao & Liu^[6] has studied the STW, which has various kind of vehicles and expense. Chang-Ing^[7] has solved the optimal routing problem with multi-objective constrains, breaking through the limitation of judging solely on a cost. Vladimir^[8] and Miguel^[9] has given a narrative of the method to get the optimal routing of STW. However, it can be figured out that in area of VRPTW, most of the studies has concentrated on the STW, thus leading a lack of the research of HTW, multi-model problem and the advantage comparison between the soft and hard time window. Work on these topic include, Tsung-Sheng^[10] constructing a problem of stochastic dynamic of HTW. Li Jian^[11] has studied the HTW planning model with multi-vehicles, but his study is based on the rental car and didn't concern the fixed costs, while most of the air express using their own cargo airplanes. To address this situation, this paper make a goal of the minimal cost, to locate in midmarket, fully guarantee the effectiveness and constructive a VRPHTW model. Using the parallel genetic algorithm, we got the optimal routing. In the end, we considered the soft time window with the minimal cost and construct a satisfaction function to analysis.

2 Description of VRPTW Value-Added Chain and Mathematical Model

2.1 Problem description

Consider a route planning model consist of one logistic transfer station and N target cities. Suppose the i th customer has m_i transport volume and $m_i < Q_k$ (Q_k is the capacity of k th cargo aircraft), the logistic transfer station sent several cargo aircrafts to deliver goods to N customers. The plane must arrive within a certain time range $[e_i, l_i]$, that is to say, not earlier than e_i and not later than l_i . literature^[7] shows the transportation costs includes the leasing costs and the fuel cost related to transportation distance. Assume the logistic company we studied using its own cargo airplanes, so we didn't calculate the leasing cost but took the fixed cost of purchasing cargo. Except meeting the

arrival time requirements, this model also considered the aircraft capacity, constrains of various types of aircrafts and site constrains, and so on. This model aims to solve out the air line of least cost and full satisfaction of demand.

2.2 Basic assumptions

- (1)The flight of every cargo starts and ends at the same logistic station;
- (2)Every target city can only be served once by one cargo;
- (3)total demand of each route should not exceed the corresponding cargo aircraft’s capacity Q_k ;
- (4)Each air line will content a certain time window constrains;

2.3 Notations

- $G = (N, A)$ denotes an undirected complete graph;
 - 0 denotes the logistic transfer station;
 - $\{1, \dots, n\}$ denotes a cities set;
 - $K\{1, 2, \dots, m\}$ denotes a cargoes set;
 - d_{ij} denotes the Euclidean distance between city i and city j ;
 - t_{ij} denotes the flight time from city i to city j ;
 - c_{vk} denotes the travel costs per hour of the kth kind of cargo;
 - c_{kf} denotes the fixed cost of the kth cargo;
 - c_{ijk} denotes the transportation cost of kth cargo from city i to city j , $c_{ij} = c_v d_{ij}$;
 - m_i denotes the goods demand of city i ;
 - Q_k denotes the capacity of kth airplane;
 - l_0 denotes the lasted time the cargo back to the departure airport;
 - t_i denotes the time reaching at city i ;
 - l_i denotes the time when city i can accept the goods;
 - s_i denotes the integrated and discharge time in city i , $s_0 = 0$;
 - w_i denotes the waiting time in city i ;
 - q_{ijk} denotes cargo capacity of the kth cargo from city i to city j .
- $$y_k = \begin{cases} 1 & \text{choose the } kth \text{ cargo} \\ 0 & \text{not choose the } kth \text{ cargo} \end{cases} \text{ and } \sum y_i = 1$$
- $$x_{ijk} = \begin{cases} 1 & \text{(cargo } k \text{ fly from city } i \text{ to city } j) \\ 0 & \text{(cargo } k \text{ don't fly from city } i \text{ to city } j) \end{cases}$$

2.4 Model construction

Mathematical model:

$$C_h \min Z = \sum_{i=1}^n \sum_{k=1}^m C_f x_{i0k} + \sum_{i=0}^n \sum_{j=0}^n \sum_{k=1}^m C_{ij} y_{ijk}$$

$$\text{For } i = 0, \sum_{k=1}^K \sum_{j=1}^N x_{ijk} = K \tag{1}$$

$$\sum_{j=0, j \neq i}^n q_{ijk} - \sum_{j=0, j \neq i}^n q_{jik} = m_i, i \in N, k \in K \tag{2}$$

$$\sum_{j=1}^n x_{0jk} = 1; k \in K \tag{3}$$

$$\sum_{i=0, i \neq h}^n x_{ihk} - \sum_{j=0, j \neq h}^n x_{hjk} = 0, \quad h \in N, \quad k \in K \quad (4)$$

$$\sum_{i=1}^n x_{i0k} = 1; \quad k \in K \quad (5)$$

$$\sum_{j=1, j \neq i}^n \sum_{i=1}^n q_{ijk} y_k \leq (Q_k - m_i) x_{ijk}; \quad i \neq j, i, j \in N, k \in K. \quad (6)$$

$$\sum_{j \neq i, j=1}^n \sum_{i=1}^n q_{ijk} y_k \geq m_i x_{ijk}; \quad i \neq j, i, j \in N, k \in K. \quad (7)$$

$$t_{ij} = d_{ij}, \quad \forall i, j \in \{0, 1, \dots, N\}, \quad i \neq j \quad (8)$$

$$t_j = \sum_{k=1}^K \sum_{i=0, i \neq j}^N x_{ijk} (t_i + w_i + s_i + t_{ij}), \quad \forall j \in \{1, 2, \dots, N\} \quad (9)$$

$$e_i \leq t_i \leq l_i \quad (10)$$

$$D_k = \sum_{i=0}^n \sum_{j=0, j \neq i}^n x_{ijk} d_{ij}; \quad k \in K \quad (11)$$

$$\eta = \frac{\sum_{i=1}^n \sum_{j=1}^n m_i x_{ijk}}{\sum_{i=1}^n \sum_{j=1}^n q_i x_{ijk}} \quad (12)$$

The objective function mainly consisted of the fixed cost of cargo aircrafts and variable costs. The fixed cost related to the number of vehicle used. The variable cost related to the expense when completing a transport, concerns the vehicle distance and traffic on every sections .formula (1) is number constrains: the transit city i has only K cargos, all should be used. Formula (3)(4)(5)is the station constrains: each cargo should departure from the central city, provide distribution services to other cities and then come back to central city. Formula (6)(7) is the capacity constrains: in the line between city i and city j , the capacity of cargo k , which at least should meet the requirement of the served city j , is no more than its capacity constraints .Formula (9) means the time-consuming flying from city i to city j is represented by Euclidean distance between the two cities. Formula (9) express the time t_j when reaching the city j equals to the sum of the time when departing the previous customer, which consisted of the arrival time and waiting ,unloading and integration time in this city, and the flight time between the two cities. Formula (10) is time constrains: all of the cities should be served and the first city can't be served before the earliest time provided and the last city should be served before the latest time provided. Formula (11) is the total route distance which must be returned when calculating. Formula (12) means the cargo aircraft utilization.

2.5 Model solution

Here the parallel genetic algorithm^[9] is used to solve the problem. After running parallel several generations, several individuals with high adaption will be selected out from the two stocks to tip the balance. This can overcome the disadvantage of the traditional genetic algorithm, which has a limitation in its function to break internal balance between different stocks, and promote all the stocks to evolutes towards a higher equilibrium to get the best individual.

Step 1: $gen = 0$, use natural number encoding and random initialization to generate stock A . Use construction method to generate stock B and input control parameters (crossover probability P_c , Mutation probability P_m scale of stocks A and B : POP_A, POP_B .largest number of running generations $Maxgen$ and complex parameter α);

Step 2: Calculate the fitness of stocks A and B ;

Step 3: If $gen \leq 10$ or $gen \leq Maxgen$, $gen \% 5 \neq 0$ (denotes the genetic variation generations is not a multiple of 5), go Step 4; if $gen \leq Maxgen$, $gen \% 5 = 0$ go Step 5; or stop calculation and output the optimal solution;

Step 4: Stocks A and B do genetic operation solely (fitness calculation, select, cross, variation);

Step 5: Select out the optimal individual (the solution) from stocks A and B , then put them respectively into stocks B and A , go step 4;

Step 6: $gen = gen + 1$.

3 Numerical Example

3.1 the programming result of the hard time window

Using the given data, it can be figured out if making the routing planning to all the cities simply, when considering the two cities has significant difference between the freight, the utilization of the cargo will be uneven. So it is necessary to set the cities with a big traffic, like Beijing, Wuhan, as the transfer station of a relative area, the goods of which will be assembled in its corresponding transfer station and go to other cities. Through literature^[5] we know the delivery to and from cycle is 16 hours. Take Beijing as an example, corresponding data are listed in Table 1 and Table 2:

Utilize the parallel genetics algorithm to solve the problem, Setting the parameters as: the scale of stock A is 50, so stock B is mainly used to break the stocks balance of A , so the scale of stock B is 20. Every 5 generations the two stocks will exchange its optimal chromosome with a number of 3. the running generation is 5000, cross and variation probability is 0.75 and 0.01. Utilize MATLAB to simulate 20 times and get the optimal solution 12 times with the minimal distribution cost of 64176 Yuan. The optimal total routing length is 64.5875 thousand kilometers, the planning result is showed in Table 3, the route graph is shown in Figure 1.

Table 1 Coordinate, Demand and Time Window of Beijing and Other Cities

	1	2	3	4	5	6	7
q_i	0	-1	0	4	5	5	4
s_i	0	6	11	4.5	5	7	9.5
$[e_i, l_i]$	[0,16]	[2,6]	[6,10]	[2,8]	[2,8]	[2,8]	[6,10]
X	28756	10297	10000	10000	10000	10000	10000
Y	32875	10000	10000	10000	10000	10000	10000

(Note: 1-Beijing, 2-Wuhan, 3-Shengzhen, 4-Wuxi, 5-Shanghai, 6-Hangzhou, 7-Quanzhou)

Table 2 Cargo Running Cost

types	Cost per hour			Pay-load(ton)
	4 hours per day	6 hours per day	8 hours per day	
B737	4.5	4	3.5	14
B757	7.5	7	6.5	28
A300	8.5	8	7.5	40

Table 3 Programming Result of Hard Time Window

Flight NO.	route	type	Cargo utilization	Running cost
1	1-3-7-1	A300	82.68%	24893
2	1-2-6-1	B737	69.86%	20051
3	1-5-4-1	B757	71.78%	19232

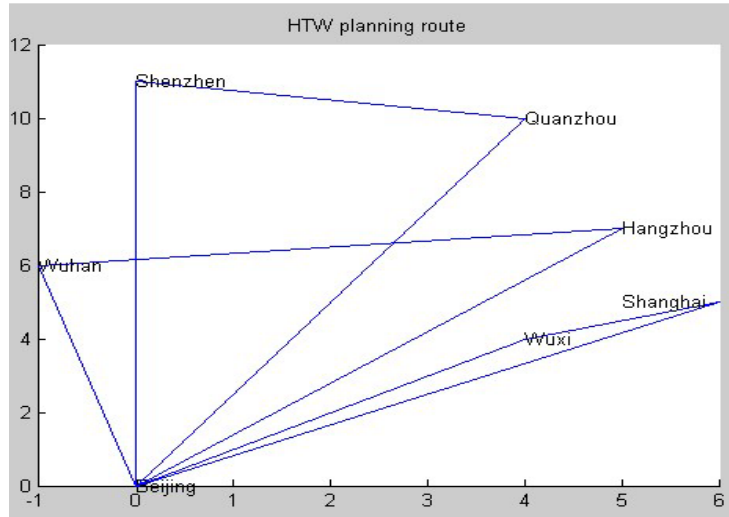


Figure 1 The Programming Routing Graph of Hard Time Window

3.2 Result comparison with the hard time window

Change the problem into the STW, with reaching a less cost while taking more time. Make change to the target function: add time penalty, then the target function change into:

$$\min Z = \sum_{i=1}^n \sum_{k=1}^m C_f x_{i0k} + \sum_{i=0}^n \sum_{j=0}^n \sum_{k=1}^m C_{ij} y_{ijk} + \sum_{i=0}^n \sum_{k=1}^m PT_{ik}$$

Change formula (4) and (5) into $T_{jk} = T_{ik} + T_{ijk} + s_{ij}$ $i, j \in N, k \in K$, while T_{ik} is the time when cargo k arrive at city i , T_{0k} is the departure time, T_{ijk} is the flight time of cargo k from city i to city j . Add constrains:

$$PT_{ik} = \max\{p^e (e^i - T_{ik}), 0, p^l (T_{ik} - l_i)\} \tag{13}$$

Formula (13) is the time penalty value because cargo k arrive at the city early or late, p_e, p_l is the penalty coefficient, which value are taken as possible. generally believed that arriving early is better than arriving late, so the early penalty is smaller than late penalty, that is to say, $p_e < p_l$.

Take Beijing as an example, the planning result is showed in Table 4:

Table 4 Programming Result of the Soft Time Window

Flight NO.	route	Running cost	The excess time or early time	Cargo utilization
1	1-5-4-1	20684	92min	88.68%
2	1-6-7-1	19762	43min	72.36%
3	1-2-3-1	22758	123min	75.28%

The total running cost of VRPSTW planning route is 63204 Yuan.

Since this paper aims to the mid-market logistic company, so the standard to measure the route should not be limited in the cost, the customer satisfaction caused by the timeliness is a more important aspect. Thus, the satisfaction function, which is constructed to both take the timeliness satisfying customers and cost satisfying the company into consideration, is estimated as: $F = \alpha\Gamma + (1 - \alpha)\Psi$.

While F is the satisfaction function, which is on the basis for a company's long-run strategy; Γ is the time measurement function, its formula is:

$$\Gamma = 1 - \frac{\max\{(e^i - T_{ik}), 0, (T_{ik} - l_i)\}}{\sum_{i=1}^n \sum_{k=1}^K \{(e^i - T_{ik}), 0, (T_{ik} - l_i)\}}$$

Obviously, to hard time window, $\Gamma = 1$; Ψ is the cost measurement function, with a formula as:

$\Psi_{s(h)} = 1 - \frac{C_{s(h)}}{C_s + C_h}$, while C_s is the total cost of STW planning. C_h is the HTW's.

Since this paper just discuss the mid-class logistic company, its market positioning determined the customer maintain a high requirement to the timeliness and incentive to the price. Thus we take $\alpha = 0.7$. The calculation result can be found in Table 5:

Table 5 Comparison of the Satisfaction

	Hard time window	Soft time window
F	0.756	0.548

We can infer that: though the soft time window planning model can reduce the cost of logistic companies, however, in terms of mid-market logistic company, using the hard time window to plan the route can guarantee the goods being sent on time, thus the better satisfaction can be got.

4 Conclusion

This paper studied the problem of air route planning, constructed a optimization model of the HTW under the strict assurance of timeliness, to plan the route between the setting logistic transfer station. The overall satisfaction degree function, which aims to the mid-market logistic company, has been constructed to compare the HTW and STW. The result shows the HTW will get a larger satisfaction function than the soft one. However, this study was limited to the self-purchasing cargo and didn't take the 'bulk air' into consideration. If we take this into consideration, then the departure time of the goods is not a fixed cycle and the question will become more complex. The further discussion will be done in the future research.

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Research on the Principle of the Risk Conduction Intensity in the Enterprise Financial System

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Abstract: This paper describes the principle of the risk conduction intensity in the enterprise financial management system, which includes Weak coupling (the recession risk conduction principle), pure coupling (the stable risk conduction principle), and Strong coupling (the growing risk conduction principle). And this paper reveals connotation and characteristics of these three principles, and has a guiding significance for enterprises that use the modern financial management theories and methods to predict and control risks of enterprise financial management system and its conduction in the dimension of strength.

Key words: Risks conduction; Enterprise financial management system; Weak coupling; Pure coupling; Strong coupling

1 Introduction

Risks, in the enterprise financial management system, start from the source of risk and conduct between link nodes via Conduction carrier and Conduction path. Since each link node has its certain external environment and internal environment factors to influence financial risk source, the risk of export of Enterprise financial management system will change its strength, after the risk of external import and the risk at this link node meet. And we call this change the risk intensity of Enterprise financial management system. From the view of Mutual coupling of risk flows, it can be divided into Weak coupling, pure coupling and Strong coupling .and from the view of the influences made by the risk flows; it can be divided into the recession type of Risk, the stable type of Risk and the growing type of Risk. And this Two kinds of classifications have some Internal relations, which shown as follows Figure 1.

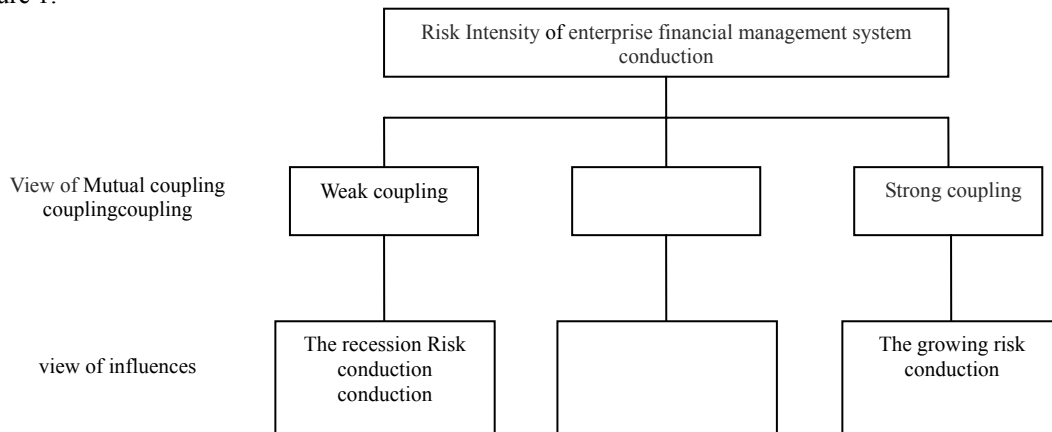


Figure 1 The Intensity of Enterprise Financial System Risk Conduction

2 Weak Coupling – the Recession Risk Conduction Principle

In the process of enterprise financial management system risk conduction, if two different risk flow—the link node A and B coupled during delivery process, and the total flow of risk becomes smaller after coupling ,In other words, the total flow subsides by the process of coupling, and achieve “1 + 1 < 2”. And this kind of coupling is “weak coupling”.

The formation of “weak coupling” of Enterprise financial management system risk flow is due to that two kinds of risk flows show a negative correlation and coupling degree between them is low, and The internal and external environmental factors of link node A and those of link node B block weaken each other in the process of risk conduction, making the overall risk flows decrease. In other words, in a certain period of time, with the time going on, corporate financial risk flow weakened gradually in

the process of conduction. This feature is called a recession risk conduction type, and it can also be called decrescendo type of risk conduction.

Recession type risk conduction has many kinds of patterns, such as linear, diminishing type, wave type, S type and so on, which is shown Figure 2.

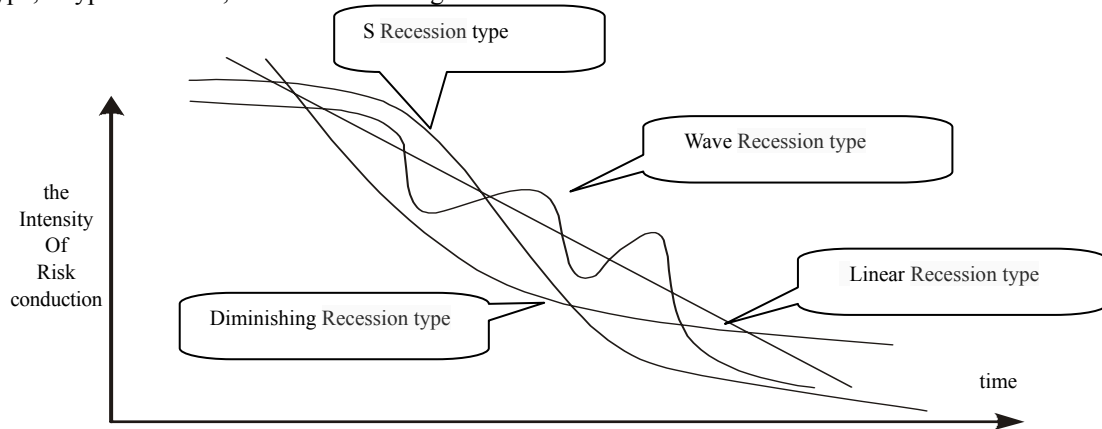


Figure 2 The Recession Risk Conduction Model

Recession risk conduction model, it is ferocious generally at the beginning, generally with a sudden, unpredictable and hard to guard against. And it is so harmful and has strong penetrating power at early period. But once its regularity is found out, strong measures can be taken to control it effectively. In 2008, for example, the outbreak of the subprime mortgage crisis in USA caused the economic volatility, led to business failures, unemployment of large number of workers, and panic and social unrest. And this spread to the world at the same time, some national economy was hit, almost to the brink of collapse, some countries Suffered from loss seriously. But with the passage of time, the national government attached great importance to the correct steps. For example the United States took out \$700 billion financial rescue, China took out 4 trillion yuan to stimulate domestic demand. All countries had strong measures to make the U.S. subprime the global financial crisis caused by mortgage crisis triggered eased. And the risk intensity was gradually weakened, and the world economic situation got better in the coming 4 to 5 years.

3 Pure Coupling – the Stable Risk Conduction Principle

In the process of enterprise financial management system risk conduction, if two different risk flow —the link node A and B coupled during delivery process, and the total flow of risk remains the same after coupling, In other words, the total flow doesn't change by the process of coupling, and achieve “1 + 1 =2”. And this kind of coupling is “pure coupling”.

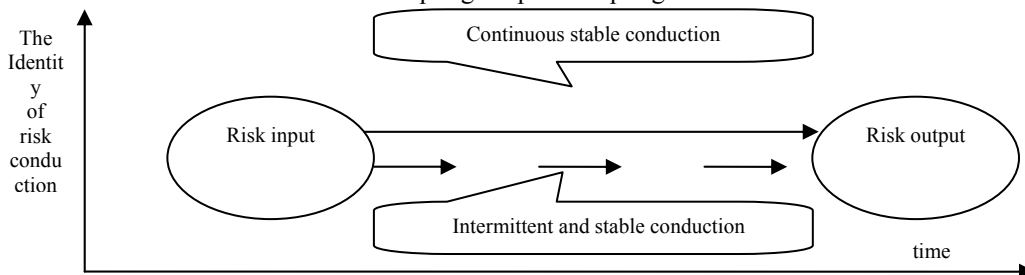


Figure 3 The Stable Risk Conduction Model

The formation of the “pure coupling” is due to that the two kinds of enterprise financial management system risk flows are not associated and risk flow coupling degree is almost zero at this point, The internal and external environmental factors of link node A and those of link node B are independent in the process of risk conduction, making the overall risk flows remain the same. In A certain period of time, the total risk flow presents a uniform and stable characteristics in the process of financial management system risk flows conduction. This feature is called stable risk conduction, and this stability can be described that risk conduction system is around a constant value within a certain

range of fluctuation, which means that the enterprise financial risk conduction amount is relatively stable, not absolutely stable.

The stable risk conduction includes continuous stable conduction and intermittent stable conduction, which is shown in Figure 3.

Risk stable conduction model generally has the Characteristics of balance, stability, controllability and basic. This is because the stable conduction generally refers to conduction of the risk with a small fluctuation. Interest rate risk and exchange rate risk is exactly this kind of risk conduction. Changes in interest rates and exchange rates are not big and will stay for a long period of time. Its impact can be estimated and predicted, and risk degree is controllable.

For example, according to the national macro policy and economic environment conditions, countries announced a 0.2% increase of Bank loan interest rates. This means that the enterprise financing cost is also increased by 0.2%. And the policy plays a some certain degree of influence in other related enterprise financial activities. Bank loan interest rate changes with relative stability, not at random, and thus the impact on corporate profits is also relative stable.

4 Strong Coupling – the Growing Risk Conduction

In the process of enterprise financial management system risk conduction, if two different risk flow—the link node A and B coupled during delivery process, and the total flow of risk becomes larger after coupling, In other words, the total flow is strengthened by the process of coupling, and achieve “1 + 1 > 2”. And this kind of coupling is “strong coupling”.

The formation of "strong coupling" of Enterprise financial management system risk flow is due to that two kinds of risk flows show a positive correlation and coupling degree between them is high. And the internal and external environmental factors of link node A and those of link node B block strengthen and contribute each other in the process of risk conduction, making the overall risk flows increase.

In other words, in a certain period of time, with the time going on, corporate financial risk flow is strengthened gradually in the process of conduction. This feature is called growing risk conduction or the mounting risk conduction. Enhanced risk conduction have many kinds of patterns, such as linear enhancement, one by one add type, wave type of enhancement, S enhancement and so on, which is shown in figure 4.

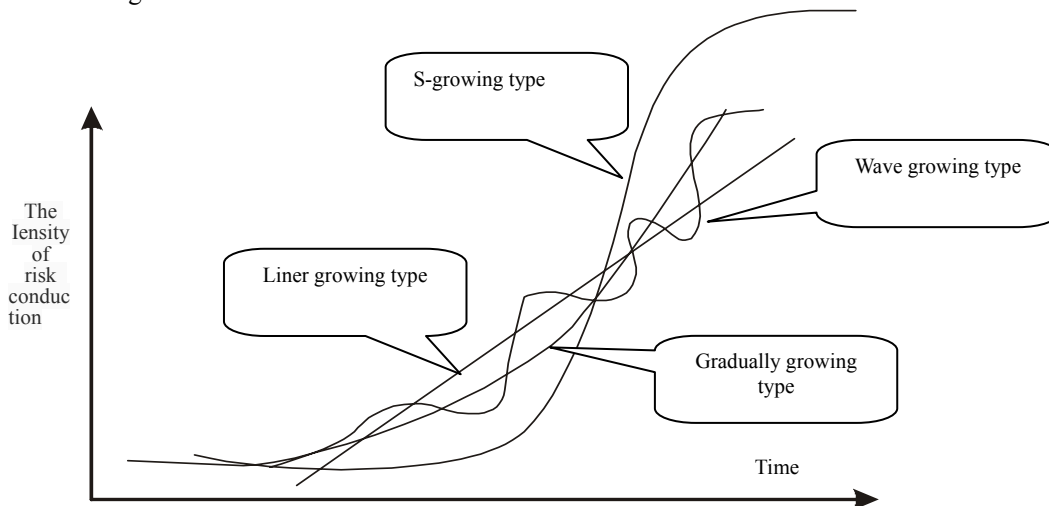


Figure 4 The Growing Risk Conduction Model

Enhanced risk conduction model, it doesn't even have the hazards in the early period of time. Then it develops very quickly at the middle time. And the later the period is, the more harmful and destructive the risk will be. And it has the characteristics of directionality, unbalance and gradually strong.

For example, the mid and late 1980s, in order to improve people's living standards, all walks of business generally increased wages by level 1 or level 2 or level. But it failed to improve labor productivity, which meant that the unit product cost was rising. To guarantee the profits, enterprises raised prices of their products. From the point of value chain, if the prices of every tons of iron is rising, metallurgical raw materials cost will rise, along with rising wages in the industry. If they fail to improve

productivity or not improve enough to reduce raw material costs and rising wage costs, to guarantee their profit, they will have to raise the price of per ton steel. Similarly, many manufacturing companies which use steel as raw materials will have to raise product prices. Finally, it will lead to the rise of prices of personal products, resulting in a decline in living standards. In order to solve this problem, pay rises will be raised. And if labor productivity cannot be improved greatly, it will form a vicious circle—people's living standards decline, causing the people's discontent and social instability. This kind of risk conduction passes along the value chain, and it is a kind of enhanced risk conduction.

5 Conclusions

(1)Enterprise financing system risk conduction intensity principle includes weak coupling type - recession risk conduction principle, the pure coupling - stable risk conduction principle and the strong coupling - growing risk conduction principle;

(2)The weak coupling—recession risk conduction principle means that corporate financial total risk flow becomes smaller and reach “ $1+1<2$ ”. It has the characteristic that, with the time going on, it is weakened gradually in the process of conduction.

(3)The pure coupling—the stable risk conduction principle means that corporate financial total risk flow keeps relatively stable and reaches “ $1+1=2$ ”. It has the characteristic that, with the time going on, it is relatively stable in the process of conduction.

(4)The strong coupling—growing risk conduction principle means that corporate financial total risk flow becomes bigger and reach “ $1+1>2$ ”. It has the characteristic that, with the time going on, it is strengthened gradually in the process of conduction.

The analysis and acquisition of the enterprise financial risk conduction system intensity principle is helpful for the enterprises in that they can use of modern financial management theory and methods to predict risks and control the risks in enterprise financial management system from the dimension of the intensity of enterprise financial management system risk conduction, so that they can realize the enterprise financial goals and improve economic efficiency of enterprises.

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Logistics Engineering Curriculum Based on Experiential Learning Environment: An Example*

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Abstract: This study aims at emphasizing the pedagogical methodology of Logistics Engineering, which is a branch of systems engineering dedicated to the scientific organization of the purchase, transport, storage, distribution, and warehousing of materials and finished goods. In today's environment, there is a critical need to improve acquisition program workforce training to reduce persistent problems in program outcomes related to technical performance, schedule and cost. Experiential learning is likely to be more effective if it gives students opportunities to practice what they are trying to learn applies not only to education for work. Software simulation, as a main element of instruction process, besides teaching and learning, must be conceived and realized as an effect of curricular approach of education and instruction. This way of thinking leads to a certain path in teaching methods, which will be highlighted in the Logistics Engineering curriculum.

Key words: Logistics Engineering; Experiential learning; Teaching methodology; Simulation

1 Introduction

The first rule of business is “know your customer”. However, most educational programs that teach functional area topics focus mainly on the technical knowledge for the particular function, not on cross-domain knowledge or on the knowledge needed to use multidisciplinary methods for knowledge elicitation and influence. This latter type of knowledge typically is gained by on-the-job experience and can take many years. In today's environment, there is a critical need to improve acquisition program workforce training to reduce persistent problems in program outcomes related to technical performance, schedule and cost.

Experiential learning models (e.g. Kolb, Rubin, & McIntyre, 1984) have been applied in academic settings to provide methods to better engrain key concepts in students. Kolb, Rubin, and McIntyre's model incorporates experience, reflection, and conceptualization to enhance learning. Similarly, action learning (Revans, 1980) and active learning (Lawson, 2006; Ross, 2011) focuses students' academic experience on learning by working on real organizational problems. Other models of learning (e.g. social learning theory and behavioral model training) have been used to improve student learning by other methods (Hess, 2007). In fact, there exists a significant debate and alternative theoretical views on the most effective process of learning (McEvoy, 1998); for example, Ramsey (2005) identifies three problematic assumptions within an experiential framework. Another learning process model, problem-based learning (Brownell & Jameson, 2004), has been advocated for helping students link theory to practice (Sherwood, 2004).

This paper is organized as follows. Section 2 reviews the objectives of Logistics Engineering from 6 aspects. Section 3 puts forward the view of education as preparation for active problem solving and participation in the world. Section 4 discusses the simulation model to be used in one chapter of this course. Finally, Section 5 concludes and provides avenues of future research.

2 Course Objectives

Logistics engineering is a branch of systems engineering dedicated to the scientific organization of the purchase, transport, storage, distribution, and warehousing of materials and finished goods. Logistics engineers work with complex mathematical models that consider elements such as mean time between failures (MTBF), mean time to failure (MTTF), mean time to repair (MTTR), failure mode and effects analysis (FMEA), statistical distributions, queuing theory, and a host of other considerations. Obviously, logistics engineering is a complex science that considers tradeoffs in component/system design, repair capability, training, spares inventory, demand history, storage and distribution points, transportation methods, etc., to ensure the “thing” is where it's needed, when it's needed, and operating the way it's

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needed all at an acceptable cost. Thus, students can understand these course objectives from 6 aspects, which are called 5W1H.

- Why (purpose & functions)

Study logistics from a systems engineering perspective. Covers design of systems for supportability and serviceability, the production and effective distribution of systems for customer use, and the sustaining maintenance and support of systems throughout their period of utilization.

- Where and When

Logistics provides an interesting application for these environments, as it is characterized by risk and disruptions, interactions with other parties (e.g., suppliers, transport providers, customers) and multiple performance metrics (e.g., cost, on-time delivery, penalties, profit). Thus, a number of efforts have addressed experiential learning for commercial logistics applications, with the intent to teach such concepts as inventory management, meeting customer expectations, cost analysis and minimization, and emergent supply chain phenomena such as the bullwhip effect. Those theories and methods of this course are always widely practiced in a lot of sectors, including manufacturing and service industries.

- Who (employment opportunities)

After graduation students may work, for example, as a planner, developer, manager, consultant, trainer, supervisor, or entrepreneur. Possible job titles include logistics engineer, development engineer, purchasing engineer, inventory manager, supply chain coordinator, warehouse manager, logistics manager, transport manager

- What(knowledge & skills)

Upon completion of this course, students will be able to:

- (1) Define logistics and the elements of an engineering logistics system
- (2) Apply engineering tools to logistics system design
- (3) Use quantitative tools to analyze and evaluate logistic system performance
- (4) Examine logistics decisions involved in life cycle design
- (5) Evaluate a life cycle cost for an engineering system
- (6) Apply trade off analysis to logistic system analysis
- (7) Evaluate and apply forecast models to logistic systems.

- How(learning methodology)

One avenue to improve training involves use of educational technology, in particular role-based experiential learning. This paper explores the creation of such a learning environment in which a learner assumes the role of a logistician who must not only understand issues in his or her functional area, but also must interact with systems engineers to understand the implications of decisions in that functional area on logistics. This environment is based on the software of FLEXSIM, an existing prototype learning environment used for logistics engineering workforce development.

3 Teaching Methodology

The reasons need to change teaching methods can be summarized as:

- The lecturer was dissatisfied with the traditional lecture teaching because of: 1) the low number of students that pass the subject every year, 2) the high rate of absenteeism, which is progressively higher during the semester and 3) the high number of drop-outs (students who do not attend the exam).

- To be positioned more in accordance with the European Higher Education guidelines that suggest moving learning systems to more student-centered teaching methods.

- Student acquisition of high quality learning outcomes wherein specific and general skills are developed should be a challenge for a lecturer in Higher Education. This is difficult with the traditional lecture approach.

The theory that education is likely to be more effective if it gives students opportunities to practice what they are trying to learn applies not only to education for work. Mathematics, for example, is best learned by students constructing their own proofs and demonstrations. The common sense of learning by doing has been upheld by philosophers and more recently by cognitive scientists. This argument is linked to a view of education as preparation for active problem solving and participation in the world. Although learning by doing has most often been a feature of vocational and professional education, it is now argued that all knowledge, including the sciences and humanities, is created, defined, and transmitted by communities of practice (Linn et al., 2004).

These types of environments often use Kolb's concept of experiential learning, which consists of

four key elements through which a learner cycles in a continuous spiral of learning. The four elements are (i) exposure to a concrete experience, (ii) reflection on that experience, (iii) generalization of the experience and formation of abstract concepts based on the generalization, and (iv) application of these concepts to the concrete experience. In an experiential interactive learning environment, the concrete experience is replaced with a simulated world, and the learner interacts with it, causing the simulated world to change.

4 An Example

The chapter of Logistics Simulation is designed to give students the opportunity to practice using the skills and knowledge from Logistics. Simulation can be an extremely powerful tool and is becoming quite widespread, yet few in industry seem well trained in the design, implementation and interpretation of a useful simulation experiment.

Table 1 Operation Chart of a Gear Processing Line

Line				Shifts	Daily Capacity	Cycle Time	Batch	Production Rhythm	Operation Period	Yield								
Gear Processing				2	320	3min	1	3min	2H	40								
No.	Standard	Machine	Rate (%)	Labor	Job content	Operation Chart												Output
						10	20	30	40	50	60	70	80	90	100	110	120	
1	2	1	67	1	And Machine 5	[Bar chart showing 33% completion]												40
2	6	2	100	2	And Machine 3	[Bar chart showing 100% completion]												20
3	2.8	4	94	3		[Bar chart showing 94% completion]												20
4	4	5	33	1		[Bar chart showing 33% completion]												40
		6	100	4		[Bar chart showing 100% completion]												10
5	1.5	7	50	5	And Machine 9	[Bar chart showing 50% completion]												30
6	3	8	100	6		[Bar chart showing 100% completion]												40
7	1.5	9	50	5		[Bar chart showing 50% completion]												40
8	2.5	10	83	7	And Machine 11	[Bar chart showing 83% completion]												40
9	2.6	11	87	7		[Bar chart showing 87% completion]												40

Students are asked to draw the Figure 1, while the data is shown in table 1 at first.

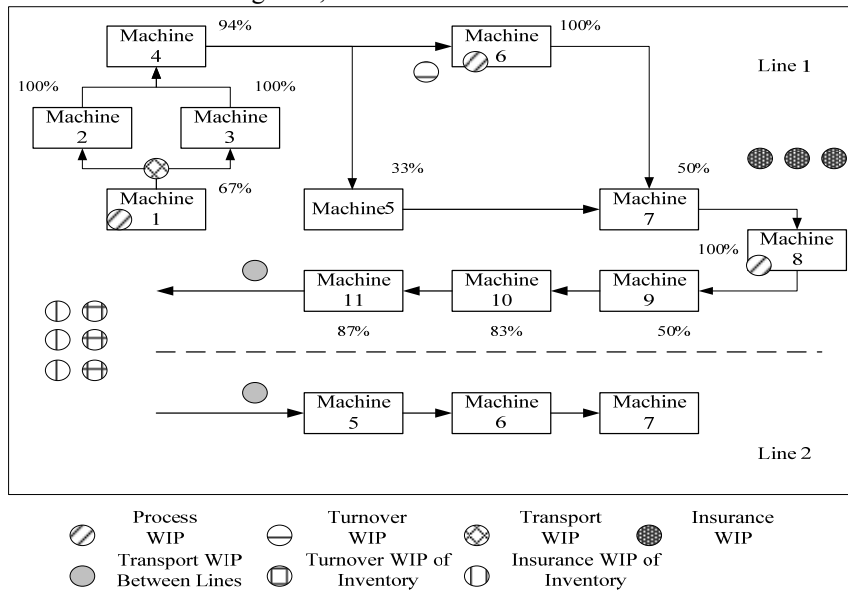


Figure 1 Location of Operators, Machines and All Kinds of WIP

The simulation model in figure 2 is an example on the software of FLEXSIM, which can show the various changes of WIP to students.

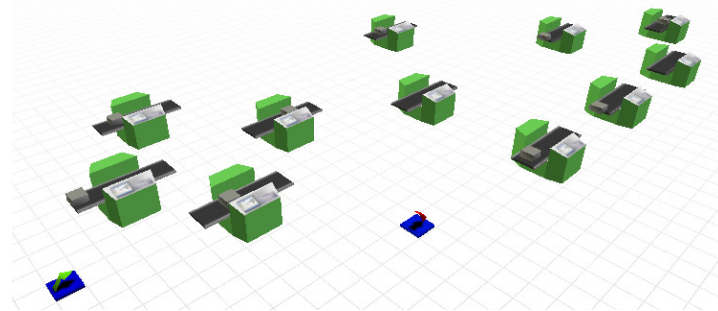


Figure 2 Simulation Model on FLEXSIM

5 Conclusions

The primary intention of this paper was to present a simulation model that facilitates manufacturing process experience. The overall goal is to meet the logistics challenges in sustaining today's complex manufacturing systems, many of which are expected to have higher productivity. Although facilitating experiences of students is important, it is not an adequate approach for designing meaningful problem-based learning environments. Future research consists of implementing, testing and evaluating the learning effectiveness of the logistics experience. In addition, there are plans to enhance the technology infrastructure – additional features, multi-learner capability and experience development tools.

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Analysis on Impact of China's Stock Index Futures on Stock Market Liquidity

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Abstract: This article uses exchanging volume, relative prices, and yield volatility of the daily trading data of the CSI 300 index as indicators to measure its liquidity and makes empirical analysis to analyze the impact of the introduction of stock index futures on the liquidity of spot market. Through study we found that the introduction of stock index futures market had a crowding-out effect on the spot market in the short term, thus reduced the liquidity of the spot market. But in the long term, the stock index futures attracted plenty of outside capital with its funds attracting effect, and the spot market showed a gradually increasing trend in liquidity.

Key words: Stock index futures; Stock market; Liquidity

1 Introduction

“The launch of the stock index futures in China is first to solve the liquidity problem.” said Leo Melamed, father of the global financial futures and lifelong honorary chairman of Chicago Mercantile Exchange. Based on conceptual and empirical analysis of the impact of CSI 300 index futures on the stock market, we arrived at the current liquidity situation of China's stock market. China Financial Futures Exchange officially launched the CSI 300 stock index futures contracts on April 16, 2010, according to its basic properties of the stock index futures, its launch undoubtedly have a huge impact on China's securities market^[1]. Therefore, it is an important issue to discuss whether the introduction of stock index futures is necessary to promote the development of China's stock market.

2 Theoretical Analysis of Stock Index Futures' Impact on Stock Market Liquidity

2.1 Theoretical model of impact of stock index futures on the liquidity of stock market

Subrahmanyam (1993) introduced liquidity variation of stock market through analyze the liquidity risk before and after the introduction of stock index futures, and his theoretical model is as follows:

Before the introduction of stock index futures, the liquidity risk faced:

$$Var(d\phi) = Var(d\varphi) \quad (1)$$

After the introduction of stock index futures, the liquidity risk faced:

$$Var(d\phi + d\varphi) = Var(d\phi) + Var(d\varphi) + 2cov(d\phi, d\varphi) \quad (2)$$

Equation (1) - Equation (2) draw out:

$$Var(d\phi + d\varphi) - Var(d\phi) = (\sigma_\varphi^2 + 2k\sigma_\phi\sigma_\varphi)d_t \quad (3)$$

If equation (3) is greater than 0, then $k > -\sigma_\varphi / 2\sigma_\phi$, that means after the introduction of stock index futures, the risk that liquidity providers faced is bigger than before, naturally require more risk premium, leading to the decrease of liquidity of stock market. Conversely, if (3) is less than 0, $k > -\sigma_\varphi / 2\sigma_\phi$ means the liquidity of stock market increased after the introduction of index futures.

Therefore, whether k is greater or less than $-\sigma_\varphi / 2\sigma_\phi$ is the standard to measure liquidity changes in stock market after the introduction of stock index futures.

2.2 Impact of stock index futures on the liquidity of stock market

This paper argues that the liquidity of the stock index futures on the stock market is mainly manifested in the crowding-out effect and the absorb effect of the transaction, so the impact of stock index futures on the liquidity of stock market due to the result of the combined effect of both.

2.2.1 Crowding-out effect

The crowding-out effect refers to the introduction of stock index futures will attract funds in the stock market, thereby reducing the liquidity of the spot market. Such situation appeared in Japan after they launched the stock index futures, the funds of stock market were attracted by the stock index futures market, therefore decreased the exchanging volume in the stock market and resulting in liquidity decrease.

2.2.2 Attracting effect

Although the introduction of stock index futures would lead to liquidity decrease in the spot market, it also has the effect to attract incremental funding of over-the-counter, which is known as the attracting effect. As to the current situation of China, the insurance funds and the security funds and other large institutional investors only put part of their funds into the stock market, the scale of outside funds can be very large, if the introduction of stock index futures attracted these incremental funds into the market, it will make large contribution to improve liquidity of the stock market and the stock index futures market.

2.2.3 Analysis of the combined effect to liquidity

In the short term, due to the low margin, low-cost, high financial leverage, etc. of the stock index futures, it attracted certain number of institutional investors and fund managers which use them as hedging and arbitrage tools, thus the stock index futures set a crowding-out effect in transaction on the spot market. In the short term, the introduction of stock index futures has an effect of diversion funds in the stock market and leading to liquidity decline in the stock market. While in the long term, stock index futures owns the function of risk aversion, investors' willingness to put money in the stock market will increase in familiar risk situation, and the stock market can attract more incremental funds which can drive the market more prosperous. So, in the long term, there exists some complementary effect between stock index futures and stock market to some degree.

Through the above analysis, this paper argues that the stock index future has a declining effect prior to ascending effect to the liquidity of the stock market.

3 Empirical Analysis of Stock Index Futures' Impact on Stock Market Liquidity

3.1 Definition of stock market liquidity

Liquidity is a concept that hard to be distinguished, it almost related to all the factors in market operation. Keynes was the first to summarize the liquidity of an asset. He thinks that the liquidity of an asset means it can easily realized without any loss in the short term. It can be viewed from two perspectives: First, the realization ability of assets, which is the risk about the ultimate value; second, market absorption capacity, that means realize without losses. Therefore, liquidity means the ability of investors to trade quickly at a reasonable price which based on market supply and demand conditions. In the financial sector, a generally accepted definition of market liquidity is: investors can buy or sell large amount of stocks in their needs with very low transaction cost and causes little effect to the price, that means the market is with liquidity^[2].

3.2 Indicators selected in liquidity measure

From the existing literature, the methods of liquidity measure still lack standard to unify. Different starting point of research and different market microstructure lead to different liquidity indicators of measure.

By comparing the equilibrium of continuous auction and sequential auction, Kyle described characteristics of market liquidity systematically under the market-maker system, he thinks that liquidity mainly consists of the following:

Depth (depth), means absorbed exchanging volume which does not affect the current price condition, it can also refer to the number of delegations entrusted to a single market maker in a certain period of time. Better liquidity means that investors can buy or sell large amount of stocks in the current price. The more quantity of the orders, the more depth of the market, conversely, the market lacks depth.

Tightness (tightness), also known as the breadth, refers to the magnitude which the market price deviate from the equilibrium price, namely time cost required when reaching an exchange under certain conditions. The most widely used method to measure the tightness is the bid-ask spread. In the continuous auction equilibrium, the market is infinitely tight, trading a certain amount of stock is very fast, almost no cost^[3]. While in the sequential auction equilibrium, the auction is not continuous, and the market is not infinite tight, therefore, the transaction cost is an increasing function of the transaction time.

Resiliency (Resiliency), refers to the loss rate of price fluctuations which caused by the transaction, or the adjust rate of order imbalance, namely the convergence speed of price to the real price of the asset. The more flexible the market is, the faster the prices returned after deviate from the value. Academia do not have a unified metric about the market resiliency, one of the methods is to measure the difference between the current best seller and the next best seller, the smaller the spread of the two orders, the shorter the time required to return, and thus lead to more market flexibility.

3.3 Empirical analysis of impact of the CSI 300 index futures on the A-share market liquidity

The indicators selected in measuring market liquidity above are too singular. This article chooses

three indicators: the exchanging volume, the relative price spread, and the yield volatility to measure the depth, tightness, resiliency of liquidity respectively to avoid biased study results and thus to obtain a more accurate result.

3.3.1 Exchanging volume:

Measure the volume or turnover of transactions in a certain price range.

$$V_q = \sum_{i=1}^n M_i^t \tag{4}$$

$$V_m = \sum_{i=1}^n M_i^t P_i^t \tag{5}$$

In these function, V_p stands for exchanging volume, V_m for turnover, M_i^t for the volume of ith transaction in period t, P_i^t for the price of ith transaction in period t

The sample selected in this article is the exchanging volume of the CSI 300 Index; the study period is from September 17, 2009 to November 16, 2010. September 17, 2009 to April 15, 2010 is the period before the launch of stock index futures; April 16, 2010 to November 16, 2010 is the period after. All data were from the Star site securities, and Djinn financial platform database. The figure below shows the changes of exchanging volume after the introduction CSI 300 stock index futures:

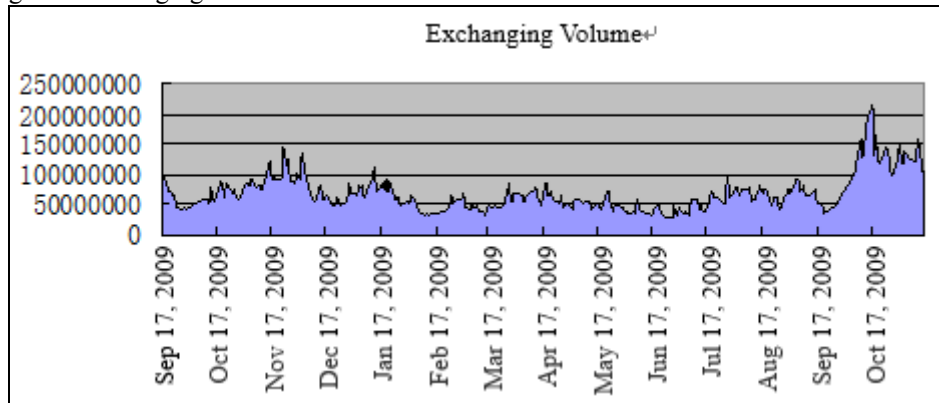


Figure 1 Exchanging Volume after the Introduction CSI 300 Stock Index Futures

Figure 1 shows that, before the launch of the CSI 300 stock index futures, the Shanghai and Shenzhen 300 stock market turnover is basically fluctuated between 3000000-1500000000, its volatility is relatively stable; after the launch of CSI 300 stock index futures, the exchanging volume decreased gradually from the launching day(April 16, 2010) to June 30, over time, after July 2010, the exchanging volume gradually increased and so did its volatility, which indicates that the liquidity was increasing rapidly.

Based on the above figure, the liquidity declined due to the crowding-out effect at the beginning of the introduction of stock index futures, but over time, the liquidity gradually increased in responding to the absorb effect, which indicates the CSI 300 stock index futures has a declining effect prior to ascending effect to the liquidity of the stock market.

3.3.2 Relative price spread

Refers to ratio of the middle price and the spread between the lowest and the highest selling price in the current market, which is the most basic measure of liquidity, and can be calculated as:

$$R_t = \frac{p_t^h - p_t^l}{[\frac{p_t^h + p_t^l}{2}]} \tag{6}$$

In which, p_t^h and p_t^l each stands for the highest and the lowest price of stock in day t.

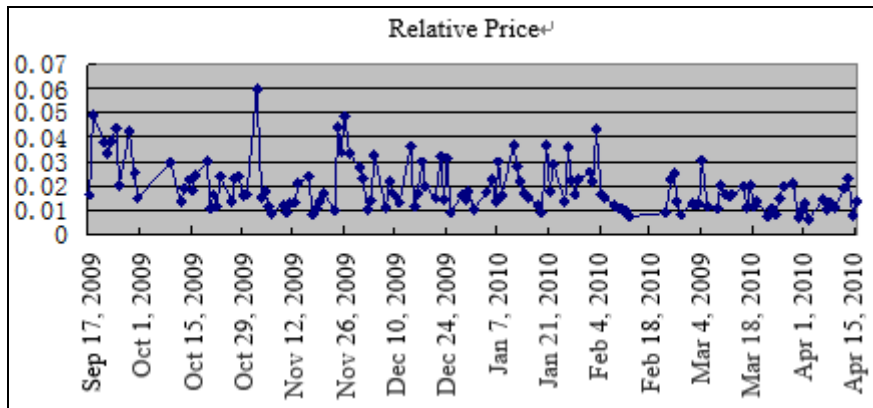


Figure 2 Relative Price Spread of CSI 300 Index in Period 1

The sample selected in this article is both the highest and lowest daily prices of the CSI 300 Index, from September 17, 2009 to November 16, 2010 and this duration was divided into period 1 and period 2 according to it is before or after the launch of the CSI 300 Index, period 1 is from September 17, 2009 to April 16 2010, period 2 is from April 16, 2010 to November 16, 2010. According to formula ③, relative spread of CSI 300 Index can be figured out, the results as shown in Figure 2 and Figure 3^[4];

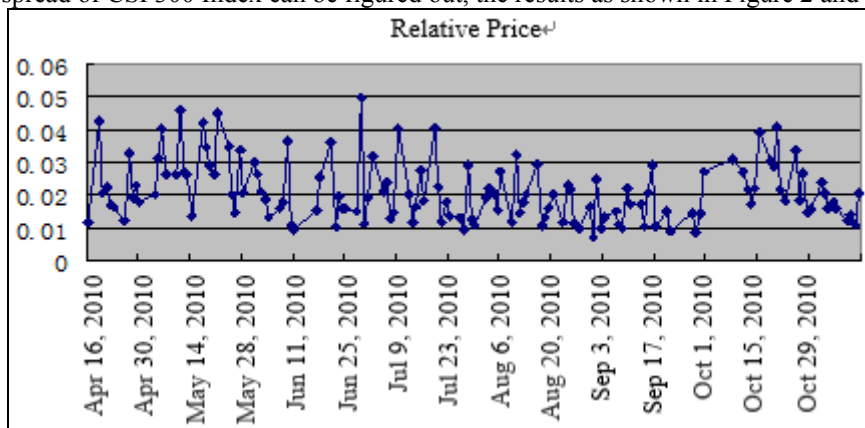


Figure 3 Relative Price Spread of CSI 300 Index in Period 2

It can be figured out by comparing Figures 2 and Figure 3 that the stock market fluctuates a lot before the introduction of the CSI 300 stock index futures, the relative spread of the CSI 300 Index was once up to 0.06, and reached 0.05 twice, but it was under 0.05 and with less fluctuations from the launching day to the last day of the study period, thus according to the above theoretical analysis, the transaction cost declined to its minimization in this period, indicating that the liquidity of stock market has been significantly enhanced after the introduction of the CSI 300 Index stock futures.

3.3.3 The volatility of yield

Following the volatility of the stock investment yield is discussed. Obviously, the random price volatility of stock with high liquidity is very small, and so did the yield volatility in normal trading. The main factor which affecting the yield volatility is the relative variation of the exchanging volume^[5], if the relative variation in the exchanging volume have little impact on the yield volatility, namely the variation of exchanging volume causes small price change, it means the liquidity is rich, and vice versa, if the relative variation in the exchanging volume showed great impact on the yield volatility, it means the liquidity is poor. Therefore, this paper will use the impact of relative variation in the exchanging volume on the yield volatility to measure stock market liquidity.

(1)The stock yield: logarithmic difference of the discrete price, its formula as follow:

$$r_t = \ln(p_t) - \ln(p_{t-1}) \tag{7}$$

In which, p_t stands for the closing price of the index in period t, p_{t-1} for the closing price of the index in period t-1, r_t for return rate in period t.

(2)The relative variation of the exchanging volume: the proportion of volume increment in the original volume, can be calculated as:

$$v_t = \left| \frac{V_t - V_{t-1}}{V_t} \right| \quad (8)$$

In which, V_t stands for the exchanging volume in period t, V_{t-1} for the exchanging volume in period t-1, v_t for the relative exchanging volume in period t.

(3)We established the regression model of yield and the relative volume, the coefficient reached can be seen as a measure index of liquidity. The equation is as follows:

$$r_t = \alpha + \beta v_t + u_t \quad (9)$$

According to the model (9), we examined the liquidity variation in 7 months both before and after the introduction of the CSI 300 stock index futures, in which β is an indicator to measure the liquidity [6]. Obviously, the coefficient is small, the price change involved by the volume is small too, which means the liquidity is rich.

Use the Eviews software to process a regression analysis on the yield and relative daily exchanging volume of CSI 300 index, the results are as follows:

$$\begin{aligned} \text{Before listed: } r_{it} &= -0.00014 + 0.01528 v_{it} + u_{it} \quad (10) \\ \text{s.e} &= (0.0013) (0.0058) \\ \text{t} &= (0.1097) (2.6214) \end{aligned}$$

$$\begin{aligned} \text{After listed: } r_{it} &= -0.00011 + 0.01362 v_{it} + u_{it} \quad (11) \\ \text{s.e} &= (0.0014) (0.0056) \\ \text{t} &= (0.0803) (2.4001) \end{aligned}$$

Through comparing expression (10) and (11), we can see in the 7 months both before and after the launch of CSI 300 stock index future, the value of β in expression (10) which before listed is 0.001528, and in expression (11) which after listed is 0.01362, it is clear that the value of β after listed is smaller than the value before listed, the liquidity indicators were declined on the spot market, indicating an increase in liquidity.

4 Conclusions

4.1 Conclusions

This article uses exchanging volume, relative prices, yield volatility of the market as indicators to measure depth, tightness and resiliency of liquidity and analyzes the impact of the introduction of stock index futures on the liquidity of spot market, through the above empirical research and analysis, we can draw the following conclusions:

1. Based on the analysis of the exchanging volume of the stock market both before and after the introduction of the CSI 300 stock index future, we figured out that in its initial listing, the CSI 300 stock index future was kind of substitution to the stock market in some degree and may generate funds crowding-out effect^[7], fund managers and speculators who values index a lot, will be transfer part of their funds to the future market, thus decreased the liquidity of stock market, but this phenomenon is temporary.

Through analyzing variation of stock index to the relative price and establishing regression model of the stock yield and relative exchanging volume, and through comparing relative parameters we found that: In the long term, the stock index future owns the advantage of hedge, high leverage and flexible, it attracted a large number of arbitragers and hedgers, and make outside capital flow into the market, and thus to increase liquidity of the stock market, so the introduction of stock index futures plays a long-term role in promoting the development of the stock market.

4.2 Policy recommendations

Stock index futures is a double-edged sword, if we lack effective means to control the risk after the introduction of it, the risk would turn into loss in reality, and even increase the risk of the entire capital

market. According to the conclusions above, the author give policy recommendations as follows:

The first is to establish and improve the supporting regulatory measures. As to the experience of some developed countries, they have formed a certain pattern for the risk management of the stock index futures, and also an impeccable management system. China can learn from the experience of the developed countries about risk management of the stock index futures market, continue to use the three-stage regulatory model, the government - China Futures Association - Futures Exchange, for risk regulation^[8]. The three stages complement and cooperate with each other, and together to ensure normal and standardized operation of China's stock index futures market, to maintain the fairness and openness of the transactions, thus to promote the healthy development of the futures market.

The second is to improve the risk management of micro-level in stock index futures market. The micro-level mainly refers to transaction subjects including investors and brokerage firms. Firstly, the futures brokerage firms should scrutinize the customer's qualification, funding sources, and credit status stringently; enforce management system of customer margin strictly; strengthen internal supervision and enhance professional ethics education of staff, and improve the system of settlement and risk management. Secondly, investors should enhance their master of risk, fully grasp the knowledge and skills in trading stock index futures and enhance their predictive ability, reduce the transaction risk through more flexible means.

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Application Study of Heuristic Algorithm on Production Plan of Compounded Flow Production

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Abstract: In the mixed assembly line production, different production have different cycle time and the same product in different process have also different cycle time. Therefore, waiting time in the process of production and even the accumulation of articles will appear. In order to reduce the waiting time, this paper will apply the methods of heuristic algorithm-Palmer and NEH into the formulation of production plan by taking BSH production plan as an example. Finally, the witness analogue simulation will verify the applicability of heuristic algorithm.

Key words: Heuristic algorithm; Production plan; System simulation; Balanced production

1 Introduction

In manufacturing enterprises, mixed production is a sort of production mode which is generally used and adapted to market. The production mode is fulfilled through a scientific arrangement of a number of product varieties which share the similar process flow and production methods in the production sequence, in which a continuous production is rhythmically and proportionally proceeded. And its varieties, outputs, cycle time, equipments should be in conformity with comprehensive and balanced the premise of the production pattern.^[1] Multispecies mixed-model production is mainly suitable for the enterprises which could undertake assembly line production and mass production in which the machining process is basically same; the production equipment do not need to be adjusted; and the tools, molds, fixtures can be rapidly transferred. The method of mixed production mainly include the heuristic method, the proportion method, the logic method and the branch-bound method.

2 Processing System Description

Table 1 Balanced Production Plan of MS

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1038301904	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
1038305220	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
1038301465	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260
1038301499	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260
1038301756	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
2228300748	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170
2228300555	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170
1038301376	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1038301412	110					110					110					110				
1038301415		110					110					110					110			
1038301852			70					70					70					70		
1038301874				70					70					70					70	
1038305072					50					50					50					50
2228300626					60															
1038301335										60										
1038301845															60					
2228300577																				60
2228300682			40	40																
1038301377								40	40											
1038301508														40						
1038301798															40					
2228300686																		40		
2228300688																				40
Sum	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840	1840

Located in Suzhou industrial park, the products of BSH company mainly include MS, BE&ED, PP ECU, ABS, PS. Each kind of products can be divided into various types. PP ECU only has one product model, that is, PP – Sensor whereas MS is composed of ten types of products which is claimed as the

most productive model. As the earliest product, MS owns a strong technical support in BSH company and exerts great influence on capital operation and profit of the company. The paper will take MS as an example based on the research of BSH company production plan^[2].

According to customer requirements, a balanced production plan is developed. As shown in table 1.

3 Application of Heuristic Algorithm

In manufacturing process, MS products will mainly proceed three procedures: SMT, ICT and Milling. Due to the different production rhythms, the production will produce waiting time during the process of production. Therefore, our target is also to reduce the waiting time during producing as much as possible. In the production process, appropriate adjustment of production order can decrease the possibility of waiting time. As for the sequence of production, the heuristic algorithm can be used to achieve the purpose of operational research. Now, taking MS production as examples, the heuristic algorithm is applied to sort the balanced production plan of the daily production plan^[3-4].

Taking the practical problems as a target object, heuristic algorithm is a method of judging and solving or a strategy to solve practical problems. Heuristic algorithm doesn't have a standard operation procedure, for its solution is by the previous experience and the accurate judgment of an actual situation. It is not mechanical in solving practical problems. Therefore, it fully embodies the human factors and plays to people's creativity and initiative. Hence, heuristic algorithm is a more humanized and user-favored flexible method^[5].

Aiming at the optimization problem of SMT production assembly line, which is also sorting problem of SMT-ICT-Milling, optimization algorithm of $n/3/F_{\max}$ problem. Based on the practical situation of BSH company, this paper applies simpler and more practical Palmer algorithm and NEH algorithm to sort the assembly lines, meanwhile, through the sequence of daily production in a set of balanced plan to save working time and fund.

1) Palmer algorithm was proposed by D.S. Palmer in 1965. Its calculation is on the basis of the slope index of the workpieces in solving the problem of assembly line. After calculating the slope index and sorting in an index decreasing, a satisfied result can be obtained. Calculation of Slope index is as follows:

$$\lambda_i = \sum_{k=1}^n [M_k - (n+1) / 2] p_{ik} \quad (1)$$

According to the sorting of the workpiece λ_i without increasing, can get satisfying sequence.

n —Machine number;

M_k —Machine k , $k=1,2, \dots,m$;

p_{ik} —Processing time on the machine of workpiece i .

According to the arrangement of the workpiece λ_i in descending order, a satisfactory sequence can be obtained.

2) NEH method was proposed by M.Nawaz and E. Enscren in 1983. The concrete procedures of NEH method are as follows:

The first step, calculating the total processing time P_i of each workpiece i :

$$P_i = \sum_{j=1}^m p_{ij} ; \quad (2)$$

The second step, according to the sorting of P_i without increasing, getting sequence T ;

The third step, choosing the top two workpieces in sequence T . The two workpieces can be composed of two kinds of sequence order. By calculating the longest completion time of the C_{\max} of the two and choosing the small of C_{\max} arrangement, the relative position of the first and the second workpiece can be determined. Put this order in a new sequence S : For $t = 3$;

The fourth step, choosing the workpiece of t in sequence T , putting it in sequence S , calculating C_{\max} under three kinds of order and selecting minimum order of C_{\max} into S .

The fifth step, if $t < n$, for $t=t+1$. Returning to fourth step. If $t=n$, then turn to sixth step;

The sixth step, the S sequence is the satisfactory sequence.

In the process of calculation, assume that all products through the SMT are manufactured in L1 and all conducted on Milling1 when cutting board. (BET is a special product which does not need to test, it can be specially considered. This sorting does not consider the special BET products.) Take day as the unit to determine the production order every day.

Take the products of Table 1 as examples by using Palmer algorithm and NEH algorithm to sort. Cycle time statistic datas of 9 kinds of products in Date1 in SMT, ICT, Milling are shown in Table 2.

Table 2 Cycle Time in Various Processes

production	number	SMT cycle time(s)	ICT cycle time(s)	Milling cycle time(s)
1038301904	270	34.1	26	24.8
1038305220	290	36.1	26	24.8
1038301465	260	27	14.5	20.6
1038301499	260	24.9	14.5	20.6
1038301756	210	29.2	18	20.6
2228300748	170	21.8	16.5	20.6
2228300555	170	19.5	14	27.1
1038301376	100	35.1	26	24.8
1038301412	100	41.2	26	24.8

1) Arranging production order according to Palmer algorithm.

First, calculate λ_i of each product according to Palmer algorithm. (It is noted that the P_{ik} time needs to be unified. For the convenience of calculation, this time takes seconds as the calculation unit λ_i) Then arrange production order in diminishing λ_i , and the sorting result is: 555, 748, 376, 499, 465, 412, 756, 904, 220.

2) Arranging the production sequence in light of NEH algorithm.

(1) Calculating the total processing time of each model P_i , According to descending order .

Getting $T = (220, 904, 465, 499, 756, 555, 412, 748, 376)$

Calculate the C_{max} of sequence 220, 904 and sequence 904,220, then choose the smallest C_{max} , and get the relative position of two types of products is: 904, 220. Put 904, 220 in the sequence S. Evaluated in order, the order of 9 types of products in sequence S is as follows: 465, 904, 220, 555, 499, 412, 376, 748, 756.

In summary, By Palmer algorithm for sorting result is as follows : 555, 748, 376, 499, 465, 412, 756, 904, 220.

By NHE algorithm for sorting result is as follows: 465, 904, 220, 555, 499, 412, 376, 748, 756.

4 Use Witness Simulation to Select the Optimal Solution

Table 3 The Definition of Entity Elements

Element name	Type	Number	Instruction
A	Part	1	1038301904 (904)
B	Part	1	1038305220 (220)
C	Part	1	1038301465 (465)
D	Part	1	1038301499 (499)
E	Part	1	1038301756 (756)
F	Part	1	2228300748 (748)
G	Part	1	2228300555 (555)
H	Part	1	1038301376 (376)
J	Part	1	1038301412 (412)
Machine001	Machine	1	SMT Machine Group
Machine002	Machine	1	ICT Machine Group
Machine003	Machine	1	Milling Machine Group
Buffers001	Buffer	1	SMT Input Buffer
Buffers002	Buffer	1	ICT Input Buffer
Buffers003	Buffer	1	Milling Input Buffer

Now we use witness to verify the applicability of the Palmer algorithm and NEH algorithm. First of

all, establish witness simulation model on production processes of production^[6-7].

Witness is a practical simulation software system, it can simulate many kinds of continuous system or discrete system. Witness is introduced by Lanner of England, which is loved by peopel due to its powerful function. So far, many countries have already maked better use of Witness,which also has been applied into the projects of international logistics optimization, process improvement, system optimization and so on. Using Witness to simulate the production plan, this paper compares the circumstances before and after the heuristic algorithm. Thus a better production plan will be obtained^[8].

1) Firstly, get the required production time of these 9 types of products after fully SMT-ICT-Milling, by simulating the original sorting of Date 1.

Define the elements, as shown in Table 3.

Design the Part element, as shown in Table 4.

Table 4 Detailed Design of Product in General

Product name	904	220	465	499	756	748	555	376	412
Arrivals Type	Active	Active	Active	Active	Active	Active	Active	Active	Active
Inter Arrival	3	3	3	3	3	3	3	3	3
Lot Size	270	290	260	260	210	170	170	100	110
First arrival	0	1	2	3	4	5	6	7	8
Maximum	270	290	260	260	210	170	170	100	110
To. . .	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE

Model simulation clock from the system default of 1 time units for 1min running, click Run in the Witness menu and run the simulation model. Finally it concludes that the total production time of a day's production plan needed is 947.84 min.

2) Simulate the sorting results after Palmer algorithm:

At this moment an adjustment is needed after the rearrangement of the General details of product design. The details of the design after sorting is shown in Table 5.

Table 5 Detailed Design of Product in General after Order in Palmer

Product name	904	220	465	499	756	748	555	376	412
Arrivals Type	Active	Active	Active	Active	Active	Active	Active	Active	Active
Inter Arrival	3	3	3	3	3	3	3	3	3
Lot Size	270	290	260	260	210	170	170	100	110
First arrival	7	8	4	3	6	1	0	2	5
Maximum	270	290	260	260	210	170	170	100	110
To. . .	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE

Table 6 Detailed Design of Product in General after Order in NEH

Product name	904	220	465	499	756	748	555	376	412
Arrivals Type	Active	Active	Active	Active	Active	Active	Active	Active	Active
Inter Arrival	3	3	3	3	3	3	3	3	3
Lot Size	270	290	260	260	210	170	170	100	110
First arrival	1	2	0	4	8	7	3	6	5
Maximum	270	290	260	260	210	170	170	100	110
To. . .	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE	Push to ROUTE

Click Run and get the operation time: 925.18 min which saves 22.66 min and production expenses 143.75 yuan as well (wages for employees and depreciation of machinery).

3) Simulate sorting results after NEH algorithm:

An adjustment is needed after the rearrangement of the General details of product design. The details of the design after sorting is shown in Table 6.

Run again and get the total processing time: 909.27 min which saves 38.57 min and production expenses 244.68 yuan.

Comparing the results of sorting after Palm algorithm with NEH algorithm, the result is that sorted by NEH algorithm is superior to Palmer's. Thus it can be seen that the applicability of NEH algorithm in scheduling of production of BSH company.

5 Conclusions

The production plan of enterprise is the primary function of enterprise production management, the provisions of the enterprise production in the planning period, the model number, quality and customer delivery rate, is also to complete the production goals for the enterprises in the planning period, an important link in improving economic efficiency of enterprises. The focus of this paper is that using the heuristic algorithm to sort the production plan, and improve the customer delivery rate^[9-10]. This paper uses heuristic algorithms-Palmer algorithm and NEH algorithm to sort the production sequence and use witness simulation to verify the applicability of the two algorithms. If there is any other better ways to apply in the production plan will be the further exploration targets.

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Research on the Correlation of Financial Innovation and Economic Growth

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Abstract: Financial innovation is seen as an inevitable product of the development of financial activities, which provides new impetus for the development of financial activity. Financial innovation has played a very important role in the process of modern economic growth. This paper expounds the connotation and the main cause of financial innovation which systematical analyzes the relationship between financial innovation and economic growth. Besides, it makes a quantitative calculation and then analyze on the correlation between financial innovation and economic growth through statistical analysis and function-fitting method which can clearly show the relationship between them when combining the qualitative analysis with the quantitative analysis method.

Key words: Financial innovation; Economic growth; Correlation; Function fitting

1 Introduction

Financial innovation is the act of creating and then popularizing new financial instruments as well as new financial technologies, institutions and markets. Financial institution or financial regulatory authorities make use of the new ideas, new technologies, new managements, new organizational forms, etc., regroup the various elements within the financial sector, in order to achieve the optimal coordination of micro and macro benefit. It is the inevitable outcome of the process of the development of social economy and finance, which has played an active role in the business scope of financial institutions, strengthening the role of economic lever of interest rates and the promotion of financial liberalization. Financial innovation has a strong force which has brought a qualitative change in the financial system and the future development through the reorganization of financial elements. Meanwhile, financial innovation activities can not only increase the flow of funds but also change the flow of funds. In this sense, financial innovation is the driving force behind economic growth and the pilot strength in promoting economic development. As the liberalization, internationalization, and the acceleration of integration process of the world's financial markets, as well as new technological revolution, especially the modern computer and information technology widely used in the financial sector, the world economy and finance present the trend of globalization. Then the study of financial innovation is also necessary since it not only promotes economic growth, but also helps to play the role of finance in economic development, maintaining the virtuous circle of finance and economy. The lacking of financial innovation will not only restrict the development of Chinese financial industry, but also limit the development and function expansion of Chinese business. Therefore, the research on the correlation of financial innovation and economic growth is of great theoretical and practical significance.

2 Financial Innovation Theories

In the history of the development of the world economy, innovation has always been the driving force. What's more, the every climax in the process of financial development is launched by the financial innovation, and every upgrade of financial development is driven by the financial innovation.

2.1 The connotation of financial innovation

Financial innovation is the re-combination of various elements in the financial sector. It refers to the reforming and creative activities on institutional settings, variety of businesses, financial instruments and institutional arrangements conducted by financial institutions and financial regulatory authorities. They mainly pay attention to the micro- and macro- interests. Financial innovation can be divided into narrow innovation and broad financial innovation: the narrow financial innovation refers to the innovation of financial instruments; the broad innovation refers to the adaption to the economic development needs, which creates new financial markets, financial products, financial systems, financial institutions, financial instruments, financial methods and financial regulation modes.

2.2 The incentives of financial innovation

The main purpose of financial innovation is to improve the competitiveness of financial institutions, financial efficiency and to optimize the allocation of resources. The theory of financial innovation incentives analysis is based on the analysis of the purpose of financial innovation:

2.2.1 Technical progress theory

Technology progress theory believes that the widely use of high-tech in the financial industry, such as that the telecommunications, computer technology, Internet and e-commerce promotes the rapid development of the electronic in Financial industry and financial networks. The incentive is that these new technologies greatly reduce the time and space distance of financial transactions, accelerate the transfer of the funds, reduce the financial transaction costs and improve the efficiency of financial markets and management level. They believe that technological innovation is mainly limited by three variables:

- 1) The degree of competition
- 2) The Scale of enterprise
- 3) The power of monopoly

2.2.2 Constraints theory

The Theory of Constraints believes that financial innovation is the response of financial institution to get rid of or reduce the constraints applied to them. External constraints come from the competition in the financial industry, the financial controls imposed by the government, the service cost that consumers wish to pay, etc. The internal constraints come from the liquid assets ratio, capital ratio, return on assets, growth and other targets formulate by financial firms themselves. As long as these constraints changed and presented the profit opportunities after deducting the cost of financial innovation products, financial firms will try to innovative.

Scholars who agree with the theory of constraints stressed that the financial regulation imposed by government is an important reason for induced financial innovation. They think that even in a market economy country, regulations that formulated by the government in the financial sector is relatively the most serious. Some financial companies “explore loophole” to circumvent them because some regulations limit the profitability of the financial industry. When the financial regulatory constraints large enough to increase operating profits if avoiding them, financial innovation that “explore loopholes” is very likely to occur. This form of innovation is called financial innovation which evades regulation.

2.2.3 Demand theory

The viewpoint that demand induced financial innovation believes that every financial product has different characteristics (such as duration, profitability, liquidity, risk, security, etc.) which analyze from the point of investors. As the economic environment changes, the investment preferences will change and result in the new financial products. The emergence and widely use of new financial products, new technologies and new financial market is because of demand. The innovation will be successful once both investors and fund-raisers find some demands that can meet through the financial innovation. Investors demand for new financial products for many reasons and two of them are the most important:

1) The demand for avoiding risks. The risks faced by investors in financial markets are exchange rate risk, interest rate risk and credit risk, etc. The degree of these risks changes with the changing economic environment. Then, they induced the demand of new financial products to avoid these risks.

2) The demand for the liquidity and profitability of the financial products. The raising of inflation rates and nominal interest rates improved the opportunity cost that without the burden of interest. Besides, it makes the traditional financial more difficult to accept an alternative between the liquidity and profitability, leading the demand for new financial products that can improve liquidity and profitability.

2.2.4 Regulatory theory

The viewpoint of regulation induced financial innovation thinks that the foundation of financial system is due to the competition between financial authorities. For governments or monetary authorities, the aim is to protect their own interests and realize their customers' welfare maximization at the same time. When the monetary authorities compete with each other, trying to maintain their loyal customers, it will deregulate or introduce new measures which are more relax, thereby contribute to the financial innovation. Fundamentally speaking, financial innovation is a kind of activity that for the monetary authorities to stabilize the financial system and to prevent uneven distribution (such as the reform of financial regulation, deregulation, etc.) At the meantime, it can induce the broader financial innovation.

3 Analyses on the Relationship of Financial Innovation and Economic Growth

3.1 Financial innovation promote economic development

1) Financial innovation makes financial industry more powerful to promote financial development and economic growth:

Financial innovation directly promotes the economic growth through the financial system risk management capabilities, information revealing, corporate governance, savings mobilization capabilities and easy exchange five functions. Through risk management functions, we can facilitate the aggregation, transactions and avoidance of the risk. What's more, we can spread the risk, change resource allocation and savings rate, reduce information cost and transaction cost, promote technological innovation and economic growth; financial innovation can reduce the individual economic information collection and processing cost, promote the efficient allocation of social resources and economic growth through information revealing function.

2) Financial innovation broadens the financial functions, facilitate the social investment and promote economic growth. Comprehensive financial increased the number of financial products and financial services, broadened the scope and expanded the ways to collect funds for financial institutions. Therefore, the financial industries' ability to collect money and improve profitability is enhanced. It also contributes to the tremendous growth in assets. In the mean while, a variety of convenient capital investment arrangements make marginal revenue increased. Then, the result of the comparison between capital cost and marginal efficiency can be changed and finally contributes to economic growth.

3) Financial innovation makes great contributions to the economic growth through the innovation of financial institutions, financial markets, financial services, financial systems and other aspects. In the most time, financial innovation use the approach of securitization and marketization which makes the rise of the status of the financial markets and the diversification of the allocation of financial resources. It goes without saying that it will promote the economic growth. What's more, financial innovation can improve the operational efficiency of financial markets, strengthen the leverage of interest and make the interest rate gradually toward liberalization. The quick react of the price in financial market to all information which can further enhance the reasonableness and price mechanism counts on the degree of modernization and internationalization in financial markets.

3.2 Economic growth promotes financial innovation

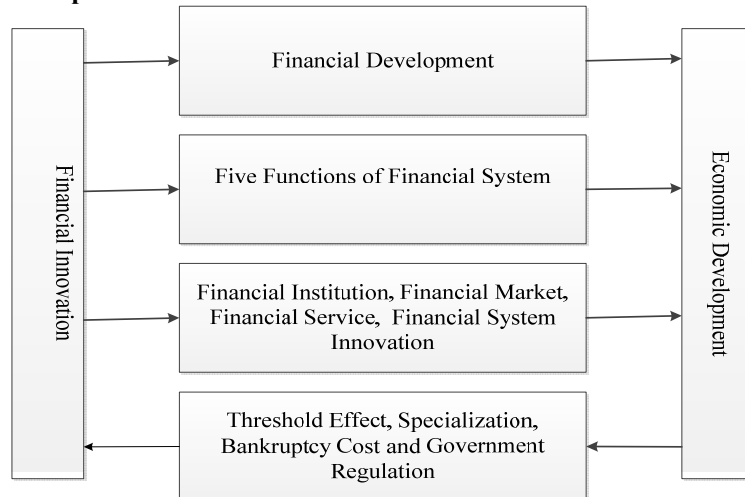


Figure 1 Relationship of Financial Innovation and Economic Development

Economics and finance conducted primarily through three channels: interest rates, prices, credit. Financial assets through interest rates and exchange rates affected investment and net exports, and ultimately affect output; financial assets have an impact on investment and consumption through financial asset price and wealth effects. The rising in interest rate or falling in financial asset price will cause the falling in investment and borrowing ability of corporate. It will further lead finance deficit and less spending of residents, eventually lead the falling in output. Financial innovation led the increase in financial asset classes and decline in transaction cost. It also sped up the transformation between assets and improved the sensitivity of credit, interest rates and asset price. In addition, with the complication

and specialization of financial innovation, economic activity and technological innovation will have different levels of impact in the financial system. There are four kinds of impact of economic growth on financial innovation: The existence of threshold effect makes economic growth and per capita income growth become the intrinsic motivation of the development of financial system. Capital accumulation helps motivate financial intermediaries take more detailed specialization, cost reduction and efficiency improvement; the increase in bankruptcy cost caused by the expanding of production scale will affect and the choice of financing channels and production technology of entrepreneurs, eventually motivates the emergence and development of stock market. Along with economic development, the government will regulate the financial industry and the regulatory approach is constantly changing. Finally, it will lead to financial innovation activities in financial industry.

In short, financial innovation and economic growth have a mutual relationship, financial innovation promotes economic growth and economic growth promotes financial innovation. The relationship is shown in Figure 1.

4 The Mathematical Analysis on the Association of Financial Innovation and Economic Development

4.1 Data collection and instructions

The data in this model contains GDP, consumer spending, the currency depth of whole social investment, human resources, total import and export, etc. In addition, the data sample collected from the national statistic. It describes the correlation of financial innovation and economic development. As is shown in Table 1.

Table 1 National Statistics

	2007	2008	2009	2010	2011
GDP (billion Yuan)	265810.3	314045.4	340940.2	401512.8	472881.6
Total social investment (billion Yuan)	137323.9	172828.4	224598.8	251683.8	311485.1
Imports (billion Yuan)	73300.1	79526.5	68618.4	94699.3	113161.4
Exports (billion Yuan)	93563.6	100394.9	82029.7	107022.8	123246.6
People spending (billion Yuan)	93317.2	111670.4	12358.6	140758.6	164945.2

4.2 Mode analysis

4.2.1 Analysis on the Correlation of GDP and Total Social Investment

First, make the fitting analysis on the data of GDP and investment, and then draw their relevance.

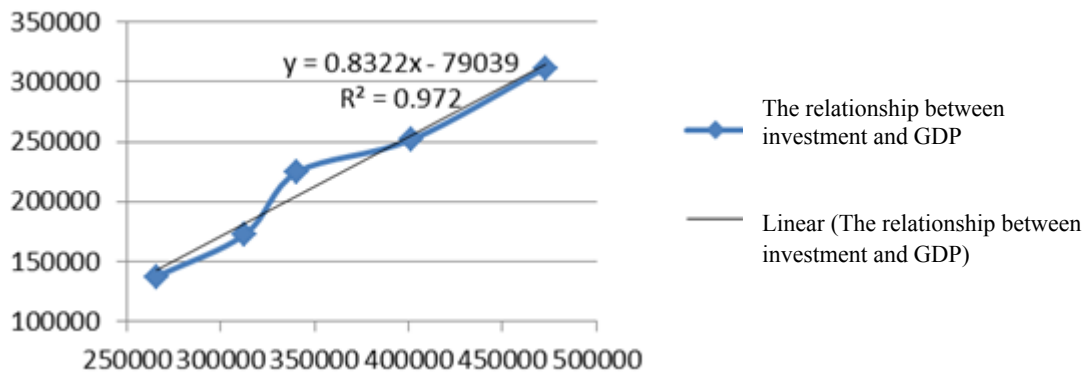


Figure 2 Correlation of GDP and Investment

The linear degree is 0.986, basic linear correlation

4.2.2 Analysis on the correlation of GDP and total social consumption

First, make the fitting analysis on the data of GDP and consumption, and then draw their relevance.

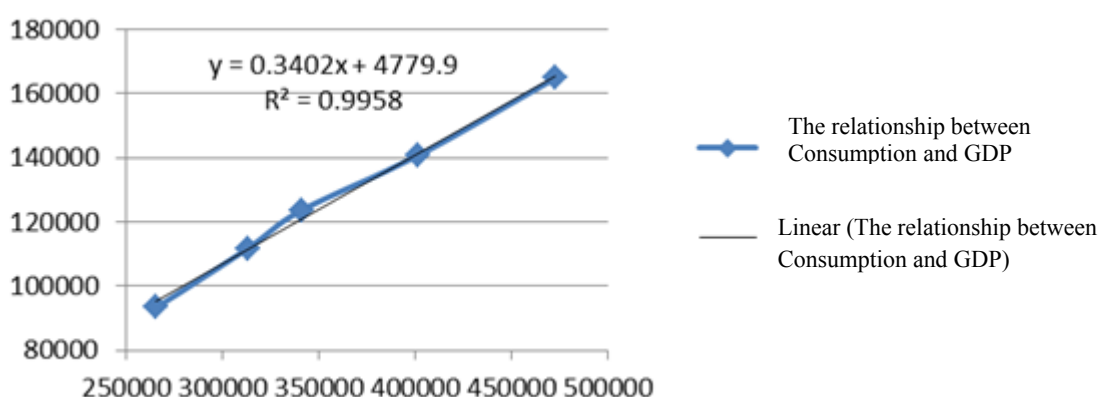


Figure 3 Correlation of GDP and Consumption

The linear degree is 0.998, basic linear correlation.

4.2.3 The analysis on the correlation of financial innovation and economic growth

For the index of financial innovation, this article is designed based on the principle of simplicity, the main indexes are the followings: currency depth, banking efficiency, the increase of deposits and loans caused by the financial innovation. The formulas are as followings:

Incremental loans caused by financial innovation = Incremental consumption + Incremental investment – Incremental loans

Incremental deposits caused by financial innovation = Trade balance + Investment + Consumption + Incremental deposits - GDP

Bank efficiency = (Total loans * Lending rate - Total deposits * Deposit rate) / Total deposits

Specific calculations are shown in Table 2.

Table 2 Data of Financial Innovation Index

	2007	2008	2009	2010	2011
Incremental loans caused by financial innovation(billion yuan)	7821.7	10153.5	13657.5	13985.6	15236.9
Incremental deposits caused by financial innovation(billion yuan)	39005.3	68153.8	152229.9	123750.1	104736.9
Bank efficiency	0.9%	1.2%	1.3%	1.1%	0.6%
Currency depth	0.218	0.228	0.384	0.228	0.218

In this paper, I make a fitting function of incremental loans caused by the financial innovation with the bank's efficiency and economic growth, in order to represent the relevance of financial innovation and economic growth. Assuming that incremental loans caused by financial innovation all transformed into investment. This assumption can be established because consumer loans are almost completed by traditional financial means. In the mean while, assume that the improvement of bank efficiency is totally caused by financial innovation which involve product, technology and institutional innovations. The increase in loans caused by Financial innovation that totally translated into investment can be directly included in the current GDP, the result is 0.603 (weighted average), so the GDP growth should be 1.603 times. The data in Table3 can be obtained from the foregoing data.

Table 3 GDP Growth Caused by Financial Innovation

	2007	2008	2009	2010	2011
GDP growth caused by the increased innovative loans	12749.4	16550.2	22261.7	22796.5	24836.1
GDP growth caused by the bank efficiency	445.5	578.8	349.1	666.7	428.2
GDP growth caused by the financial innovation	13194.9	17129	22610.8	23463.2	25264.3

It can be calculated that GDP growth caused by financial innovation in the proportion of GDP per year, respectively 4.96%, 5.45%, 6.63%, 5.84%, and 5.34%. Visual display: GDP growth caused by financial innovation per year is relatively stable. We can get the correlation of financial innovation and economic growth by the fitting function of GDP growth and GDP over the same period.

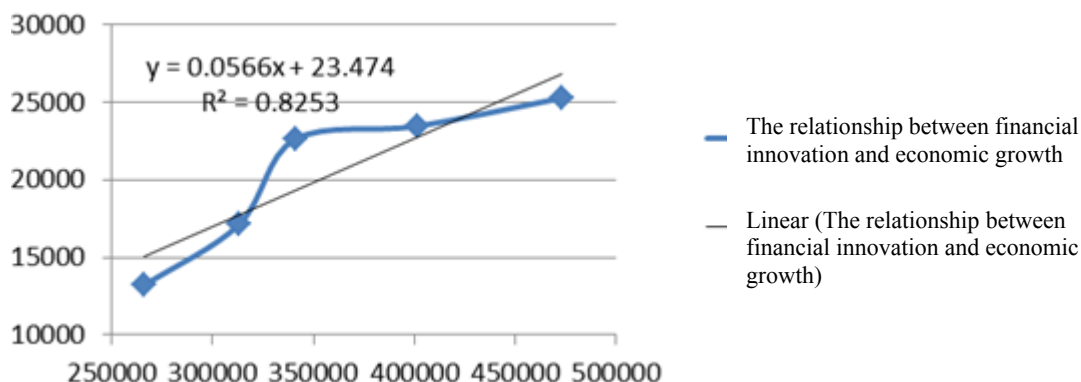


Figure 4 Correlation of Financial Innovation and Economic Growth

From the above data model analysis, the linear degree is 0.908; there is a positive correlation between financial innovation and economic growth.

5 Conclusions

From the above, we can conclude that economy and finance have a close relationship in a country's economic growth. Reasonable and appropriate financial innovation can improve the operating efficiency of the financial system and optimize the allocation of resources. In the meanwhile, economic development can also promote financial innovation.

Innovation is the power of development, it is also the driving force for continues development of bank sector and finance system. Only when we comprehensive understand the mutual influence of financial innovation and economic development can we control the financial risk and promote the social development best. This paper is guided by statistics, financial theory, innovation theory and system theory. On the basis of the correct understanding and analysis of financial innovation, it analyzes the correlation of financial innovation and economic growth from the 'financial innovation promotes economic development' and 'economic development promotes financial innovation' two aspects. On this basis, it takes advantages of system analysis, quantitative analysis and specific data validation. Studies suggest that financial innovation and economic growth exist positively correlation.

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Research on Innovation Development and Risk Prevention of Logistics Financial Business of Commercial Banks in Wuhan City Circle*

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Abstract: As a kind of financial innovation business among domestic commercial banks in China, logistics finance has been catching universal attention in both theoretical and practical sense. Based on analyzing the features, problems and risks revealed by commercial banks in Wuhan City Circle when they conducted logistics finance, the paper pointed out that commercial banks in Wuhan City Circle should upgrade the developing level of logistics finance and make innovations on logistics financial mode to avoid risks for its further development. Meanwhile, it concluded that the development of logistics financial business complies with the need of commercial banks in Wuhan City Circle on innovative development; and also the need of domestic industrial development and the competition trend of supply chain.

Key words: Commercial bank; Manufacturing industry; Logistics finance; Risk

1 Introduction

Logistics finance is the settlement and financing service provided by banks and third-party logistics enterprises to customers during the whole process of supply chain. By conducting logistics financial business, companies are able to manage and coordinate the movements of capital and credit effectively, realizing the organic unification of logistics, information flow and capital flow.

Logistics Finance has been greatly developed abroad, acting as the main support for small and medium enterprises on financing. Generally, the development of western logistics finance can be divided into three phrases: before the middle of 19th century, prosper of capitalism gave birth to the warehousing industry, and further more pushed forward the inventory financing business. This is seen as the primary mode of western logistics finance; from the middle of 19th century to 1970s, the creation and implementation of relevant laws clarified the legal relations among all parties involved in logistics finance, impelling logistics financial business to further development of inventory financing-centered and account receivable financing- assisted mode; starting from 1980s, market competition among single enterprises developed into competition among multiple supply chains, meanwhile, the supply- chain finance emerged right after this, leaving logistics financial business in a superior position. Logistics finance functioned by depending on the supply chains at that time, through the cooperation between logistics enterprises and financial institutions, it managed to apply focal enterprises on supply chain as its center and supporting point so that it can achieve capital injection into those down-stream enterprises among the focal enterprises and interconnect focal enterprises and down-stream enterprises as a cohesive unit to improve the competitive capacity and inherent value of the supply chain itself.

Logistics finance is a new-born and fast-growing industry sprang up in China. The domestic logistics financial business originated from domestic commercial banks' innovative practice on financial business, of which the pressing financing demands were the primary motivation of it. At the end of 1990s, the cooperation among foreign banks, world-renowned logistics enterprises and some Chinese companies, in the form of warehouse financial business offered by some international large-scale enterprises and domestic enterprises, made it possible for them to conduct logistics financial business. This served as an example for the development of domestic logistics finance. Hereafter, at the end of the 20th century, some Chinese-funded banks began to give it a shot, shifting their unfold warehouse financing to trade financing through the trade of multiple commodities. However, the development of domestic logistics finance was still under inadequate attention and still had not achieved unification. After the year of 2005, with the development of economy and the innovation in both financial industry and modern logistics industry, domestic logistics finance got to enter into a period of rapid expansion.

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Deemed as the innovative product of financial institutions, logistics finance has its own characteristic which lies in that banks no longer evaluate enterprises according to the aspect of their financial capabilities, they evaluate enterprises according to their financial capability, market position and efficiency of its supply chain management, etc. Banks mainly finance for the enterprises which conduct business and cooperate with focal enterprises on the supply chain directly. Banks converted their practice of evaluating only credit risks on individual enterprise to the practice of evaluating credit risks on both whole supply chain and its transactions. Through coordinative risk management on the whole supply chain, the contradictory relationship on loans, it is difficult for enterprises to get loans from banks and meanwhile banks are very stint about loans to enterprises, between enterprises and banks gets to be coordinated, which provides a new way of financing for small and medium enterprises; and meanwhile creates a new service offered by banks and provides a new revenue growth opportunity for third-party logistics enterprises as well. Logistics finance promoted the close and effective cooperation of banks, third-party logistics enterprises and small medium enterprises within the whole supply chain system, and it also reduced the risks exist in information transfer, logistics and supervision, etc. Moreover, logistics finance improved the efficiency of commodity circulation and also the efficiency of logistics in the whole supply chain, achieved the stable, swift and efficient circulation of logistics, capital flow and information flow. By achieving these, it improved the competitive power of the whole supply chain system.

2 Development Characteristics and Problems of Commercial Banks' Logistics Financial Business in Wuhan City Circle

2.1 Joint-equity bank oriented

The developed logistics financial business in Wuhan City Circle is mainly propelled by joint-equity banks. Wuhan branch of Guangdong Development Bank, Wuhan branch of Hubei Huaxia Bank and Wuhan branch of Shenzhen Development Bank carried out logistics financial business with distinctive features one after another.

Table 1 The Logistics Financial Business of Commercial Banks in Wuhan City Circle

Banks	Business Type	Business Features and Scale of Development
GDB (Guangzhou Development Bank)	1. Developed banking business such as manufacturer-retailer-bank, chattel mortgage and goods property mortgage successively since the year of 2003; 2. Developed logistics bank etc. banking business in 2005;	Specifically aimed at small and medium enterprises to develop personalized products. The "Goods Mortgage" and "Logistics Bank" have been very popular in manufacture industry-centered industries like retailing industry and circulation industry. There have been 11 cooperative regulating companies and 36 authorized circulation enterprises so far.
HXB (Huaxia bank)	1. Launched Automobile Logistics Finance in 2006; 2. Launched Win-Win Financing Chain in 2006;	1. Establish specialist department to achieve team marketing and mainly work for First Automobile Works and Dongfeng Motor Cooperation. There had been more than 120 automobile raw material and parts suppliers, auto makers and auto dealers offering a capital of more than 13 billion RMB in the whole supply chain. 2. With the help of multiple financing tools to coordinate domestic and international financial business in the supply chain. In the former 5 months of the year 2008, HXB achieved a value of 16.1 billion RMB on enterprise financial business in the supply chain.
SDB (Shenzhen Development Bank)	Developed Supply Chain Finance in Hubei province in 2010, including three series of asset based financial products: Advanced Payment, Inventory and Accounting Receivable.	Multiple in kinds and widely used.

2.2 Rural credit cooperative assisted

In 2009, the rural credit cooperatives in Hubei province advocated to put the leading industries in motion, develop competitive industries and highlight small enterprises' backbone and main channel role in each county's economical development. In order to support technology-advancing, technology-applying, industry-optimizing, environmental energy-saving and region-specializing small

and medium enterprises, Rural Credit Cooperatives developed the mode of “Mortgage + Pledge” and “Guarantee + Mortgage + Pledge”. The logistics financial business mainly includes the logistics financial products follows: Chattel Pledge Loan, Warehouse Receipts Pledge Loan, Liquidity Revolving Loan, Accounts Receivable Pledge Loan, Cooperative Loan and Commercial Property Mortgage-Backed Loan.

2.3 Key cities focused

Some commercial banks in Wuhan developed some logistics financial products or supply chain financial products, such as the “Win-Win Financing Chain” developed by HuaXia Bank and the “Logistics Bank” developed by Guangdong Development Bank. However, these financial products have been rarely applied in the small and medium cities of Hubei province.

2.4 The overall level of development is low

2.4.1 The capability of logistics enterprises to participate logistics finance is limited

Generally, the logistics enterprises in Hubei province are of small size, of limited capability and scattered, they mainly depend on banks to carry out logistics financial business and failed to benefit from logistics finance as its main subject. According to the statistic conducted in Wuhan, there are only 100 or more out of 1200 logistics enterprises have a registered capital over 0.1 million RMB and most of the 1200 are of small scale. Problems like the lack of logistics service diversity, low service efficiency and poor competitive power are found in most of those logistics enterprises. Many of those logistics enterprises are only capable of conducting single stream and segmented logistics service rather than a complete logistics supply chain service. In all, the current situation of Hubei logistics industry is still way behind the development of modern logistics.

2.4.2 Logistics financial business still has not been paid fully attention

The acknowledgment financial institution, logistics enterprises and small-medium enterprises have on logistics finance is quite limited. They are lacking passion on conducting logistics financial business and many of them don't even know that they can solve their financing problems by conducting logistics financial business. Accordingly, the number of banks which conduct logistics business is quite limited and it is joint-equity commercial banks that mainly conduct logistics financial business.

2.4.3 The development of logistics finance is still in the elementary phase.

According to the survey, HuaXia Bank is the only bank which has accomplished some achievements in the area of logistics financial business, many other banks are still in the primary or even lower level when it comes to logistics financial business and most of the banks mixed logistics finance with some general company credit operations without running it according to its own features. Such condition made logistics finance failed to fulfill the enterprises' needs, and made logistics financial business mainly concentrated on limited industries like automobile industry steel industry, etc. Moreover, the logistics financial business conducted within those industries are scattered around without forming a business scale.

2.4.4 The logistics financial products are still underdeveloped and not fully exploited.

Though domestic banks put more emphasis on supply chain financing when they conduct logistics finance, but they are still mainly focused on “inventory financing”; to some extent, this still falls in the category of asset loan. The improvement is that the inventory financing focused logistics financial system allows focal enterprises as the variable of risk control, the supply chain financing mainly concentrates on the middle and lower part of the supply chain and small-medium sized enterprises in the financing market. However, this kind of inventory financing is merely the innovation and scope extending of mortgage and pledge business, rather than thinking about business from the view of the supply chain.

3 Innovative Developments of Logistics Financial Business in Commercial Banks

3.1 Largely improve the development level of logistics finance

Supply chain has been working on its own way to be the mainstream pattern of international industrial organization. Meanwhile, commercial banks developed supply chain management service to seek commercial opportunities. Normally, in a supply chains, numerous small-medium sized enterprises would gather around some focal enterprises which are considered to be the center of the whole supply chain. When banks develop financial business according to the supply chain, it is most of the settlement and financial business the supply chain (including those focal enterprises) that they are trying to conduct rather than trying to serve any single enterprises. It is in this way that commercial banks manage to develop into the focal banks of the whole supply chain. By relying on the trustworthy credit that some

focal enterprises enjoy, supply chain finance gets to drive the capital to places where capital is in need and also gets to support the whole supply chain with capital. In this way, it effectively fulfills the financing needs of some underdeveloped small-medium sized enterprises; optimizes the circulation of capital. Redeemed as the newly development and higher level, supply chain finance creates opportunities for innovation and gradually becomes the area where commercial banks gain their competitive advantages.

According to the industrial policies in Hubei province, logistics and finance are prioritized industries in Hubei province. While Hubei is putting efforts in developing its logistics and being the financial center of central China, the development of modern service industry will certainly be the solid foundation of logistics. With the development of competitive and mainstay industries, multiple supply chains will certainly come into being. Considered this growing trend, commercial banks in Wuhan City Circle should further develop their logistics financial business on the basis of the industrial supply chain.

3.2 Further develop logistics financial business mode

3.2.1 Prepayment-based logistics financial business in the acquisition Phase

Confirming Storage Business (also known as Acceptance Bill Business) is normally described as “bill comes before goods”. In this type of business, client (buyer) can get the acceptance bill from the bank after paying the bank a certain amount of cash deposit. With the acceptance bill, client gets to conduct purchase from the upstream focal enterprise (seller) by paying prepayment in exchange of the bill of lading from the seller. After the purchase, the client will mortgage the bill of lading to the bank and deliver the goods from the bank in batches by paying the bank in batches.

The business mentioned above is suitable for those dealers downstream in the supply chain. In that focal enterprises are in a quite competitive position, dealers downstream are often required to make prepayment in the acquisition phase and will also face big financial pressure by receiving stringent demands from focal enterprises when it comes to price, delivery time, payment period, etc. However, this is the time when the banks using the “future drawn right” role of the prepayment to make a guarantee to finance for dealers. In Wuhan City Circle, the steel industry, automobile industry, non-ferrous metal industry, etc. are suitable in developing such logistics financial business.

3.2.2 Inventory and warehouse receipt based logistics financial business in the production phase

1) Inventory financing is a commercial activity in which enterprise mortgages its chattel to the bank in order to get loans from banks (as shown in figure 1). Meanwhile, in order to realize risk control, enterprise puts its mortgaged chattel under the supervision agencies or third-party logistics enterprises’ supervision. Compared to traditional bank loan, which concentrates on the immovable property, and third-party guarantee, inventory financing transforms enterprises’ chattel (like raw materials and finished products) which banks are not willing to accept into ones that banks are willing to accept. Hence, inventory financing belongs to the chattel mortgage business category. Goods which are of stable value and with good market liquidity like steel, building materials, petroleum, non-ferrous metal, commissariat, cotton, glasses, automobile, paper pulp, fertilizer, rubber, etc.

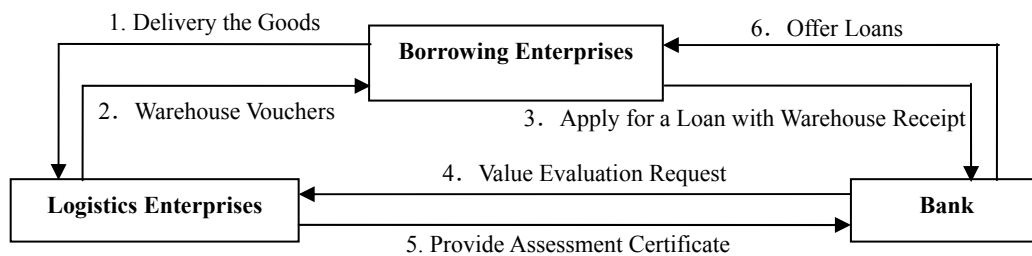


Figure 1 Flow Chart of Inventory Pledge

This type of business is especially suitable for competitive industries in Wuhan City Circle like steel industry, automobile industry, glass industry, commissariat industry, cotton industry, etc. In addition, banks can also conduct this type of business with enterprises which have inventory in both acquisition phase and sales phase of above materials. In this way, enterprises get to vitalize their inventory and solve the financing problems they face.

2) Warehouse receipt financing, usually called as goods goes before bills, in which manufacturing enterprise stores its raw materials purchased or finished products in logistics enterprise’s warehouse as pledge or counter indemnity (as shown in figure 2). In this way, logistics enterprise issues warehouse receipt to the bank which will loan a certain amount of money to manufacturing enterprise under the

warehouse receipt. The logistics enterprise which issues the warehouse receipt gets to supervise the goods in store and the manufacturing enterprise will pay for its loan from the bank in its future manufacturing and sales phases. Because warehouse receipt is based on the Contract of Warehouse Keeping signed between custodian and bailer, it is the certificate of custodian accepting the bailor's goods, so warehouse receipt financing one of rights pledge business.

Generally, suppliers in the upstream of focal enterprise in the supply chain are manufacturing enterprises, they are easy to suffer financing gap. However, the application of warehouse receipt financing can help manufacturing enterprises overcome the financing problems. Commercial banks in Wuhan City Circle can rely on the supply chain in manufacturing industry to develop warehouse receipt financial business.

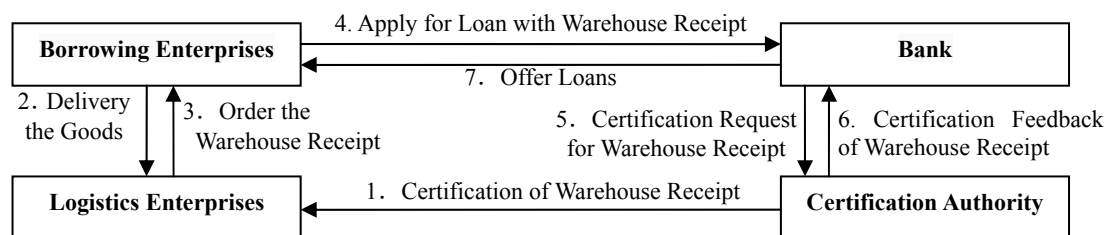


Figure 2 Flow Chart of Warehouse Receipt Pledge

3.2.3 Account receivable and purchase order based logistics financial business in sales phase

1) In account receivable financial business, enterprise applies for short-term loans from commercial banks by mortgaging its account receivable. However, the loan period is not allowed to exceed the period of its account receivable. When the borrower cannot pay the loan in time, lender bank enjoys the rights to discount, sell its account receivable to get paid with priority.

Account receivable financing mainly occurs in the period from the delivery of goods till the payment made by focal enterprise downstream. The eventual payer is focal enterprise enjoys good capital and credit reputation, which reduces the credit risks bore by the bank and also improve the capital and credit reputation of the borrower. This way of financing is especially suitable for those relatively stable account receivable in the supply chain.

2) Purchase order financing is a way of financing in which enterprise can apply for loans from bank with sales contract and valid purchase order approved by the bank. Small-medium sized suppliers can apply for loans from commercial banks by mortgaging valid sales orders that have covered a certain amount of prepayment and are issued by focal enterprises in the supply chain. To the mortgaged sales orders, banks are supposed to verify the authenticity, risk and value of them with the assistance of logistics enterprises so that banks can authorize an appropriate amount of loan for the applicants. Furthermore, with the assistance of logistics enterprises, banks get to conduct enclosed management on the logistics and capital involved in the acquisition phase and sales phase to make sure that they can get paid back with the payment of goods. In this type of financing mode, enterprises upstream in the supply chain which have received sales orders from focal enterprises get to solve the financing problems to finalize sales orders, so they are quite fit with this type of financing. Commercial banks should develop this type of financial business on the basis of manufacturing industrial supply chain.

3.3 Optimize the development environment of logistics finance in all ways

3.3.1 Enhance governmental support

According to the situation of economy, society and logistics in Wuhan City Circle, it is difficult to achieve the great-leap-forward development of logistics finance by merely depending the current independent development of logistics enterprises and financial institutions. In order to achieve this, our government plays a vital role in publicity and promotion.

3.3.2 Cultivate market entity

Logistics enterprises in Wuhan City Circle are of small size, of great number, scattered around and in disorder. To improve this situation, our government should allocate logistics resources in a reasonable way; should put efforts in cultivating large-scale, all-round logistics enterprises which have solid risk resisting abilities and are capable of leading the development of the whole industry.

3.3.3 Forge elementary platform

Municipal government should set up a financial institution- centered information platform led by government to forge a feedback system of market. First, government should analyze the process of logistics financial technologies and services in comprehensively to achieve scientific classification and

management on information. Secondly, in order to achieve comprehensive processing on information through information communication platform with full smooth and high efficiency, our government should promote the construction of public information platform. Thirdly, our government should establish social credit system to enable financial institutions to keep track of the credit-rating information of logistics enterprises and loan enterprises. In this way, the asymmetry of marketing information and logistics financial risk get to be reduced.

4 Risk Resistances of Logistics Financial Business for Commercial Banks in Wuhan City Circle

Commercial banks are faced with multiple kinds of risks when they conduct logistics financial business: first off, the credits of borrowing venture and supply chain will affect loan recovery directly. It is the credit risks that commercial banks are faced with at the very first. Secondly, parties involved in logistics finance need to sign a contract; each party's rights and obligations are defined on the basis of the contract signed and the laws involved. Hence, commercial banks are faced with legal risks. Furthermore, the value variation and estimation of pledged goods bring commercial banks with market risks. Moreover, the low technical level and the deficiency of operational process also bring operational risks to commercial banks. Therefore, commercial banks which conduct logistics finance should take effective measures to resist and control the above risks.

Firstly, a mechanism of mutual trust and benefits should be established between commercials and third-party logistics enterprises. In logistics financial business, many a risk is due to the asymmetry of information among banks, clients and logistics enterprises. Commercial banks should reasonably establish and develop the information communication platform with logistics and establish the mechanism of mutual trust and benefits. In addition, commercial banks and logistics banks should develop a mechanism of interactive supervision and control; evaluate the credit and the risks of the financing project together to minimize the risks due to the asymmetry of information.

Secondly, commercial banks should reinforce their internal management on business standards and business operation. Logistics enterprises and commercial banks shall set strict business standards and supervisory process in accordance with different modes of logistics financial service, only to minimize the risks due to administrative vulnerabilities and unregulated operations.

Thirdly, commercials banks should establish prompt and efficient feedback system of market information. With this feedback system, commercials banks can gain genuine information of the market to keep in track of the variation on commodity value and sales condition in the market, only to avoid the misestimating result from the asymmetry of information.

Fourthly, commercial banks should establish a mechanism to transfer and share risks. Insurance industry plays a significant role in the benign development of logistics finance; and meanwhile, logistics insurance is the key duty of logistics financial service. By using logistics insurance, the uncertain risks in logistics financial business are transferred into some fixed empirical cost.

5 Conclusions

The coordinated development and innovation of modern service industry are of pivotal importance to the development and adjustment of industries in Wuhan City Circle. With the implement of industrial policies, the industrial clustering and supply chains' come into being in Hubei province, small-medium sized enterprises in Wuhan City Circle will become the vital part of the whole industrial chain. Therefore, the development of logistics financial business not only can create new ways of financing for small-medium sized enterprises, but also can fulfill the financing needs of the industrial chain. In this way, the competitive power of the industry gets to be improved; the coordinated development and innovation of financial service industry, competitive industries and key industries in Wuhan City Circle get to find their own way to prosper. Overall, the conduct of logistics financial business provides commercial banks in Wuhan City Circle with commercial opportunities for their business innovation. The last but not the least, risk resistance and control are of vital significance in the process of conducting logistics financial business for commercial banks.

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Research on Financing Mode of Strategic Emerging Industries in the Initial Development Stage

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Abstract: In the 21st century, the strategic emerging industry has become the key to economic recovery all over the world. Compared with the traditional industries, strategic emerging industries in the initial development have features such as long cycle investment risks and financing difficulties. This paper presents some suitable financing models for the early developed strategic emerging industries, including direct financing and indirect financing model, and analyses the operation process and the applicability of the financing models.

Key words: Strategic emerging industries; Financing; Development financing

1 Introduction

Strategic emerging industries is a concept proposed in recent years which has no consensus. In this paper, it is defined as the emerging industry which has an important strategic significance on technological innovation, optimization and upgrading of industrial structure and social stability of the coordinated development of the national economy. These industries have features like innovative elements such as knowledge and technology-intensive, long cycle investment risks, the development of international and intense international competition. The seven major industries are considered to be strategic emerging industries including energy conservation and environment protection, new generation of information technology, organisms, high-end equipment manufacturing, new energy, new material and new energy automobile.

This paper does not use the traditional four classification methods (introduction, growth, maturity and decline phases) to classify the industrial cycle. At present, the development stage of strategic emerging industries can not be accurately divided, so we take the concept of strategic emerging industries formally proposed as a starting point, from then on, strategic emerging industries are in the beginning stages of development, namely the initial strategic emerging industries.

In this paper, we think financing mode refers to a complete set of solutions that available and can be reused by the subject of investment when finance for a common characteristic of certain types of financing projects. While the initial financing mode of strategic emerging industries refers to plans available and can be reused for the financing subject when finance on the strategic emerging industry in the early stages of development. Development finance is the combination of single or countries through the establishment of financial institutions with the national credit to provide long-term credit for specific demand. At the same time, with the construction of the market and the improvement of the system, it is a financial form that can accelerate economic development, realize long-term economic growth and other government targets^[2].

2 Target Systems for Financing Mode in Early Industry Based on the Development Finance

The ultimate goal of the establishment of the initial financing mode for the emerging industries based on the strategic development is to reasonable use and fully mobilize the existing financial resources, and modest financial innovation on this basis, so as to promote the transition of strategic emerging industries to the mature stage, and ultimately achieve economic and social sustainable and steady development. To achieve this goal, we need to decompose and clear the target system of the early financing of strategic emerging industries in depth. The process is showed in Figure 1.

3 The Developmental Direct Financing Mode

Development of direct financing mode refers to the developmental financial institutions as a major source of funds in corporate finance, and capital market drive through the direct financial system to support the strategic development of emerging industries. In this process, the developmental financial institutions like commercial banks also play an intermediary role in government-backed credit strengths as a community to raise funds to expand direct investment in total funds. The most essential difference

between development finance and policy finance lies in that development finance implement market action like self-management and self-financing.

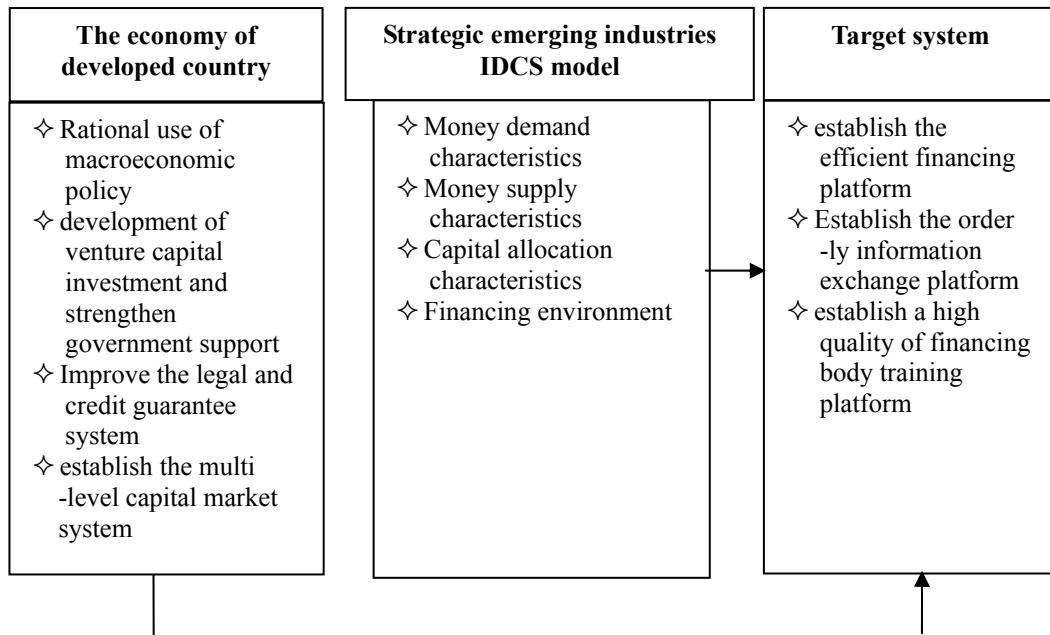


Figure 1 The Ideas of the Construction of the Financing Mode of Target System

Therefore, development finance step into the field of strategic emerging industries financing by direct financial method, actually it is a kind of special means to engage in commercial banking, and its essence lies in the special and commercialization. The speciality of this mode is that it is not a general purpose commercial action purchase of profit, but need to attach some special conditions and special historical mission(Such as improving public welfare,improve the capital markets). The commercialization of this mode refers to its difference to policy in implementation of fiscal policy. Development of direct financing mode is showed in Figure 2.

In the development of direct financing mode, financing activities starts from the government. In accordance with the construction of socio-economic planning, government give clear instructions to developmental financial institutions, and request developmental financial institutions to issue loans. According to the topic studied in this paper, the government needs developmental financial institutions to give necessary financial support to the emerging industries.

For the case of non- specific investment objectives, in receipt of government’s request of funding to support strategic emerging industries loan, there are two kinds of investment options to choose from for developmental financial institutions. One is to select the appropriate corporate to direct invest from the strategic emerging industries. The other is to put money into the capital market, and the capital market to complete the emerging industries of strategic investments. In these two choices, developmental financial institutions actually played the role of venture capitalists^[3]. In this type of investment, in order to pursue their own performance, the developmental financial institutions will make long-term investment and management in companies, which can both accelerate the company's growth rate and the maturity of the industry, but also make accessing to venture capital success that bring high return possible. The second investment program for developmental financial institutions is to invest in the capital market, so as to make non-specific enterprises to integrate into their own funding through the capital market. Compare to the first two programs, such program has higher risk, the reason is the lack of a guarantee provided by the government, at the same time,it use the capital market investments. The various risk in capital markets and corporate commissioned are development finance agency risk institutions must face. However, this solution has its advantages. Capital market has a long history of development in the world, and in China it has developed more than 20 years, and has gradually formed a multi-layer capital market system including the motherboard market, the second board market and the OTC market. Of course, the use of development financial to promote the strategic development of emerging industries is inseparable from the capital markets. But in this program, developmental financial institutions need to pay attention

to select investment projects so as to ensure the risks and benefits of investment projects are reasonable matching. At the same time, we need to pay attention to put investment objectives on the enterprise in emerging industries, and to ensure that government industrial planning objectives are achieved.

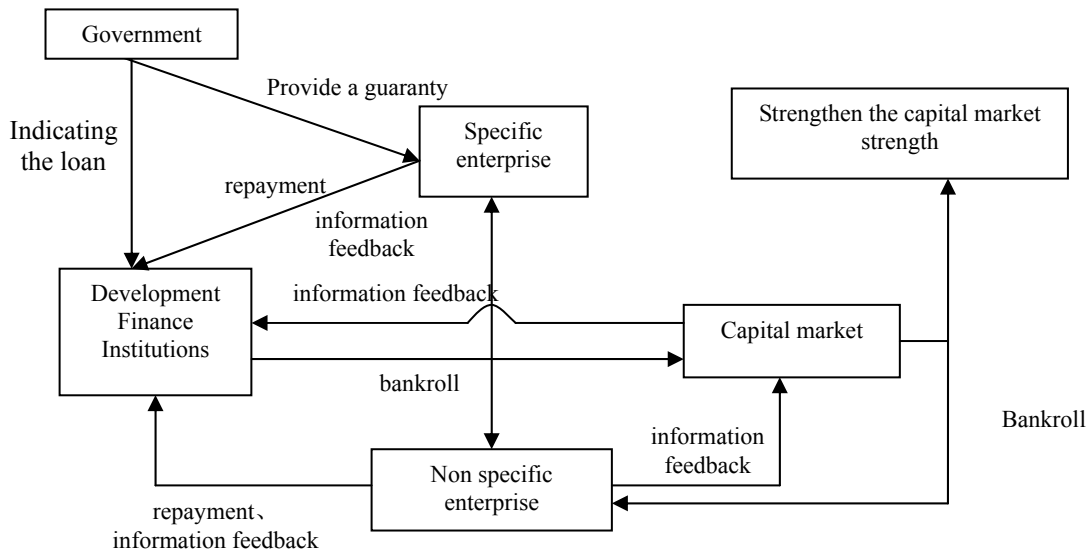


Figure 2 Developmental Mode of Direct Financing

4 The Development Indirect Financing Mode

Developmental indirect financing mode refers to that as a corporate finance non- major source of funding; the developmental financial institutions should support indirect strategic emerging industries through the credit market-oriented financial system. The biggest difference between this financing mode and development direct financing lies in that in developmental financial institutions, provide funding is not the main source of funding of corporate finance, but they participate in social capital investment direction in the forms of equity or loan, so as to expand more financing channels within the corporate in strategic emerging industries. Meanwhile, developmental financial institutions and social capital share the investment risk together and social capital is the main bearer. Developmental indirect financing mode is showed in Figure 3.

Developmental indirect financing mode is the same with direct financing mode in that their source is from the government. In receipt of financial support for loan to strategic emerging industries indication by government, financial institutions who choose the developmental indirect financing mode may choose investment institutions with government-backed or commercial bank-based financial intermediaries to provide fund, and attract social funds into the finance field of strategic emerging industries in the process of investment, and ultimately realize the goal to promote the development of strategic emerging industries by finance.

In the case that developmental financial institutions select institutional investors to invest in strategic emerging industries, in addition to investment institutions with certain government-backed, investment institutions that can be chosen by developmental financial institutions can be cooperate with domestic and foreign venture capital firms and other private capital to cooperate, and then these investment institutions complete the investment business work in the strategic emerging industries^[4].

This mode can stimulate commercial banks to invest in strategic emerging industries for the following reasons: First, government-backed developmental financial institutions is an important shareholder of investment fund, which can pass information that government has decided to vigorously develop strategic emerging industries to commercial banks. Second, due to commercial banks is not the only investment contribution to the strategic emerging industries, investment risk no longer just borne by the banks. Third, it is commercial bank itself who take responsible for the daily operations of the investment fund, so the agency and operational risks for commercial banks is also controllable. To establish the hybrid fund swith commercial banks, the developmental financial institutions can

effectively mobilize commercial banks and social capital to inject capital in strategic emerging industries so as to promote the rapid development of the industry.

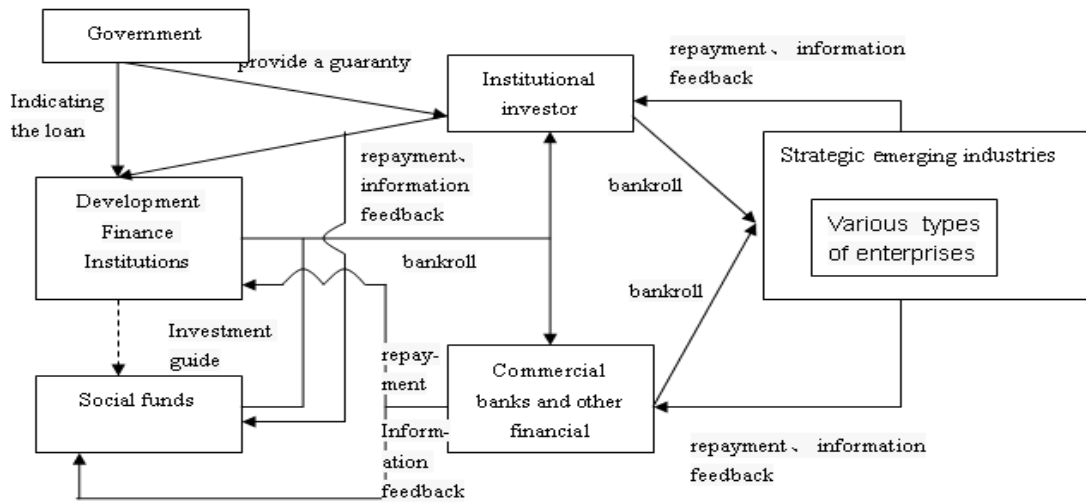


Figure 3 Developmental Indirect Financing Mode

5 Conclusion

The paper shows that developmental finance is a suitable financing mode for strategic emerging industries through mobilizing and using the existing financial resources, and conducting modest financial innovation on this basis, so as to promote strategic emerging industries to the mature stage, and ultimately achieve sustainable economic and social, stable development. In actual operation, we can choose developmental direct financing or developmental indirect financing mode according to the different characteristics of the project.

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Comparative Analysis on Characteristics and Countermeasures of China-US Shadow Banking*

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Abstract: This article studies the composition, size and causes of China's shadow banking, compares the similarities and differences in participants, financial instruments, credit expansion mechanism and the risk characteristics of China-US shadow banking. It can not only help us get deeper understanding of the nature and characteristics of China's shadow banking, but also make a great sense for reflecting financial crisis, preventing systemic risks, exploring financial innovation and strengthening financial supervision on China's shadow banking.

Key words: Shadow banking; Comparative analysis; Risk management; Countermeasures.

1 Introduction

After 2008 U.S. financial crisis, the “Shadow Banking” was known by the public. In recent years, China’s “Shadow Banking” developed rapidly, but due to the huge differences in the economic and financial structure, financial market development stage, and the financial regulatory environment, China's Shadow Banking shows a different way with U.S Shadow Banking in the product structure, mode of operation and risk characteristics.

2 What is “Shadow Banking”

2007, Paul McCulley, worked for Pacific Investment Management Company (PIMCO), first proposed the concept of Shadow Banking, as “the whole alphabet soup of levered up non-bank investment conduits, vehicles, and structures.” Shadow banking is also known as “parallel banking system”, “near-bank”.

Table 1 Introduction of Shadow Banking Definition

People or institution	Perspective	Definition of shadow banking
Paul McCulley	Organization type	the whole alphabet soup of levered up non-bank investment conduits, vehicles, and structures.
Financial Crisis Inquiry Commission(FCIC)	Financing function	The investment banks, most prominently, but also other financial institutions—that freely operated in capital markets beyond the reach of the regulatory apparatus that had been put in place in the wake of the crash of 1929 and the Great Depression.
Financial Stability Board(FSB)	Financing function	Broad definition is credit intermediation involving entities and activities outside the regular banking system. Narrow definition is those types of non-bank credit intermediation that have the potential to pose systemic risks.
Federal Reserve Bank of New York	Financing function	Shadow banks are financial intermediaries that conduct maturity, credit, and liquidity transformation without explicit access to central bank liquidity or public sector credit guarantees.
Ben Bernanke	Organization type	Shadow banking refers to the intermediation of credit through a collection of institutions, instruments, and markets that lie at least partly outside of the traditional banking system.
International Monetary Fund(IMF)	Financing function	"Near-bank entities" typically intermediate credit (or hold securities of those loans) traditionally originated by banks, primarily rely on capital market financing, have not generally been eligible for regular central bank funding (though access has been expanding), and in some cases are only loosely regulated. They include the special

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		purpose entities that issue ABS, mortgage-backed securities (MBS), CDOs, and asset-backed commercial paper (ABCP), and firms such as real estate investment trusts, global funds, the GSEs, and, until recently, the five major U.S. investment banks.
Paul Tucker	Financing function	Instruments, structures, firms or markets which, alone or in combination, replicate, to a greater or lesser degree, the core features of commercial banks: monetary or liquidity services, maturity mismatch and leverage.
China Banking Regulatory Commission(CBRC)	Organization type	Pursuit to FSB's definition, the non-bank financial institutions under CBRC supervision do not belong to the scope of shadow banking. Because the regulatory system for six non-bank financial institutions is complete, they should not be included in the scope of shadow banking, including trust companies, finance companies, auto finance companies, financial leasing companies, money brokers, consumer finance companies and other non-bank financial institutions.

From the perspective of regulatory arbitrage, due to the different regulatory requirements between non-bank financial institutions and banking institutions, the size of banking institutions, balance-sheet and off-balance sheet business, the driving factor of regulatory arbitrage for shadow banking always exist. From a regulatory perspective, the shadow banking is not necessarily visible institutions, nor can completely rule out the traditional commercial banks.

3 The Composition, Size And Causes of China's Shadow Banking

3.1 The composition of China's shadow banking

In recent years, the loans of China's banking sector accounted for the total amount of social financing decreased rapidly from 91.9% in 2002 to 52.1% in 2012. It reflected the development of direct financing channels and deepening of financial markets. But, we cannot ignore that a large number of financing needs converted to shadow banking business, and the nature of its credit facilities have not changed.

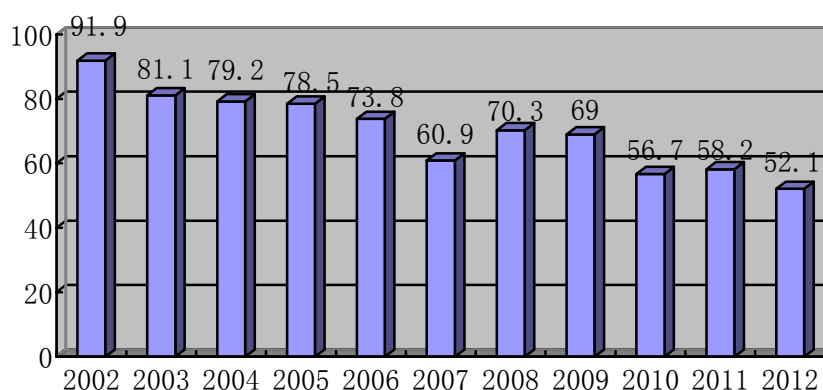


Figure 1 The Proportion of Bank Loans Accounted for Total Social Financing Amount

Source: WIND, website of the People's Bank of China

At present, China regulatory agencies, financial institutions and scholars dispute on the definition and the scope of China's shadow banking. This article agrees with financial institutions' and scholars' opinions and focus on financing functions of the shadow banking, considering the credit intermediation and the financial instruments outside the traditional banking business as the shadow banking. Participants of the shadow banking mainly involves three categories: one is the bank, the second is the non-bank financial institutions with the ability of credit creation, including securities institutions, trust companies, finance companies, security companies, small loan companies, the third category is private financing institutions, including pawn shops, private lending, internet finance.

Table 2 The Business and Products of China's Shadow Banking

Participant	Banks' off-balance sheet business	Banks' other off-balance sheet business		Trust financing			Asset Management of Brokers	Other non-bank financial institutions and private financing
	Off-balance financial product	Entrusted Loan	Off-balance sheet commercial bills	Cooperation of bank and trust	Cooperation of government and trust	Cooperation of real estate company and trust	Cooperation of bank and brokers	small loan companies, pawn shops, private lending, internet finance
Product	financial product	Entrusted Loan	Discounting, acceptance	Single trust product, beneficiary right	Infrastructure trust, funds pool trust	Single trust product	Targeted asset management plan	Lending

3.2 The size of China's shadow banking

According to FSB's Global Shadow Banking Monitoring Report 2012, the total size of the global shadow banking was about \$ 26 trillion in 2002, and then increased to \$ 62 trillion in 2007, with the average annual growth rate up to 48%. The global scale slightly declined in 2008, but then gradually rebounded, increased to \$ 67 trillion in 2011. The amount of U.S. shadow banking was largest, approximately \$ 23 trillion in 2011; the amount of Euro zone was after the United States, about \$ 22 trillion; the size of British about \$ 9 trillion; the amount of China's shadow banking accounted for about 1% of global size, about 4 trillion RMB, with an average annual growth rate of 110% post-crisis, ranking first in the world.

At end-2005

At end-2011

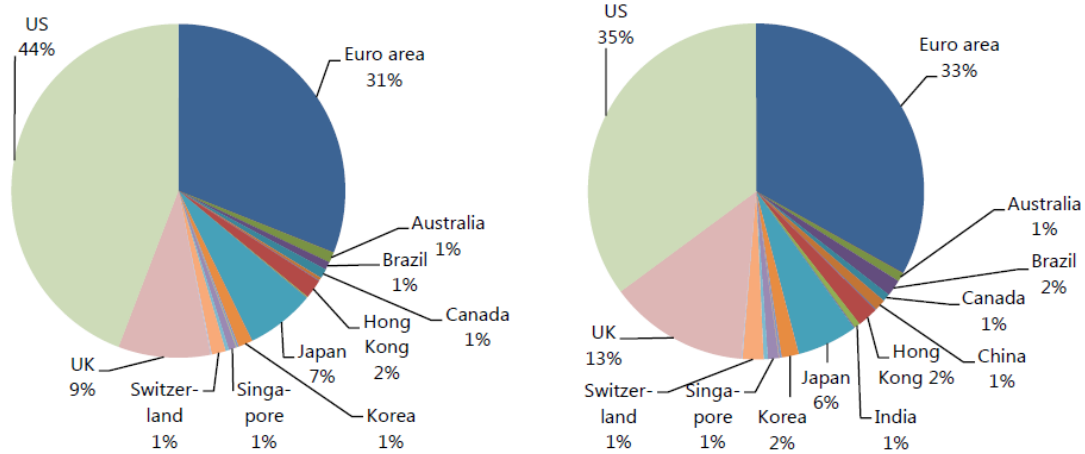


Figure 2 Share of Assets of Non-Bank Financial Intermediaries
(Source: FSB, Global Shadow Banking Monitoring Report 2012)

Domestic and foreign research institutions generally believe that size of China's shadow banking is huge. Standard & Poor's estimated that, by the end of 2012, China's shadow banking was 22.9 trillion RMB (about 3.7 trillion U.S. dollars), equivalent to 34% of total banking sector loans and 44% of gross domestic product (GDP) at the same year. China merchants securities(CMS), China investment securities(CIS), CITIC securities(CITIC), China securities CO, Haitong securities estimated China's shadow banking was 23 to 29 trillion RMB, higher than the estimation of Standard & Poor's from 0.4% to 26%. The statistical results of FSB and other agencies are quite different, mostly because that the data of FSB derived from China Banking Regulatory Commission, whose statistical standard of shadow banking is relatively strict and small.

Table 3 Estimation of China's Shadow Banking Size (Billion Yuan)

Institution	FSB	Standard & Poor	China merchants securities	China investment securities	CITIC securities	China securities Co.	Haitong securities
size	4	22.9	28.25	26.6	23 - 25	24 - 26	28.8

Source: The Institution research reports and Global Shadow Banking Monitoring Report 2012 of FSB.

Note: The estimated time points of S & P and FSB were the end of 2012 and 2011, and the estimated time points of remaining institutions were the end of 2012 Q3.

3.3 The causes of China's shadow banking

Monopoly and regulation. Those factor lead to the high price and low level of money supply, including the entry barrier to traditional banking system, industry scale effect and strict regulatory requirements. Interest rate controls lead to excess money supplies and unsatisfied social funding needs bypass the formal banking system by innovating products and channels. Different financial regulatory systems obviously influence the development of the shadow banking. Because of separate regulatory systems, industrial monopolies, entry barriers and spread controls in China, the size of the shadow banking is very great.

Regulatory arbitrage. Different regulatory measures regarding for financial institutions and financial assets result that, in one hand, commercial banks and non-bank financial institutions (trust, securities companies) established various "channels" to seek regulatory arbitrage, and on the other hand, commercial banks converted asset categories for improving capital utilization efficiency and performance rewards by financial products, i.e. commercial bills and repo.

The imbalance of money supply and demand. On the money demand side, the commercial banks need to control credit risk, and tend to choose the companies, projects and individuals with higher ratings, more collaterals or stronger guarantee ability. In Chinese economy, there are a higher proportion of unqualified borrowers, e.g. many small enterprises and individuals cannot reach financial terms of bank loans and collateral requirements, real estate and government financing platform cannot get new loans from the banks directly due to regulatory prohibitions. On the money supply side, the attractiveness of deposits was greatly weakened for investors by the interest rate controls. A lot of money escaped from banks' balance sheets to seek better investment opportunities, and be attracted by various types of financial products with higher yields and lower risk.

Financial innovation. Financial innovations constantly dig and meet various demands of money suppliers. For example, MBS and ABS which meet the housing needs, CDS against bond defaults, all has the same characteristics of acquiring yields from duration spreads, liquidity spreads, credit spreads and leverage.

Technological innovation. The advances of information and network technology, as the representative of large data, cloud computing, mobile Internet, greatly expand the scope of time and space for financial transactions. Investors can borrow and lend money at any time and any place by internet. In recent years, China emerged internet-based financing models, including Ali small loans, P2P finance, and public finance and so on.

4 Comparative Analysis of China-US Shadow Banking Risk Characteristics

4.1 Comparative analysis of China-US shadow banking

From the participating subjects, the U.S. shadow banking is constituted by non-bank financial institutions, including investment banks, hedge funds, money market funds, bond insurance companies, structured investment vehicles (SIVs), etc. U.S. shadow banking system steps across the protection for traditional commercial banks, and competes with banks, rather than cooperation. China's commercial banks dominated in the agencies, scale, and channels. So, China's shadow banking is mainly led by commercial banks. The relationships of other financial institutions with banking are more cooperation than competition, mainly as a channel cooperation to avoid banking supervision.

U.S. shadow banking was established on derivatives, securitization and re-securitization of financial instruments, including mortgage-backed securitization (MBS), asset-backed securitization (ABS), asset-backed commercial papers (ABCP), structured investment vehicles (SIVs), collateralized debt obligation (CDO) and credit default swap (CDS) and other diversified financial products. Through complex financial operations based on classification, cutting, credit enhancement, re-packaging, these financing products create financial market liquidity and gradually replace commercial bank credit market, or achieve self-creation relying on bank credit. China's shadow banking mainly consists of financial products of bank-trust cooperation and bank-securities cooperation, private financing to meet the financing needs of SMEs and personal credit business. The complexity and innovation of financial products of China's shadow banking are far less than that of U.S.

From the credit expansion mechanism, the U.S. shadow banking was mainly based on derivatives, securitization and re-securitization of financial instruments, formed a bottom-up "chain" credit intermediation systems including the product lines, the business departments and the agencies. The

credit creation of U.S. shadow banking was built on monetary banking credit, through securitization, eventually expanded credit creation functions of the entire financial system. The main target of U.S. shadow banking is to service the virtual economy. By the end of 2007, the average leverage ratio of top ten U.S. investment bank's was 30.6 times, greatly improved comparing with that of 23 times in 2003. China's shadow banking is relatively simple credit expansion mechanism with low leverage, services the real economy in a certain extent, which differs from the U.S. shadow banking.

4.2 Comparative Analysis of China-US shadow banking risk characteristics

This article compared the risk characteristics of China-US shadow banking, and preliminary assessed the risk severity (Table 4). U.S. shadow banking has a high level of risk in leverage, maturity mismatch, credit mismatch, liquidity mismatch and systemic risk. The reason is that the U.S. shadow banking is the product of well-developed financial market. China's shadow banking is product of underdeveloped financial market, unsatisfied financial needs and regulatory arbitrage. China's shadow banking has a high level of risk in systemic risk because it highly was associated with bank's customers, channels and products.

Table 4 The Shadow Banking Risk Characteristics and the Risk Severity

Risk characteristics	Description	Risk severity	
		U.S.	China
Relationship with traditional banking	The shadow banking system associated extensive, not only closely related to each other, but also associated with commercial banks and private investors, closely dependent on banks and their holding companies to participate, formed a complex chain of credit intermediation.	High	Very high
Leverage	The leverage of shadow banking can be greatly improved, without capital, reserves and leverage limitation,	Very high	Low
Maturity mismatch	Through short term borrowing and long term lending, the shadow banking can obtain high profits term spreads. When Term Structure of Interest Rates of financial market will fail, causing panic even deleveraging liquidity crisis.	Very high	High
Credit mismatch	Shadow banking provides credit enhancement services to acquire credit spreads benefits, or finance high credit asset to low credit asset to arbitrage.	Very high	High
Liquidity mismatch	Shadow banking lacks stable source of deposit, finances highly liquid assets from financial markets, counterparties and investors, invest objects are generally illiquid high-yield projects. There is a liquidity mismatch. Market liquidity depletion will lead to the funds chain of shadow banking breaks.	Very high	High
Imperfect regulation	To some extent, the shadow banking has the traditional banking functions, but without or less regulation of prudential standards or procedures. The shadow banking need not to disclosure the capital adequacy ratio, leverage ratio, liquidity and other information, nor regular supervision with the primary rely on self-discipline.	High	High
Systematic risk	Shadow banking is more fragile and vulnerable to a liquidity crisis, has a close relationship with channels, customers, products, transactions of traditional banking system. Their risk will be substantially transmitted to the banking system.	Very high	High
Incomplete risk control system	Shadow banking is not included in the deposit insurance system, the mechanism of central bank discounting and the last lender protection. Generally, the government guarantees does not apply on the shadow banking system.	High	High

5 Conclusions

China's shadow banking rapidly expanded, closely associated with traditional banks, and the systemic risk is high, but the complexity of the product, the leverage ratio of it is less than that of U.S. shadow banking. In post-crisis era, China should improve the regulatory mechanism, and guide the China's shadow banking to develop healthy and reasonably.

Regulatory authorities need to innovate the idea of financial regulatory and make the clear definition of China's shadow banking, preventing the excessive expansion of shadow banking and regulatory blind spots.

In the macro-prudential perspective, China should build up across-agency collaboration regulatory mechanisms which consider the monetary and fiscal policies, and the regulatory requirements for the banks, securities, insurances, trusts and other non-bank financial institutions. It will expose the shadow banking to the sun and promote the further development of China's financial markets.

The shadow banking business involves commercial banks, trusts, securities, private finance, and other participants. The key point is to prevent the risk contagion in the financial market, and distinguish the risk responsibilities among the participants in shadow banking system.

Commercial banks should improve the risk management mechanism for "internal" shadow banking, establish an effective means of risk identification, evaluate the direct and indirect risks of the shadow banking, establish risk prevention and response mechanisms, strengthen the management of cooperation agencies, explicit exit mechanism for business, and build up risk stop-loss and self-help mechanisms.

Regulate private financing development, gradually combines induction of the regulatory approach and mandatory legal system to promote China's financial industry stability and development.

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Exchange Rate Pass-Through to Import and Export Prices: An Empirical Analysis in China

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Abstract: This paper conducts empirical analysis on exchange rate pass-through to import and export prices in China with monthly data from 1999 to 2008, and finds that exchange rate pass-through is higher to export prices than to import prices. The analysis shows that the difference in the pass-through of exchange rate to import and export prices arises from the difference in industrial margin, international treaties and trade barrier. Based on empirical results and China's sustained trade surplus, this paper concludes that the demand elasticity of China's export is small due to strong competitive edges in price of China's export products, so the appreciation of RMB will do little in reducing China's foreign trade surplus.

Key words: Exchange rate passes through; Import price; Export prices

1 Introduction

Over the years, China's trade surplus continues to expand and foreign exchange reserves increase substantially, which have imposed great pressure on China's economic development and policy making. Meanwhile, China's great trade surplus has been always condemned by America and EU and they point out that it is because RMB is undervalued that China's export increases greatly and vast trade deficit occurs in their own countries. So since 2002, RMB has been faced constant appreciation pressure that the international community exerted. In 2005, China initiated the reform about the exchange rate formation mechanism of RMB and since then RMB has been put on the track of appreciation. So far, the exchange rate of RMB against USD has risen about 20%. The subprime crisis took place in 2007 in the United States brings about serious economic recession in most countries especially in USA and Europe, these countries point out that the substantial trade surplus of China is harmful for them to recover the economy growth and employment, so the United States and other countries force China to appreciate RMB again in 2010.

Theoretically, fluctuation of exchange rate does affect one country's import and export following two steps. At first, the fluctuation of exchange rate affects the prices of import and export, which then affect the volume of import and export and trade balance further. In order to know exactly whether exchange rate fluctuation affects China's import and export and whether the appreciation of RMB reduces China's vast trade surplus or not, it is important to understand the effects the exchange rate change leads to at two steps. This paper tries to analyze the first step at which exchange rate change affects the import and export, that is to say, the paper tried to investigate to what extent the exchange rate fluctuation of RMB affects the prices of China's import and export. The research is of great significance to understand the exact effects of the exchange rate change of RMB on China's foreign trade and then is helpful for adopting appropriate foreign exchange rate and trade policies.

The structure of this paper is as follows, part I is the introduction and part II is literature review, part III is the procedure and results of empirical analysis, and the last part is the conclusion and suggestion.

2 Literature Review

The effects of exchange rate change on import and export prices can be theoretically interpreted by the Law of One Price (LOP) and Purchasing Power Parity (PPP). If the LOP holds, the change of exchange rate will be passed through to the prices of import and export in the same proportion, and the change of price will affect the import and export further. So the more the exchange rate appreciates, the more the trade surplus can be affected.

Though there have been much literature study exchange rate pass-through of RMB in China, most of them are focused on the pass-through to import or export price exclusively. This paper will analyze and compare the exchange rate pass-through of RMB both to import and to export prices, thus is more

helpful for understanding the overall effect of the exchange rate change on foreign trade and for adopting concrete import and export policies. We analyze the exchange rate pass-through empirically with monthly data from 1999 to 2008, and adopt the methods of co integration test and impulse response analysis.

3 Empirical Analyses

3.1 Model and data

According to LOP, the import price is decided by the exporting price abroad and the exchange rate of local currency, which can be expressed as follows:

$$IMP = E \times FP \quad (1)$$

Where IMP stands for domestic import prices; E is the exchange rate of local currency (direct quotation); FP is the price of the imported goods in foreign currency. Taking it into consideration that income level will influence the demand for import and further raise prices, this paper adds income level (Y) as one of the factors that affect prices of import. Taking logarithm of values on both sides of Expression (1) and we get the liner equation for logarithm of import prices as follows:

$$\ln IMP = \ln E + \ln FP + \ln Y \quad (2)$$

Similarly, the liner equation for logarithm of export prices is as follows:

$$\ln XP = \ln E + \ln DP + \ln FY \quad (3)$$

Where XP stands for domestic export price; E is the exchange rate, DP stands for domestic price of the exported goods, FY is income level in foreign countries.

According to Expression (2) and (3), we establish the econometric model for import and export prices as follows:

$$\begin{aligned} \ln IMP &= a_0 + a_1 \ln E + a_2 \ln FP + a_3 \ln Y + \varepsilon_0 \\ \ln XP &= \beta_0 + \beta_1 \ln E + \beta_2 \ln DP + \beta_3 \ln FY + \varepsilon_1 \end{aligned} \quad (4)$$

Based on Expression (4), this paper uses monthly data from 1999 to 2008 to analyze the exchange rate pass-through to China's import and export prices empirically. IMP and XP are expressed by the import and export price indices respectively. The exchange rate E is expressed by nominal effective exchange rate of RMB. Foreign price FP is expressed by price index of foreign producers, while domestic price DP is expressed by the domestic producer price index (PPI). Domestic income level Y and foreign income level FY are expressed by domestic GDP and foreign GDP respectively.

Since there is no monthly data for domestic GDP, this paper converts the seasonal data for domestic GDP into monthly data using Eviews 6.0. And there is no global GDP data, we convert seasonal GDP data of China's major trade partners (USA, Russia, South Korea, Japan and some countries in EU) into monthly data first and then made seasonal adjustment with X12. Afterwards, GDP of those countries are converted into dollar-dominated GDP using monthly exchange rate of those countries' currencies against USD, and then the monthly global dollar-dominated GDP are obtained by summing up monthly dollar-dominated GDP of those countries. Foreign producer price index FP was calculated using producer price index of China's major trade partners (Japan, USA, Russia, South Korea and EU), it is the weighted average number of those countries' PPI and the weight is obtained by each country's share in China's import volume.

Except that RMB nominal effective exchange rate comes from the website of the Bank for International Settlements, other data involved are derived from the database of China Economic Information network. For the domestic PPI, import price index and export price index, we take data in 2005 as 100. Foreign GDP and domestic GDP were also converted into relative data by taking data in 2005 as 100. The analysis software used in this paper is Eviews6.0.

3.2 Unit root test

For time series, stability of all variables shall be tested before doing regression analysis in order to avoid spurious regression. This paper uses ADF criteria to test the stability of variables in Expression (4) and the results are shown in Table 1.

According to Table 1, the series including $\ln IMP$, $\ln E$, $\ln FP$, $\ln CGDP$, $\ln XP$, $\ln PPI$ and $\ln GDP$ are unstable at 5% significance level, but their 1st difference series are stable, which indicates that all the variables are I(1) series.

Table 1 Results of ADF Test

Variables	Methods	Lag intervals	5% critical value	ADF value	Results
lnIMP	Trend	3	-3.44902	-3.04052	Unstable
dlnIMP	Intercept	2	-2.886509	-3.25138	Stable
lnE	Trend	1	-3.448348	-0.85634	Unstable
dlnE	Trend	0	-3.448348	-8.03321	Stable
lnFP	Trend	1	-3.448348	-2.18935	Unstable
dlnFP	Trend	0	-3.448348	-5.7532	Stable
lnY	Trend	11	-3.451959	0.315966	Unstable
dlnY	Trend	12	-3.452764	-5.72806	Stable
lnXP	Trend	1	-3.448348	-1.38985	Unstable
dlnXP	Trend	0	-3.448348	-21.095	Stable
lnDP	Intercept	0	2.885863	-1.21527	Unstable
DlnDP	Trend	0	-3.448348	-8.80182	Stable
lnFY	Trend	0	-3.448348	-1.91652	Unstable
DlnFY	Trend	0	-3.448348	-8.81863	Stable

3.3 Cointegration test

According to unit root test, the seven variables were all 1st order integration and cointegration test was conducted for Expression (4) to check whether there existed a long-term cointegration relationship between those variables. Since import prices model and export prices model involve four variables, it is inappropriate to use two-step stability test (this method is suitable to examine the relationship between two variables) and this paper adopted Johansen method to conduct cointegration test for variables.

The optimal lag intervals of VAR model for import prices was 4 according to AIC and SC rules, therefore the lag intervals in co integration test was 3. The results of co integration test were as shown in Tab.2.

Table 2 Results of Co Integration Test for Import Prices Equation

Null hypothesis	Trace Statistic	Critical Value 5%	Maximum Eigen value	Critical value of maximum Eigen value 5%
no	64.75843	54.07904	39.62574	28.58808
One at most*	25.13269	35.19275	11.19731	22.29962
Two at most	13.93538	20.26184	8.571199	15.8921
Three a most	5.364184	9.164546	5.364184	9.164546

Trace test and the maximum eigenvalue test indicated that a cointegration equation existed between import prices, RMB nominal effective exchange rate, foreign product prices and domestic income at 5% significance level and the normalized long-term cointegration equation is as follows:

$$LNIMP = -0.1730 LNE -1.1354 LNFP + 0.6772 LNCGDP +7.4379 \quad (5)$$

(0.25907) (0.42028) (0.11094) (1.82314)

The optimal lag intervals of VAR model for export prices was 2 according to AIC and SC rules, therefore the lag intervals in cointegration test was 1. The results of cointegration test were as shown in Tab.3.

Table 3 Results of Cointegration Test for Export Prices Equation

Null hypothesis	Trace Statistic	Critical Value 5%	Maximum eigenvalue	Critical Value of maximum Eigenvalue 5%
no	67.2315	54.07904	32.26359	28.58808
One at most*	34.96791	35.19275	21.84329	22.29962
Two at most	13.12462	20.26184	10.79431	15.8921
Three a most	2.330314	9.164546	2.330314	9.164546

Trace test and the maximum eigenvalue test indicated that a cointegration equation existed between export prices, RMB nominal effective exchange rate, domestic product prices and foreign income at 5% significance level and the normalized long-term cointegration equation is as follows:

$$\text{LNXP} = 0.7593\text{LNE} + 0.7453 \text{LNPP} + 0.0905\text{LNGDP} - 2.7969 \quad (6)$$

(0.26827) (0.32136) (0.24291) (1.48210)

From the above two cointegration equations, the elasticity of import prices against exchange rate was -0.173, that is to say, import prices decline by 0.173 percentages as RMB nominal effective exchange rate rises by 1 percentage. The elasticity of export prices against exchange rate was 0.759, that is to say, export prices rises by 0.759 percentages as RMB nominal effective exchange rate rises by 1 percentage. This is consistent with the theoretical analysis that import prices decline and export prices rise when domestic currency appreciates. This also means that rise of RMB exchange rate has expected pass-through into import and export prices and this will cause China's import to increase and export to decrease. On one hand, the long-standing problem of vast trade surplus in China can be narrowed; on the other hand, China's export products and employment will be affected adversely.

In addition, a distinctive feature can be seen from the analysis results that RMB exchange rate has different pass-through into import and export prices and latter is greater. The t-statistic was 0.6678 in import prices equation, while the t-statistic was 2.830 in export prices equation, thus the significance level of the latter was apparently higher than the former. The author thought there were several reasons:

Foreign exporters are more capable to adjust product prices according to exchange rate fluctuation. Imported products of China are mainly hi-tech products, energy (oil), raw materials (iron and steel) fuels and non-ferrous metal and those industries are highly profitable. For example, oil is basically a monopolized industry and has little competition, so different prices can be set in different markets. Because a stabilized supply of resources products is quite important to China's construction and development, many manufacturers have built a long-term supply relationship with international resources suppliers and effects of exchange rate on import prices of those products are weakened^[5]. Export products of China are mostly agricultural products, manufactured products and textiles and those industries have fierce competition and low profitability. Therefore, when RMB exchange rate changes adversely, foreign exporters adjust profitability or raise price makeup to counteract loss in exchange rate fluctuation, but domestic exporters can make limited adjustment. Besides, export cost is higher than import cost in China. Since China's export products usually have price advantage, many countries restrict price and quantity of China's export products. During recent years, they limit China's export products to enter markets of their own countries and set trade barrier in the name of green trade. In opposite, imported products of China usually have high technological content or scarce resources and cannot be replaced by domestic products. Therefore, China has set few trade barriers for imported products. As is known to all, trade barrier will increase trade cost and lower trade cost can bring more profit for foreign exporters, thus their pricing strategies are not so incentive to exchange rate.

4 Conclusions and Suggestions

This paper made use of monthly data from 1999 to 2008 and studied RMB exchange rate pass-through effect on China's import and export prices through cointegration test, vector error correction model and impulse response analysis, and the research findings are as follows. 1. In a long run, RMB exchange rate fluctuation has negative pass-through effect on import prices but positive pass-through effects on export prices, which is consistent with theoretical analysis. Besides, the elasticity of import prices against exchange rate (absolute value) is only 0.173, much lower than the elasticity of export prices against exchange rate at 0.759. This indicates the impact of exchange rate on export prices is much greater than that on import prices. In addition, this research also shows that import prices are in inverse proportion to foreign product prices and direct proportion to domestic income, while export prices vary directly with domestic product prices and foreign income. 2. There is a reverse amendment mechanism in exchange rate pass-through effects on both import and export prices, but both import and export prices are slow to recover to the long-term equilibrium. When exchange rate suffers from a positive impact, import prices will show negative response which lasts for a long time and export prices will show positive response which is weak and lasts for a short period.

According to results of empirical researches, RMB nominal effective exchange rate has exerted pass-through effect on both import and export prices which are consistent with theoretical expectation. To put it clearly, appreciation of RMB causes export prices to rise and import price to decline. In particular, the degree of pass-through effects on export prices reaches 0.76. This means, the changes of

RMB effective exchange rate have significant effects on China' import and export commodity prices, especially on export product prices. Therefore, RMB exchange rate can play a crucial role in China's import and export. This can explain why America and other countries have been imposing pressure on appreciation of RMB in face of China's vast trade surplus, in the expectation of reducing price competitiveness of China' export products and lowering down China's export volume through substantial appreciation of RMB. This can also explain why Chinese government has always been holding a cautious attitude towards appreciation of RMB, and placing great emphasis on initiative and controllability in adjustment of RMB exchange rate. Since exchange rate pass-through effect on import prices is much lower than that on export prices, appreciation of RMB may have no major impact on import but great adverse effects on export.

Appreciation of RMB exchange rate causes import prices to decrease and export prices to rise, but the low price of China's export products leads to small elasticity of export demand and thereby safeguards China's export. However, it is not a permanent solution to maintain export and promote economic development by relying on our advantage in low-priced products. What lies behind lower prices is cutthroat competition among Chinese exporters and massive consumption of China's resources and cheap labor. Besides, low-price competition leads to low margin of China's export industry, which is unfavorable to the long-term development of our export industry.

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The Relevant Research on Information Ability and Core Competence in Chinese State-Owned Joint Stock Banks*

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Abstract: In order to make the analysis of information ability and core competence in Chinese state-owned joint stock banks, structural equation model (SEM) is used in this paper. By factor choice, research supposition, factor decomposition, model establishment, data collection and reliability analysis and validity testing, the SEM can effectively conduct empirical research on information ability and core competence in Chinese state-owned joint stock banks. For illustration, the collected copies are 429, and the effective rate of collection is 42.9%, which has satisfied the requirement that the questionnaire returns-ratio is not lower than 20% in the data investigation. The empirical results show that Information productivity ability has the remarkable incentive function to the risk control ability, product development ability and internal control ability. Furthermore, the product development ability have obtained a more effective cultivation, risk control and internal control ability have obtained the certain cultivation. Finally, the practical data examination can provide the feasible theory reference for the state-owned joint stock commercial banks (SJSCBs) to develop information ability and cultivate core competence.

Key words: Chinese state-owned joint stock commercial bank; Information ability; Core competence; Structural equation model (SEM)

1 Introduction

The competition among the modern enterprises is essentially a fight for the core competence. The cultivation of core competence is the basic strategy for enterprises to maintain the sustainable competitive advantage. Similarly, being one kind of typical knowledge industry, the competition in banking industry mainly depends on a race for core competence. The massive resources have been put into the following aspects such as product development, risk control and market marketing to rapidly cultivate the partial superiority in some domains so as to construct the core competence. Therefore, the cultivation of core competence has been considered to the most important strategy for banks' development in the state-owned joint stock commercial banks (SJSCBs) since last century.

The core competence theory stemmed from the early-1990s. In 1990, Prahalad & Hamel firstly proposed the concept of core competence. He thought that the core competence was the cumulative knowledge in the organization, which was specially related to how to coordinate the different productive skills and make the organic synthesis of the technological means. The prologue to the theoretical probe was opened^[1]. So the organization can acquire the core competence through the cultivation and the development in the long time.

Being the constituent part of the enterprise strategic theory, the core competence theory was the fifth stage of strategic theory. Therefore, the core competence theory stemmed from an insufficiency of the traditional strategy theory^[2]. The core competence theory believed that enterprise competition went far beyond the scope of Porter Five Force Model so that the theory was a mixture of the internal and external factors in enterprises.

The concept of bank information ability stemmed from the concept of enterprise information ability. At National Commission on Libraries and Information Science (NCLIS) in 1974, Paul Zurkowski, the President of Information Industry Association (IIA) put forward the concept of information ability for the first time. The information ability referred to the skill and the technology through which the person with information ability took advantage of the multiple message tools and the main information resource to deal with problems^[3]. Therefore, the bank information ability referred to a series of information

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management activities completed by staffs with the certain information ability with the help of information tool in order to finish some information tasks.

In fact, the insufficiency of information ability has been restricting the enhancement of core competence variously in the SJSCBs. The insufficiency of information ability will restrict the SJSCBs-related innovation ability in the domain of risk management, reduce the SJSCBs-related risk value assessment ability, and hinder the application of quantitative technique in risk management^[4].

Therefore, based on the cultivation goal of the core competence, the analysis on the incentive mechanism of information ability has promulgated the incentive microscopic mechanism of the SJSCBs information ability, which will provide the theoretical reference for strengthening the development, the management and the application of the information ability and promoting the growth of core competence in the SJSCBs.

2 The Establishment of Research Model

2.1 The choice of research factors

2.1.1 The factor choice of information ability system

American information scientist Marchand proposed the information orientation (IO) theory. The information application efficiency included three key factors such as the information behavior and the value, the information management practice, the information technology practice^[5]. The US management scientist John Mckean believed the enterprise information ability system included the following essential factors such as staffs' application information ability, the information valid disposition, the organizational structure, the reward of the effective information application from various functional departments, the information culture of manifesting the information value, the full understanding of information function and the leadership skill in relation to supporting information investment, the enhancement of the information value as well as the accuracy of information of the applied technology information^[6]. The enterprise information ability was divided into five essential factors and bank information ability included three aspects. According to the above analysis, the SJSCBs information ability can be divided into three essential factors in the research such as information productivity ability, information retrieval ability and information application ability.

2.1.2 The factor choice of core competence system

The SJSCBs core competence system can be divided into the following four essential factors including risk control ability, product development ability, internal control ability and market development ability. Risk control ability is related to operational risks, credit risks and market risk. Product development ability refers to the design ability, the transformation ability and combination ability of each kind of financial product. Internal control ability refers to the promotion ability of each kind of internal control essential factor. Market development ability refers to the development ability, the optimization ability and the coordinated ability towards marketing channel.

2.2 Research supposition

2.2.1 The incentive analysis of information productivity ability towards core competence

The information productivity ability is the basic element of information ability because the bank can gather the massive information resource and make the cultivation of the core competence only through the information productivity ability. The following research suppositions are given:

H1A: SJSCBs information productivity ability promotes the implementation effect on the risk control ability.

H1B: SJSCBs information productivity ability promotes the implementation effect on the product development ability.

H1C: SJSCBs information productivity ability promotes the implementation effect on the internal control ability.

H1D: SJSCBs information productivity ability promotes the implementation effect on the market development ability.

2.2.2 The incentive analysis of information retrieval ability towards core competence

The information retrieval ability is the crucial factor concerning information ability because only after completing the demand information search, the information-related application value can be achieved. The information retrieval ability is the link of information collection ability and the information application ability. According to the above analysis, the following research supposition can be seen.

H2A: SJSCBs information retrieval ability can promote the implementation effect on the risk

control ability.

H2B: SJSCBs information retrieval ability can promote the implementation effect on the product development ability.

H2C: SJSCBs information retrieval ability can promote the implementation effect on the internal control ability.

H2D: SJSCBs information retrieval ability can promote the implementation effect on the market development ability.

2.2.3 The incentive analysis of the information application ability towards the core competence

Being the fundamental essential factor in the information ability system, the information application ability is the combination of information resource and the banking process, which will has the most direct motivation function to the cultivation of the core competence. In the SJSCBs, the risk control, the product development, the internal control and the market development need the support of the massive reliable information. But the information-related support behavior towards these leading services is a gradual process and a process of gradual integration. Therefore, the cultivation of the information application ability is a kind of management art, which will be affected by kinds of factors such as staff's business proficiency, incentive mechanism, banks' strategy development project and enterprise culture and so on. According to the above analysis, the following research suppositions are presented.

H3A: SJSCBs information application ability promotes the implementation effect on the risk control ability.

H3B: SJSCBs information application ability promotes the implementation effect on the product development ability.

H3C: SJSCBs information application ability promotes the implementation effect on the internal control ability.

H3D: SJSCBs information application ability promotes the implementation effect on the market development ability.

2.3 The essential factor decomposition

2.3.1 The essential factor analysis of information ability

According to the literature, combined with the operational mechanism of the SJSCBs information ability system, the essential factor analysis of the SJSCBs information ability system can be achieved.

Information productivity ability can be divided into four measure targets such as the information gathering ability (X1), the information storage ability (X2), the combination ability (X3) and the information filter ability (X4).

Information retrieval ability can be divided into four measure targets such as the database ability(X5), the infrastructure performance (X6), the software ability (X7) and the professional cultivation (X8).

Information application ability can be divided into four measure targets such as the market application ability(X9), the product application ability (X10), the flow transformation ability (X11) and the policy-making application ability (X12).

2.3.2 The essential factor analysis of core competence

According to the literature, combined with the operational mechanism of the SJSCBs information ability system, the essential factor decomposition of the SJSCBs core competence system can be achieved.

Risk control ability can be divided into four measure targets such as the credit risk control ability (Y1), the operational risk control ability (Y2), the market risk control ability (Y3) and the comprehensive risk control ability (Y4).

Product development ability can be divided into four measure targets such as the core product development (Y5), the basic product development (Y6), the augmented product development (Y7) and the latent product development (Y8).

Internal control ability can be divided into four measure targets such as the climate control (Y9), the risk loss assessment (Y10), the implementation of internal control system (Y11) and the information feedback mechanism (Y12).

Market development ability can be divided into four measure targets such as the market segmentation ability (Y13), the product positioning ability (Y14), the network marketing ability (Y15) and the customer value analysis (Y16).

2.4 The establishment of research model

The research plans to use the structural equation model (SEM) to examine the theoretical supposition. Suppose that the information productivity ability is ξ_1 , the information retrieval ability is ξ_2 ,

the information application ability is ξ_3 , simultaneously suppose that the risk control ability is η_1 , the product development ability is η_2 , the internal control ability is η_3 , and the market development ability is η_4 . According to the research supposition, the research model is shown in Figure 1.

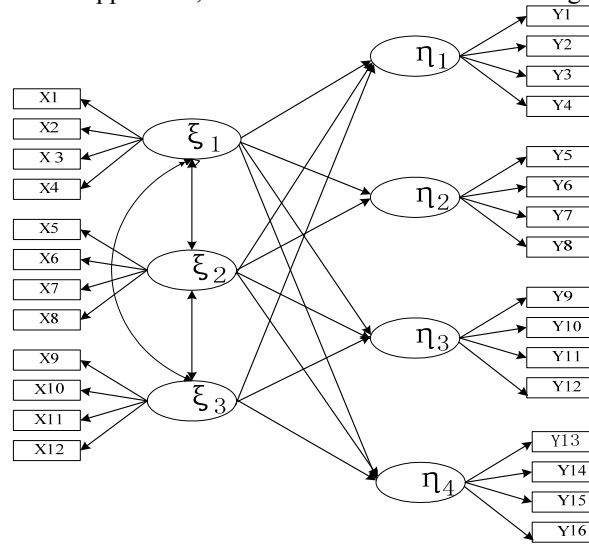


Figure 1 Research Model

3 Model Checking

3.1 Data collection

The research used Li Kete 7 meters to carry on perform towards 28 measure targets. The sample units were the bank municipal branch of Chinese SJSCBs system. The data investigation provided 1000 questionnaire, the collected copies were 429, and the effective rate of collection was 42.9%, which had satisfied the requirement that the questionnaire returns-ratio was not lower than 20% in the data investigation. 168 samples with the better data quality were selected among the recycling questionnaire. The ratio of the sample number and the target number was 6:1, which had satisfied the examination requirement of the SEM data. Among them, there were 60 copies of samples to China ICBC, 29 copies of samples to China Construction Bank, 36 copies of samples to Agriculture Bank of China, 43 copies of samples to Bank of China. So these samples had represented the overall sample characteristics of Chinese SJSCBs. The data interviewee mainly was the senior management, the head of department or backbone in banks. Therefore, the data quality had the high credibility. The data investigations began in March 19, 2012, end in April 30, 2012, altogether lasted for 41 days.

3.2 Reliability analysis and validity testing

In banks' information ability system scales, Cronbach α value was 0.7548. The first-level confirmation analysis result of banks' information ability system was GFI=0.932, CFI=0.917, TLI=0.955, RMR=0.014, RMSEA=0.038, Cronbach α =58.128, $p=0.000$ in the bank information ability system, the factor load of each measure target was bigger than 0.5, and the smallest T value was 2.331. Therefore, the bank information ability system had the good reliability and the validity.

Table 1 Effect Matrix

Assumption	Extraneous source variable	Endogenous variable	Path assumption	Load coefficient	Standard error(se)	T value
H1A	Information productivity ability	Risk control ability	$\xi_1 \rightarrow \eta_1$	0.30	0.09	3.23
H1B	Information productivity ability	Product development ability	$\xi_1 \rightarrow \eta_2$	0.32	0.10	3.20
H1C	Information productivity ability	Internal control ability	$\xi_1 \rightarrow \eta_3$	0.45	0.13	3.46
H1D	Information productivity ability	Market development ability	$\xi_1 \rightarrow \eta_4$	0.13	0.08	1.52
H2A	Information retrieval ability	Risk control ability	$\xi_2 \rightarrow \eta_1$	0.12	0.07	1.76
H3A	Information application ability	Risk control ability	$\xi_3 \rightarrow \eta_1$	0.35	0.08	4.38

The Cronbach α value of the banks' core competence system was 0.7643. The first-level confirmation analysis result of the bank core competence system was GFI=0.980, CFI=0.921, TLI=0.912, RMR=0.030, RMSEA=0.043, Cronbach α =132.52, $p=0.000$, the factor load of each measure target was bigger than 0.5, and the smallest T value was 2.223. Therefore, the bank core competence system had the good reliability and the validity.

The research used LISREL 8.7 to perform the whole model test. The effect matrix (r) of the extraneous source variable and the endogenous variable was shown in Table 1.

Simultaneously the whole model fitting index was shown in Table 2.

Table 2 Fitting Index Tabulation

Fit index	X ² /d.f.	RMSEA	RMR	CFI	NFI	IFI	CFI	TLI
Index current value	1.354	0.034	0.065	0.988	0.927	0.909	0.945	0.929
optimal value trends	<3	<0.08	<0.1	>0.9	>0.9	>0.9	>0.9	>0.9

Therefore, the model's fitting effect was good so that model revision did not need to be corrected.

4 Conclusions

According to the fitting index tabulation, the model fitting effect is good. Therefore, the check result of effect matrix tabulation has the certain reliability, which can effectively reflect the intrinsic relevance between SJSCBs information ability and the core competence.

According to the effect matrix tabulation, based on the cultivation goal of the core competence in SJSCBs, the microscopic function mechanism of information ability is followed. Information productivity ability has the remarkable incentive function to the risk control ability, product development ability and internal control ability, but lacks the effective incentive to the market development ability. Information retrieval ability has the remarkable incentive function to the product development ability, internal control ability and market development ability, but lacks the effective incentive to the risk control ability. Information application ability has the remarkable incentive function to the risk control and product development ability, but lacks the effective incentive to the internal control ability and the market development.

Therefore, SJSCBs information ability has the certain incentive function to the formation of core competence, but this kind of incentive function still has certain deficiencies, which needs to expand and perfect continuously. From the information ability angle of view, the information productivity ability and information retrieval ability have the better incentive function to the formation of core competence, but the information application ability is weak. At the same time, based on the formation of core competence, under the operational mechanism of information ability, the product development ability have obtained a more effective cultivation, risk control and internal control ability have obtained the certain cultivation, but the cultivation effect of market development ability is weakest.

Based on the practical data examination of the information ability and the core competence in SJSCBs, the research conclusion has the higher objectivity, which will provide the feasible theory reference for the SJSCBs to develop information ability and cultivate core competence with a clear aim.

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Study on Quantitative Evaluation of Comprehensive Transportation Planning Programs

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Abstract: Comprehensive transport planning, comprehensive and systematic, is aimed for the optimal benefits of the entire system which includes railways, highways, waterways, civil aviation, pipeline and other transport subsystems. This paper deals with the selection of the optimal comprehensive transport planning program among several candidates through the use of quantitative evaluation, constructing a comprehensive evaluation index system and also evaluation models, elaborating on the principles of quantitative evaluation, clarifying the significance of quantitative evaluation.

Key words: Transportation engineering; Comprehensive transportation planning; Design scheme; Quantitative evaluation

1 Introduction

Since the various transport subsystems complement, influence and compete with each other, it is inadvisable to be solely concerned about the efficiency of a particular mode of transport while devising a comprehensive transport scheme (System Theory suggests that local optimum is no guarantee of global optimum). Therefore, comprehensive transport planning is fairly complex, being multi-level, multi-factor and multi-target. The implementation of the scheme will not only improve the transportation network itself, but also exert great influence on society, economy, and environment. Moreover, evaluation of a comprehensive transport scheme hinges not only on its feasibility but its impact upon technology, economy, society, environment, etc.

2 The principles of Quantitative Evaluation and the Evaluation Index System

2.1 The principles of quantitative evaluation

Systematic evaluation forms the basis of systematic decision-making, which means that without proper evaluation, correct decisions can no be made. The evaluation of the comprehensive transport scheme can help to locate its demerits and discern the weak points of the modern comprehensive transport system, which is conducive to effective policy-making and betterment of the modern comprehensive transport system. In view of all that have been discussed above, the basic principle and ultimate goal of evaluation of the comprehensive transport planning is to select the optimal scheme from a variety of candidates by means of quantitative analysis, or to revise the existing scheme and to redesign on the basis of evaluative analysis, hence providing scientific support for the ultimate decision-making.

2.2 The establishment of an evaluation index system

Considering the structural characteristics and attributes of the modern comprehensive transport system, this paper sets up a hierarchical, multi-indicator index system based on the principles of systematicity, measurability, stratifiability, comparability. The index system is composed of four categories of indicators: technical, economic, social, environmental; it is stratified into three layers: the target, namely the comprehensive evaluation that constitutes the ultimate goal, the criteria that involves all the factors influencing the realization of goals, the specific indexes.

Table 1 The Modern Comprehensive Transport Planning Evaluation Index System

Target	First-level indexes (criteria)	Indexes
Comprehensive Transport Planning Program O	Technology-A	The proportion of comprehensive transport hub nodes-A1
		The convenience of a comprehensive transport network(reach ability)-A2
		Comprehensive transport network connectivity-A3
		Continuity of the comprehensive transport network-A4

	Economy-B	The direct economic benefit of the national economy-B1
		Operating divisions economic benefits -B2
		Indirect economic benefits of the national economy-B3
	Society-C	Consistency with national policies and local economic development-C1
		Land development and utilization-C2
		Employment-C3
		Rational distribution of population-C4
		National defense and foreign exchange-C5
		Exchanges and national unity -C6
		People's lives (User benefits, transport and delivery) -C7
	Environment-D	Land possession-D1
		Pollution (discharge of pollutants, noise) -D2
		The ecological balance-D3
The natural landscape and cultural relics-D4		

2.2.1 Technical evaluation of the comprehensive transport planning program

The technical evaluation of the comprehensive transport planning program means analyzing the internal structures and functions of the comprehensive transport system from a technical point of view, aiming at checking the rationality of the scheme and providing technical support for optimization and decision-making. The four indicators above are the main technical indicators used to describe a comprehensive transport network, according to the widely adopted methods in planning. While the four indicators are put into practical use, it is unnecessary to calculate each and every one of them; rather, in specific situations, certain indicators should be highlighted and singled out for calculation, analysis and evaluation.

2.2.2 Economic evaluation of the comprehensive transport planning program

Generally, the national economic evaluation model is employed in the evaluation of the economic benefits of the comprehensive transport planning program, which entails two dimensions: costs and benefits. In accordance with the principle of rational distribution of resources, national economic evaluation adopts evaluation indexes such as shadow price etc. to calculate the social resources consumed in the project and the social devotion drawn from the project, aiming at measuring aims at measuring the economic rationality of projects. National economic evaluation mainly involves calculating the national economic benefits and costs, calculating and selecting the shadow price, calculating the national economic indexes as well as comparing economic schemes. National economic evaluation is widely used in the field of railways, highways and other transportation projects, as well as a large water hydropower projects, the state-controlled strategic resource development projects.

2.2.3 Social evaluation of the comprehensive transport planning program

Social evaluation means analyzing the social influences of the comprehensive transport scheme (project) within the planning area. As is known to all, transportation plays an essential role in urbanization, exploitation of resources, employment expansion, and economic prosperity of a region. For example, Port of Shanghai has profoundly accelerated the development of Shanghai. It is not presumptuous to say that transportation is irreplaceable and unchallenged in terms of its profound influence on society and economy. However, it is usually difficult to quantify fits social influences and different situations may lead to widely different results. Therefore, it is advisable to combine quantitative and qualitative analysis in carrying out social evaluation, while taking the specific circumstances into account.

2.2.4 Environmental evaluation of the comprehensive transport planning program

The environmental impact of the transportation projects includes air, water, soil and noise pollution, harm to animals and plants, damage to natural landscapes and cultural relics, etc. The environmental evaluation index can be regarded a salute to the "low-carbon transportation, pollution-free transportation" appeal. At the annual meeting of the 2010 World Economic Forum New Champions, Premier Wen Jiabao said in his speech that China will make great efforts to build a low-carbon-emission

transportation system, to boost the demonstration and industrialization of low -carbon technology research, to enhance the ability to cope with climate change, to actively carry out international cooperation to address climate change under the principle of “common but differentiated responsibilities”. It should be noted that the first three first-level indicators are positive, whereas the environmental evaluation indicators are negative, namely only “minimal impact on the ecology” scores the highest marks and proves to be optimal. Thus in statistical analysis, reverse scoring helps to achieve the consistency of outcomes.

3 The Comprehensive Evaluation Model of the Comprehensive Transport Planning Program

In the process of a comprehensive evaluation of the comprehensive transport plan, the analytic hierarchy process is not suitable for comparing various transport plans yet suitable for calculating the weight value of each level, whereas the fuzzy evaluation method is quite the reverse. In light of the respective merits and demerits of the analytic hierarchy process and fuzzy evaluation, as well as the characteristics of the comprehensive transport planning program, this paper adopts and combines the two methods to construct an evaluation model. There are four steps to implement the model, namely data normalization, using AHP to determine the weight of each level, using fuzzy evaluation to evaluate the plan and establish a fuzzy relation matrix, and finally drawing conclusions. Having tested and demonstrated the model, two comprehensive transport schemes m and n are picked out for empirical evaluation and analysis, so as to get the final results of the evaluation.

3.1 Data normalization

While using the formula to calculate the composite indicator, some important indicators may make up a very small proportion of it due to its small value, which results in the distortion of the comprehensive index value. The main reason for that is the differential meaning and units of each indicator. Therefore, data normalization is prerequisite for a comprehensive evaluation. The formula is as follows:

$$Y_i = \frac{X_i - X_{\min}}{X_{\max} - X_{\min}} \tag{1}$$

In which , X_i is the secondary index value, X_{\min} is the minimum value of the secondary index, whereas X_{\max} is the maximum value of the secondary index, Thus, the outcome Y_i belongs to the interval [0, 1].

3.2 Using AHP to determine the weight of indicators

(1) The implementation of AHP

①calculating the product of the elements of each row of the matrix M_i

$$M_i = \prod_{j=1}^n a_{ij} (i = 1, 2, \dots, n) \tag{2}$$

②Calculating the nth root \bar{W}_i

$$\bar{W}_i = \sqrt[n]{M_i} \tag{3}$$

③ Normalizing vector quantities $\bar{W} = [\bar{W}_1, \bar{W}_2, \dots, \bar{W}_n]^T$

$$W_i = \frac{\bar{W}_i}{\sum_{j=1}^n \bar{W}_j} \tag{4}$$

Thus, $W = [W_1, W_2, \dots, W_n]^T$ is the desired eigenvector.

④Calculating the minimum eigenvalue of the matrix O- λ_{\max}

$$\lambda_{\max} = \sum_{i=1}^n \frac{(AW)_i}{nW_i} \tag{5}$$

In which

$$AW = \begin{pmatrix} \frac{W_1}{W_1} & \dots & \frac{W_1}{W_n} \\ \frac{W_1}{W_1} & \dots & \frac{W_1}{W_n} \\ \vdots & \ddots & \vdots \\ \frac{W_n}{W_1} & \dots & \frac{W_n}{W_n} \end{pmatrix} \begin{pmatrix} W_1 \\ W_2 \\ \dots \\ W_n \end{pmatrix} = \begin{pmatrix} nW_1 \\ nW_2 \\ \dots \\ nW_n \end{pmatrix} = nW \tag{6}$$

$(AW)_i$ Means the i the element (indicator)of the vector quantity AW.

(2) Determining the weights of indicators

Using the comprehensive evaluation of the plan as the criterion, experts establish a judgment matrix O for sub indexes according to pair wise comparison methods and Method of nine marks.

Table 2 Weight Values of First-Level Indicators

Evaluation of the comprehensive transport planning program O	Technology-A	Economy -B	Society-C	Environment-D
Technology-A	1	2	1/3	1/4
Economy-B	1/2	1	1/2	1/3
Society-C	3	4	1	1/2
Environment-D	1/2	3	4	1
Weights	0.1358	0.1142	0.2797	0.4704

Notes: $\lambda_{max}=4.1532$, $CI=0.0511$, $RI=0.9$, $CR=0.0569$

Therefore, the outcomes are as follows: $\lambda_{max}=4.1532$; $CI=0.0511$; $RI=0.9$; then $CR = \frac{CI}{RI} = \frac{0.0511}{0.9} = 0.0569 < 0.10$.

Analysis of factors of the criteria level generates the weight coefficient of each index, which can be arranged in the order of importance: Technology-A (0.1358), Economy-B (0.1142), Society-C (0.2797), Environment-D (0.4704) .

Although the analytic hierarchy process can also produce a comprehensive evaluation result through pair wise comparison of the sub-criteria layer in light of the main criteria layer, it is not suitable for comparing various indicators, which can be made up by fuzzy evaluation. Therefore, weights of the first-level indicators can be evaluated by means of fuzzy evaluation and the fuzzy matrix.

3.3 Calculating the composite score

The composite score is calculated by the weighted average according to the index weighs and ratings.

3.4 Comparing, selecting and determining the planning program

Arrange the plans according to their composite scores and then select the optimal one. The calculation model is:

$$D = \sum_{i=1}^n (k_i \cdot P_i)$$

D ——the composite score; k_i ——the weight of the i -th index; P_i ——the score of the i -th index; n ——the total number of indexes.

4 Conclusions

Undoubtedly, there are various factors influencing the selection of the optimal comprehensive transport planning program. In this paper, however, a lot of emphasis is put on “resource-saving and environmental friendly “indicators, thus some evaluation outcomes may not be in complete consistency with the actual situation. But it is not presumptuous to say that the mathematic evaluation models adopted in this paper may prove to be very useful support tools for government policy-making. Nevertheless, in actual situations, while analyzing and comparing the various comprehensive transport planning programs on the basis of evaluation models, it is essential that the actual situations and study objects be taken into consideration in order to ultimately make the right decisions.

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Comparative Study on Advanced Manufacture Industry Between Wuhan and the Five National Central Cities in China*

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Abstract: This paper compared the comparison of advanced manufacture industry between Wuhan and the five national central cities in China from the GDP, total industrial output value and key industries, and pointed out the current problems of Wuhan in developing advanced manufacture industry, including unchanged industrial system model, weak industrial competitiveness, imperfect technological innovation system and unreasonable spatial layout. Besides, it suggested Wuhan to focus on electronic information industry, automobile industry, equipment manufacturing industry, steel industry, petrochemical industry, food processing industry and bio-pharmaceutical industry, and optimize its industrial layout.

Key words: Advanced manufacture industry; Wuhan; Five national central cities; Industrial layout

1 Introduction

In 1992, the concept of advanced manufacturing industry was first formally proposed by the U.S. government. In their opinion, the advanced manufacturing industry is the industry with advanced manufacturing technologies. In China, the advanced manufacturing industry is a new formulation appeared in official documents in recent years. It is a summary of industrial clusters which lead the direction of industrial manufacturing development and master the advanced technologies. Under the background of informatization and globalization, it means that the manufacturing industry constantly absorbs high-tech achievements from the aspects of electronic information, computers, machinery, materials, modern management techniques, etc. And these advanced manufacturing technologies will be integrated and applied into the entire process of design, manufacturing, online testing, marketing services and management, thus to realize the production of informatization, automation, intelligence, flexibility and greening and acquire both good economic and social effects.

The national central cities in China refer to the cities that are on the top of the national urban system. For external, they play an important role in developing export-oriented economy and promoting international cultural communication. They are the centers of finance, trade, culture and management of Asia and even the whole world. For internal, they own the functions of lead, radiation and distribution, which can be seen in politics, economy and culture. In February 2010, the *national urban system planning*, released by the Ministry of Housing and Urban-Rural of China, put forward five national central cities and six regional central cities. The former are Beijing, Chongqing, Tianjin, Shanghai and Guangzhou, while latter are Shenyang, Nanjing, Wuhan, Shenzhen, Chengdu and Xi'an. So Wuhan should actively seek its difference with the five national central cities and try to get closer to them.

2 Comparisons and Analysis

Wuhan is an important industrial base in China and has a complete range of industries. There are 33 industry categories and more than 30,000 manufacturing companies, including steel, automotive, optical communications, machinery, petrochemicals, bio-pharmaceuticals, textiles, clothing, food, etc. Its comprehensive industry strength is the first in central and western China.

In recent years, the modern industrial system in Wuhan has been an important means of stimulating economic growth. First, its heavy industry sectors have taken shape initially. So far, Wuhan has basically formed four pillar industry sectors and six competitive industries. The former contains steel, automobiles and machinery, optoelectronics information and petrochemical, while the latter includes environmental protection, tobacco and food, household appliances, textile and apparel, pharmaceuticals, paper and packaging printing. Second, its key industrial clusters grow fast. According to Hubei Provincial Government, its key industrial clusters are laser industry cluster in East Lake High-tech Zone, food processing industry cluster in Dongxihu District, Xugu mushroom industry cluster in Xinzhou

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District, Jiahai apparel industry cluster in Huangpi District, electronics industry cluster in Caidian District and packaging printing industry cluster in Hannan District. Third, the spatial layout of manufacturing industry has basically formed five industry segments. They are Qingshan sector (Qingshan-Yangluo), Economic Development Zone sector (Zhuankou Development Zone-Hanyang-Caidian), High-Tech Zone sector (East Lake High-tech Zone-Hongshan-Jiangxia), Dongxihu sector and Hanzheng Street sector (Qiaokou-Jiangnan-Dongxihu). Fourth, fifteen industry-chains with comparative advantages have appeared, including steel and deep processing, automobiles and parts, consumer electronics, bridges and steel, petroleum and chemical industry, modern communications, semiconductors, machinery and equipment, transportation equipment, clean energy and new materials, food and tobacco, pharmaceuticals, household appliances, textile and apparel, and paper printing and packaging.

2.1 GDP

With the implementation of the rising strategy of central China and the construction of two-oriented society, Wuhan focuses on the industrial strategy, promotes the transformation of old industrial bases, accelerates the construction of advanced manufacturing, and has basically built modern industrial system which can adapt to the features of central cities. However, the advanced manufacturing in Wuhan is still less-developed than the national five central cities in China. Table 1 is a comparison of GDP in 2008-2012 between Wuhan and the national five central cities in China.

Table 1 GDP in 2008-2012 unit: hundred million

City	2008	2009	2010	2011	2012
Beijing	11115	11865.9	14113.6	16000.40	17801
Tianjin	6719.01	7500.8	9224.46	11307.28	12746.4
Shanghai	14069.87	14900.93	17165.98	19195.69	20101.33
Guangzhou	8287	9112.76	10748	12303.12	13551.21
Chongqing	5793.66	6528.72	7925.58	10011.13	11459.00
Wuhan	4115.51	4620.86	5565.93	6762.2	8004.58

From Table 1, the GDP ranking of five national central cities in China is Shanghai, Beijing, Guangzhou, Tianjin and Chongqing. Wuhan's GDP is rather less, which indicates that its economic level and economic power is far from the five national central cities.

2.2 Total industrial output value

The data of the total industrial output value in 2008-2012 can be seen from Table 2. There is also a distance between Wuhan and the five national central cities in China.

Table 2 Total Industrial Output Value in 2008-2012 unit: hundred million

City	2008	2009	2010	2011	2012
Beijing	10413.09	11039.13	13699.84	14513.63	15405.7755
Tianjin	12503.25	13083.63	16751.82	20862.74	23250.54
Shanghai	25120.92	24091.26	30114.41	32445.15	31548.41
Guangzhou	12639.05	12502.08	15329.21	16718.30	18640.9
Chongqing	5755.90	6772.90	9143.55	11847.06	13104.02
Wuhan	6251.79	6317.94	7004.96	8461.21	

Unlike the GDP, the rank of the total industrial output value is Shanghai, Tianjin, Guangzhou, Beijing and Chongqing. Shanghai is still the first and Chongqing is still the last. But the ranking of Beijing has dropped, which is caused by the larger proportion of tertiary industry in Beijing's industrial structure. No matter how the rank of the national central cities changes, the total industrial output value of Wuhan is still behind them. To develop Wuhan's advanced manufacture industry, its volume and speed should both be improved.

2.3 Key industries

It cannot be denied that Wuhan's industry has achieved a relatively higher growth during the 11th Five-Year Plan. It formed six billion-industry clusters which includes electronic information, automobile, equipment manufacturing, iron and steel, petrochemical and food. And in high-tech industry, the annual growth rate of output value was more than 23%.

In Table 3, there is a comparison of the key industries of advanced manufacturing between Wuhan and the five national central cities in China. It is obvious that the electronic information industry, automobile industry and equipment manufacturing industry are the priority development industries for the five national central cities, as well as Wuhan advanced manufacture industry. Besides, each city has its own key industries which are different from the others. These special key industries are developed according to their local conditions.

Table 3 Key Industries

City	Key industries	
Beijing		Petrochemical new materials, pharmaceutical industry, metropolitan industries, bio-industry
Tianjin	Electronic information industry, automobile industry, equipment manufacturing industry	Aerospace industry, petrochemical industry, bioengineering and pharmaceutical industry, new energy and new materials industry, light and textile Industry, defence science technology
Shanghai		Petrochemical and fine chemical industry, fine steel manufacturing, complete sets of equipment manufacturing industry, biomedical manufacturing
Guangzhou		Electronics product manufacturing industry, petroleum and chemical industry, shipbuilding industry, complete sets of equipment, technical equipment and extreme manufacturing, fine steel manufacturing
Chongqing		Automobile motorcycle industry, chemical engineering industry, material industry,
Wuhan		Iron and steel industry, petrochemical industry, bioengineering and pharmaceutical industry

3 Current Problems

Compared with the five national central cities in China, Wuhan's current problems in developing advanced manufacture industry can be found.

3.1 Unchanged industrial system model

The industrial system model in Wuhan has not been essentially changed. Wuhan's advanced manufacture industry still regards the traditional industries and the traditional growth pattern as the mainstay, which causes a considerable distance from the new-type industrialization. At present, the characteristic of heavy industrialization in Wuhan is distinctive. Since there is no fundamental change in its growth pattern, the heavy industrialization makes the economic growth over-rely on the capital investment, resource and energy consumption and environmental damage, which turns out to be high input, high consumption, high pollution and low output.

3.2 Weak industrial competitiveness

The industrial efficiency of Wuhan is low. The per capita GDP in Wuhan is quite inferior to the five national central cities in China. This is because Wuhan's industries focus more on traditional industries, which are low value-added, labor-intensive and have shorter industrial chain.

3.3 Imperfect technological innovation system

Wuhan is full of rich scientific and educational resources and innovative talents, as well as a number of national key laboratories, enterprises' research centers, etc. However, its technological innovation system which is market-oriented and regards enterprises as the mainstay has not been established yet. So the conversion rate of scientific achievements and industrialization is low. The government and enterprises' investments of independent innovation capacity have obvious gaps compared with the five national central cities in, either the absolute volume or the percentage of GDP.

3.4 Unreasonable spatial layout

The manufacturing enterprises' core competitiveness is not strong, and the spatial layout needs further adjustments. The scale level of industrial development is low. The industry concentration and market share are not enough. These result in weak core competitiveness of both industry and enterprises. In the perspective of spatial layout, some less environmentally friendly manufacturing enterprises are still left in Wuhan's central urban area, such as chemicals, textiles, locomotives, machinery, etc. They negatively affect the upgrade of the central urban areas' overall function.

4 Future Key Industries in Wuhan

Based on the above shortcomings, the advanced manufacturing in Wuhan should accelerate the pace of technological innovation and combine new industries and traditional industries to make pillar industries bigger and stronger and promote the construction of national advanced manufacturing center.

4.1 Electronic information industry

The optical communications, consumer electronics, high-end devices, integrated devices, and integrated circuits should be stressed. Electronic information industry should treat the construction of "Wuhan • Optics Valley of China" as the key point and strengthen the leadership of two dominant industries, namely photonics and mobile, and continue to promote the development of high-end optoelectronic and accelerate the upgrades of mobile communication equipment.

4.2 Automobile industry

Automobile industry is the largest pillar industry in Wuhan and has a certain capacity of self-development and innovation. It should concentrate on improving vehicle production scale, speeding up the development of automotive parts and service system, and improving the supporting capacity of the industry chain. In practical terms, the automobile industry should actively support Dongfeng Motor Corporation. Relying on the Dongfeng Automobile Company, the industry can take efforts to improve its production scale and comprehensive strength of passenger vehicles, actively develop energy-saving and new energy vehicles, greatly support innovation and cultivate independent brands, expedite parts and industrial services system development, and accelerate the building of automobile and parts export bases, thus making Wuhan become the first-class cluster base of automotive industry.

4.3 Equipment manufacturing industry

The equipment manufacturing industry should focus on shipping and supporting, locomotives, electrical equipment, numerical control machine and metallurgy equipment, so as to build an international standard shipbuilding and repair base and the largest research and development manufacturing base of railway in China.

4.4 Steel industry

The steel industry should concentrate on the steel deep processing to build a national high-quality steel production base for rolled silicon steel sheet, automotive sheet steel, high-performance constructional steel and so on. Wuhan Iron and Steel Group is the core enterprise of the steel industry in Wuhan. The development of the steel industry can depend on the Group and extend its industrial chain. The upstream should develop design and manufacturing of metallurgical equipment, while the downstream can create a steel deep processing base in China.

4.5 Petrochemical industry

This industry should rely on the key enterprises and focus on high value-added petrochemical industry, salt chemical and fine chemical products. Besides, the industry should extend its industrial chain of deep processing on new materials and chemical to build an oil and chemical industry production base in the central China.

4.6 Food processing industry

The food processing industry can work on beer, soft drinks, vegetable oil, dairy products, meat and poultry processing, condiments, convenience foods and other food processing industries, and support the major projects, in order to promote food processing enterprises become bigger and well-known.

4.7 Bio-pharmaceutical industry

In China, Wuhan is in the leading position of antiviral drugs, steroids, antipyretic analgesics and anesthetics. Relying on the key enterprises, like biological products research institute, Wuhan can utilize its unique resource advantages and technological advantages. And to build an important domestic pharmaceutical industry base, Wuhan should accelerate the development of diagnostic reagents and vaccines and modern medicine.

As to the other competitive industries, for example, textile and apparel industry should focus on high-grade knitted underwear and fashion leisure clothing. Light home appliances industry should focus on air conditioners, freezers, water heaters, kitchen utensils, small appliances, etc. Building materials industry should focus on the new wall materials, green decoration materials, inorganic non-metallic materials, etc.

5 Layout Optimization

With the development of the industrial system, the spatial layout of Wuhan industry has clear and positive changes and shows a new layout. The changes are mainly in two aspects. For one thing, the traditional manufacturing industry has speeded up the pace of relocation. The manufacturing industry has significantly gathered in the Third-Ring and Fourth-Ring, which forms an industrial belt around the city. For another thing, the level of area gathering is improving and five industry-gathering areas are being built. They are steel-chemical industry and environmental protection industry cluster (Qingshan-

Yangluo-ZuoLing), automobile and electromechanical industry cluster (Wuhan economic and technological development zone-Hanyang-Caidian-Hannan), photoelectron and biological medicine industry cluster (East lake new technology development zone-Hongshan-Jiangxia), food industry cluster(Dongxihu-Huang Jinkou) and urban industry clusters(Qiaokou-Jianghan-Dongxihu).

In the future, the industrial layout of Wuhan should be further optimized. Besides promoting the above industrial layout process, the layout should also be combined with the function of central city and “8 +1” city circle development strategy, which means the implementation of the "four circles" strategy. They are the urban industry circle based on downtown within the Third Ring, the core industry circle between the Third Ring and The Outer Ring, the industrial circle made up of six distant suburban area and the industrial docking circle of “8 +1” city circle.

6 Conclusion

Among the five national central cities in China, the development of the advanced manufacture industry in Shanghai is the fastest, while Chongqing is the least developed. However, compared with the five national central cities in China, the advanced manufacture industry in Wuhan still has a long way to go both in quantity and quality. At present, the weak points of Wuhan during its development are the unchanged industrial system model, weak industrial competitiveness, imperfect technological innovation system and unreasonable spatial layout. They are the obstacles which prevent the improvement of the advanced manufacture industry in Wuhan.

Thus, to reach the standard of national central city in China, Wuhan should reposition its key industries and optimize its layout. The former means Wuhan should focus on the electronic information industry, automobile industry, equipment manufacturing industry, steel industry, petrochemical industry, food processing industry and bio-pharmaceutical industry. The latter requires Wuhan to implement the "four circles" strategy, as well as continue to promote the present industrial layout process. The "four circles" strategy mainly refers to the urban industry circle based on downtown within the Third Ring, the core industry circle between the Third Ring and The Outer Ring, the industrial circle made up of six distant suburban area and the industrial docking circle of “8 +1” city circle. Only by doing these can the advanced manufacture industry in Wuhan develops in a sustainable, fast and healthy way.

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Determinants of Capital Structure of Chinese Manufacturing Firms: A Panel Regression Analysis

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Abstract: The research objectives of this paper is to whether firm specific variables affect capital structure decision and respond to the selected capital structure determining factors of Chinese manufacturing firms. Seven years' data from year 2004-2010 has been taken for analysis; a total sample of 196 Chinese firms from manufacturing industries—Food, Fuel & Power, Pharmaceuticals and chemicals, and Textile. A static balanced panel data regression model was used for analysis. The result of the model based on the Total Debt Ratio shows that Profitability, Liquidity and tax burden is significant at 5 percent level and inversely related to debt financing for Chinese firms which complies with the Pecking order theory. Firm's Size variable is positively associated for Chinese firms which comply with Trade-off theory. Operating risk is significant and positively associated for Chinese companies which is absolutely opposite of Trade-off theory. Industry dummy is found insignificant which indicates industries have no significant difference in their capital structure. Besides, this research also highlights the diverse impact of the capital structure determining factors in firm's overall leverage decision and in long term debt financing decision.

Key words: China; Capital Structure; Fixed Effect Model (FEM); Random Effect Model (REM); Corporation Finance, Panel Data Model

1 Introduction

The term Capital structure is commonly used in corporate finance. An ongoing debate in corporate finance concerns the question of a firm's optimal capital structure. Specifically, is there a way of dividing a firm's capital into debt and equity so as to maximize the value of the firm?

Financing and investment are two main activities undertaken by a firm. In the financing decision, the manager is concerned with determining the best financing mix or capital structure for his firm. Capital structure decisions affect a firm in two ways. Firstly, firms of the same risk class could possibly have higher cost of capital with higher leverage. Secondly, capital structure may affect the valuation of the firm, with more leveraged firms, being riskier, being valued lower than less leveraged firms. Thus, capital structure is an important decision for it could lead to an optimal financing mix which could maximize the market price of the firm.

The concept of optimal capital structure is expressed by (Myers, 1984, pp. 575-592) and (Myers & Majluf, 1984, pp. 187-221) based on the notion of asymmetric information. The existence of information asymmetries between the firm and likely finance providers causes the relative costs of finance to vary among different sources of finance. Apart from identifying the determinants of capital structure an important issue is defining what is meant by capital structure or leverage (Doukas & Pantzalis, 2003, p. 59) and (Mittoo & Zhang, 2005) amongst others define leverage as long-term debt scaled by total debt plus market value of equity.

The traditional trade-off argument postulates that optimal capital structure involves balancing the corporate tax advantages of debt financing against the present value of bankruptcy costs (Kim, 1978; Kraus and Litzenberger, 1973) and agency costs (Jensen and Meckling, 1976; Myers 1977). The empirical support for this argument is far from conclusive. For instance, while Bradley et al. (1984) find no clear evidence, Trezevant (1992) reports evidence supportive of this argument. Issues such as personal taxes (Miller, 1977) and non-debt tax shields (DeAngelo and Masulis, 1980) make the debate even more complicated. On the other hand, the Pecking Order Theory (Myers, 1984) suggests that firms do not have leverage targets and they use debt only when retained earnings are insufficient.

Manufacturing industry, Textile, garments and Multinationals are playing the crucial role at the economy of any country. Major Industry is dealing with about all the economic activity of a country. However, to do that organizations have to utilize their other financial resources efficiently. Consisting with that the intention of this paper is to explore the determinants of capital structure for selected companies of China.

2 Literature Review

Before the forthcoming paper of Modigliani and Miller in 1958, traditional view on capital structure lack the theoretical basis for making direct assumptions about the nature of the costs of debt and equity. The MM theory was revolutionary and changed market view forever. Although MM theory will not stand in a practical world which is obviously not perfect, it became a foundation for serious development of the currently popular capital structure theories such as Trade-off Theory, Static Trade-Off theory, Dynamic Trade-off Theory, Pecking Order and Market Timing Theory. Previous studies of capital structure determinants have found that corporate financial leverage is closely related to the business characteristic (Titman & Wessels, 1988; Harris & Raviv, 1991).

Rajan and Zingales (1995) found across the G7 group of countries that firms are more levered than in market-oriented countries and determinants of the capital structure that have been previously reported for U.S. data are equally important in other G-7 countries.

The determinants of capital structure choices are such as agency signaling costs (Heinkel, 1982; Poitevin, 1989), bankruptcy (Ross, 1977), taxes (Leland and Toft, 1996), institutional and historical characteristics of national financial systems (La Porta et al., 1997, 2006; Rajan&Zingales, 2003) but the understanding of the determinants of national and international capital structure is still limited and vague (Aggarwal & Jamdee, 2003).

Capital structure has been the core issue of a large number of corporate finance researchers. The history about empirical research on the determinants of capital structure in Western countries is much longer than the P.R. China. Here in China research arena, Chen (2004) and Huang and Song (2006) are notable studies to assess the capital structure theories in Chinese listed companies. Evaluating the explanatory power of capital structure theories in China is important because China is the largest developing and transitional economy in the world. Although Booth et al. (2001) have done research in developing countries including China, those countries using market-based economic models that are similar to developed countries.

Chen (2004) provides the study to examine whether and how the determinants of capital structure investigated in Western countries are also feasible in Chinese economy, where using firm-level panel data of 77 Chinese non-financial listed companies from the year 1995 to 2000. The methodology and determinants of that research refers to previous studies. Chen (2004) reports that the modern theories of capital structure, such as the tradeoff theory and the Pecking order hypothesis, are less applicable to the financing choice of Chinese firms. Due to the transitional nature and distinctive institutional features of publicly listed corporations, it seems to appear a new Pecking order for financing in Chinese firms. Internal fund is still the first consideration, then equity financing and lastly long-term debt choice in Chinese companies. Chen (2004) finds that financial leverage in Chinese firms decreases with profitability and it is consistent with existing literature. Additionally, growth opportunities and tangibility are positively related to debt in China.

Huang and Song (2006) exercise a new data set of both market and accounting value to analyze the capital structure models in more than 1000 Chinese listed companies over the period 1994-2000. In their research, they indicate the same findings as Booth et al. (2001) that firms in developing countries tend to have lower long-term debt. Moreover, 'as in other countries, leverage in Chinese firms increases with firm size, non-debt tax shields and fixed assets and decreases with profitability and correlates with industries'. However, results different from others is that debt in Chinese firms have a negative relationship with earnings volatility.

In very recent study, Qian et al. (2007) have examined the six determinants of capital structure for Chinese listed companies over the period of 1999-2004. The static panel-data models showed that firm size, tangibility and state ownership are positively related with firm's leverage ratio. However, factors such as profitability, non-debt tax shields and volatility have a negative relationship with the leverage ratio.

3 Methodologies

3.1 Sampling design and data collection

This paper deals with a developing country- China. Primary focus of this paper was the behavior of manufacturing companies, hence financial institutions were not considered in sampling design. Priority of sampling design was randomness and availability of data. Four manufacturing industries—Food, Fuel & Power, Pharmaceuticals and chemicals, and Textile— have been selected for analysis and companies under each industry have been selected randomly for Chinese companies. Seven years' data from year 2004-2010 was taken for both countries and for all the four industries. Total sample of 196 Chinese

companies has been taken out of which 26 was from Food industry, 50 from Fuel & Power industry, 79 Pharmaceuticals industry, and 41 from Textile industry. Quantitative analysis will be performed by using the software STATA (Version 11.1). MS Excel will be used also where it is necessary.

3.2 Empirical model

To begin with the analysis descriptive statistics were estimated and correlation among the variable were checked. A static balanced panel data regression model was used for analysis. The generalized form of regression equation is–

$$y_{it} = \alpha_i + \beta'x_{it} + u_{it}$$

Where,

$i = 1 \dots N$ and $t = 1, \dots T$

α_i : Constant

y_{it} : The leverage of the firm i and in year t

β : A $K \times 1$ vector of coefficients

x_{it} : A $K \times 1$ vector of explanatory variables

u_{it} : Error term

Specification of the model 1 with dependent variable Leverage1 (total debt to Total asset ratio) is given below–

$$\begin{aligned} \text{Leverage1}_{it} = & \alpha_i + \beta_1 * \text{Assetstructure} + \beta_2 * \text{Profitability} + \beta_3 * \text{Size} + \beta_4 \\ & * \text{Growthopportunity} + \beta_5 * \text{Operatingrisk} + \beta_6 * \text{Liquidity} + \beta_7 \\ & * \text{TaxBurden} + \beta_8 * \text{InterestRate} + \beta_9 * \text{MarketIndex} + \beta_{10} \\ & * \text{Industrydummy} + u_{it} \end{aligned}$$

Specification of the model 2 with dependent variable Leverage2 (Long-term debt to Total asset ratio) is given below–

$$\begin{aligned} \text{Leverage2}_{it} = & \alpha_i + \beta_1 * \text{Assetstructure} + \beta_2 * \text{Profitability} + \beta_3 * \text{Size} + \beta_4 \\ & * \text{Growthopportunity} + \beta_5 * \text{Operatingrisk} + \beta_6 * \text{Liquidity} + \beta_7 \\ & * \text{TaxBurden} + \beta_8 * \text{InterestRate} + \beta_9 * \text{MarketIndex} + \beta_{10} \\ & * \text{Industrydummy} + u_{it} \end{aligned}$$

Fixed Effect Model (FEM) and Random Effect Model (REM) were estimated and Hausman test was utilized to choose the appropriate model. Robustness of the estimated result was checked.

4 Result Analysis

4.1 Correlation analysis for Chinese selected industries

Table1 represents that the correlation among the different variables of capital structure determinants of China. Correlation coefficient is significant at $P < 0.01$ for all level of relation among factors for China. Here, leverage is significantly negative with profitability, tax burden and liquidity and others for positive value. It indicates that China industry depends on more equity financing and if more levered then they have to pay more tax. Other variables like interest rate. Growth and size indicates the mixed relationship among them. Ultimately the results enhance the strength of the study.

Table 1 Correlation for China Data

Variable	Leverage	Leverage	Profitability	Liquidity	Tax burden	Size	Growth	Market	Operation Risk	Interest Rate
Leverage	1									
Tangibility	0.1052	1								
Profitability	-0.3958	-0.1892	1							
Liquidity	-0.2726	-0.2219	0.1608	1						
Tax burden	-0.0273	-0.0574	0.0183	0.0135	1					
Size	0.1297	0.2026	0.1164	-0.1694	-0.0225	1				
Growth	0	0.0073	0.1987	-0.0212	0.0321	0.2397	1			
Market	0.0143	-0.0006	0.0622	-0.0444	0.061	-0.0454	0.0167	1		
Operation Risk	0.1356	-0.0203	-0.0459	0.1105	-0.0121	-0.3472	-0.1236	0.0403	1	
Interest Rate	0.0352	-0.0146	0.0363	-0.0318	0.0405	-0.1464	-0.0332	0.1422	0.1428	1

4.2 Empirical result analysis

In this section, represent the results of empirical analysis on the determinants of capital structure as mentioned earlier that Huasmen test, regression result with Fixed Effect Model (FEM) and Random Effect Model (REM) is used to analysis the study of capital structure determinants of china data.

Table 2 Regression Output of Chinese Firms Based on Two Models

Variable	Model-1: Dependent Variable Leverage 1 (Total debt to Total Asset Ratio)			Model-2: Dependent Variable Leverage 2 (Long-Term Debt to Total Asset Ratio)		
	Coefficient	S.E	P value	Coefficient	S.E	P value
Tangibility	0.1215714	0.180918	0.502	0.2437533*	0.083863	0.004
Profitability	-1.236467*	0.488087	0.011	-0.3732209**	0.213715	0.081
Liquidity	-0.0100325*	0.004755	0.035	0.0008386	0.001054	0.426
Tax burden	-0.0002135*	3.95E-05	0.0000	-0.0001628*	4.38E-05	0.000
Size	0.0899335*	0.011328	0.0000	0.0527782*	0.00836	0.000
Growth	1.431135	0.912667	0.117	0.5908933	0.394187	0.134
Market	0.0001853	0.000209	0.375	0.0002929*	0.000104	0.005
Operation Risk	0.0001263*	5.92E-05	0.033	-1.92E-06	2.45E-05	0.938
Interest Rate	0.0146549*	0.006345	0.021	0.0019242	0.003636	0.597
D2_Fuel	-0.0642319	0.044354	0.148	0.0662553*	0.020057	0.001
D3_Pharma	-0.0045791	0.042666	0.915	0.0560789*	0.017345	0.001
D4_Textile	0.0007546	0.065341	0.991	0.0571823*	0.026879	0.033
Constant	-1.859493*	0.358861	0.0000	-1.398421*	0.258447	0.0000
R Square Value	within	0.2552		0.2264		
	between	0.2372		0.3236		
	overall	0.2405		0.2687		
Chi2 Test/F Test	Wald chi2(9) = 362.62			Wald chi2(12) = 176.36		
	Prob> chi2 = 0.0000			Prob> chi2 = 0.0000		

*Significant at 5 percent level

**Significant at 10 percentage level

FEM and REM is estimated and tested with Hausman test to select the best model and REM is selected. Robustness of the model is checked and final result is presented in the Table: 2).

For model-1 with dependable variable “leverage-1 (Total debt to total asset ratio)”, R square value is very small 25.5 percent which indicate lower strength of the variables included in the models in explaining the variability of leverage or capital structure decision. On the contrary, overall model is significant at 1 percent level—chi square test is significant at 1 percent level— indicates that the joint power of the variables included in the models are good enough to explain the behavior of leverage decision. Model-2 with dependable variable “leverage-2 (Long-term debt to total asset ratio)” shows the similar goodness of fit and overall significance of the model.

Tangibility: In model-1 Tangibility is not significant at even 10 percentage level which is a sharp contrast with both Trade-off theory and pecking order theory. Tangibility is significant at even 1 percentage level and the coefficient is positive for model-2 which complies with the trade-off theory. The coefficient shows a positive relationship which indicates that 1 unit rise in Chinese companies’ tangibility increases company’s capital structure decision of debt financing by 0.24 units. Trade-off theory suggests positive relationship between tangibility and leverage decision. This is because firms with more tangible asset are more capable of debt financing providing higher collateral.

Profitability: Profitability is significant at 5 percent level for Chinese companies for model-1 and is significant at 10 percent level for model-2. Both model shows that profitability is inversely related to total leverage and long-term leverage. The coefficient of model-1 indicates that 1 unit rise in Chinese company’s profitability declines company’s capital structure decision of debt financing by 1.23 units. Similarly, coefficient of profitability of model-2 indicates that 1 unit rise in Chinese company’s profitability declines company’s capital structure decision of long-term debt financing by 0.37 units. This finding suggests that profitable Chinese companies are more likely to finance internally through retained earnings than external financing via debt which complies with the systematic analysis of

pecking order theory. This finding sharply contrasts with the tradeoff theory which suggests profitable firms have greater exposure to corporate tax, lower possibility of bankruptcy, and more free cash flow related problems and firm can reduce tax burden and agency cost through debt financing.

Liquidity: Liquidity is significant at 5 percent level for Chinese companies for model-1 only. The coefficient shows an inverse relationship with debt financing which indicates that 1 unit rise in Chinese company's Liquidity negatively affects company's capital structure decision of debt financing by 0.010 units. This estimation indicates that firms with higher liquidity avoid external financing and prefers internal financing.

Tax burden: Literatures suggest impact of tax burden on capital structure decision is twofold. Companies have incentive to reduce tax burden by taking debt and conversely, revenues from debt are taxed heavily than revenue earned from equity. Tax burden is significant for both model-1 and model-2 and the coefficient shows inverse relationship. Hence, empirical result of this paper complies with the second viewpoint and shows an inverse relationship between tax burden and capital structure decision of both debt financing and long-term capital structure decision for Chinese firms.

Size: Firm's Size is significant at 1 percent level for Chinese companies for both models. The coefficient shows a positive relationship which indicates that 1 unit rise in Chinese companies' size increases company's capital structure decision of debt financing by 0.089 units, and 1 unit rise in Chinese companies' size increases company's capital structure decision of long term debt financing by 0.05 units. This finding suggests that large firms have greater capacity to absorb debt and better access to debt market than small firms which complies with trade-off theory and contrast with pecking order theory. Empirical studies, such as Marsh (1982), Rajan and Zingales (1995), Wald (1999), and Booth et al. (2001), generally find that leverage is positively correlated with company size.

Stock Market Condition: Result suggests that for stock market condition is statically significant for model-2, long term debt financing decision, at 5 percent level and the coefficient is positively associated. This finding suggests that good performance of shares in the stock market is used as virtual collateral to finance through long-term debt by Chinese companies.

Operation Risk: Operation Risk is significant at 5 percent level for model-1 but insignificant for model-2. The coefficient shows a positive relationship with debt financing which indicates that 1 unit rise in Chinese company's operation risk positively affects company's capital structure decision of debt financing by 0.0001 units. This estimation indicates that firms with higher volatility prefer external financing. This result is contrasting to both trade-off theory and Pecking order theory.

Industry Dummy: Industry dummy for model-1 shows that Industry type has insignificant differences in their capital structure decision of debt financing. Industry dummy shows that Industry type has significant differences in their long-term debt financing decision.

5 Conclusions

Capital structure considers of debated topics that increasing the concerning of financial economists. The research investigated the effect of the determinants of capital structure Chinese selected four industries (Food, Fuel, Pharmaceuticals and Textile) for period (2003-2010) by using FEM, REM and Huasmen Test model as regression technique. The determinants are selected based on two prominent theories of capital structure, static trade-off theory and pecking order theory. Previous studies have been analyzed to find the possible determinants. FEM and REM regression model for panel data with cross section random effects was run with two equations. Total debt to market value of the companies was used as the leverage ratio in one equation and long term debt to market value was used in another leverage equation.

Consistent with previous empirical researches, this study confirms that profitability has negative effect on capital structure. Fama and French (2002) and Myers (1984) use this fact to reject the static tradeoff model. However, Chang (1999) builds a new model within the agency-principal framework and its comparative static analysis shows that firm's leverage decreases with profitability. Here, in our research also find the same result as per previous empirical investigation.

The study also explores that Chinese listed companies leverage increases with company size, volatility of profitability, tangibility, and it decreases with profitability, tax burden. Sometimes Chinese companies tend to heavily rely on external financing, especially equity financing at the aggregate level (Huang 2005). Calculation from this study, the descriptive statistics shows that almost 50% leveraged financing. Findings from some papers that net equity issuance are negative in the United States during 1991-1993 (Rajan and Zingales, 1995). Also, Myers (1984) points out that, 62% of capital expenditures

came from internally generated cash flow for non-financial American companies during 1973-1982. Myers used such fact to justify the pecking order hypothesis. China is still holds their market economy and their capital financing policy is contrary with GAAP. That's why exploring the huge equity market with controlled financing. Chinese firm's capital structure decision partially depends on ownership structure.

At the end, the results will be more reliable if number of observations and variables can be increased for Chinese firms. China has huge market which is difficult to manage in depth. Personal traits of the managers such as their personal risk tolerance can have impacts on firms' capital structure decision. Further scopes are there to do similar studies by adding more observations and variables. Besides, further studies can also be directed towards finding the optimal capital structure.

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Research on the Competitiveness Analysis Model of Industrial Cluster in High-Tech Industrial Zone

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Abstract: This paper argues that the main standard to the high-tech industrial zone's overall competitiveness is the competitiveness in industrial clusters. Based on the above consideration, according to the theoretical framework of Porter's diamond model, the paper built up the indexes system of high-tech industrial zones' industrial cluster competitiveness, which is closely combined with national environmental features of high-tech industrial development zones, and constituted by 7 secondary indexes and 26 third-level indexes. And the analysis model was established with the application of analytic hierarchy process and principal component analysis.

Key words: High-tech Industrial Zone; Industrial Cluster; Competitiveness Analysis; Evaluation System

1 Introduction

Energetically enhancing the competitiveness of high-tech industrial zone is related to our natural scientific and technological innovation strength and the development of high-tech industries. The main standard to the high-tech industrial zone's overall competitiveness is the competitiveness in industrial clusters. If the industrial clusters have apparently competitive advantages in the industry, then this high-tech industrial zone must also have prominent competitive advantages. Therefore, the establishment of the competitiveness analysis model of high-tech zone's industrial clusters is helpful in the scientific evaluation of high-tech zones' industrial clustering competitiveness, and can promote the formation and development of industrial clusters in high-tech industrial zones, which has important practical significance in enhancing the overall competitiveness of high-tech industrial zones.

2 Structure Path

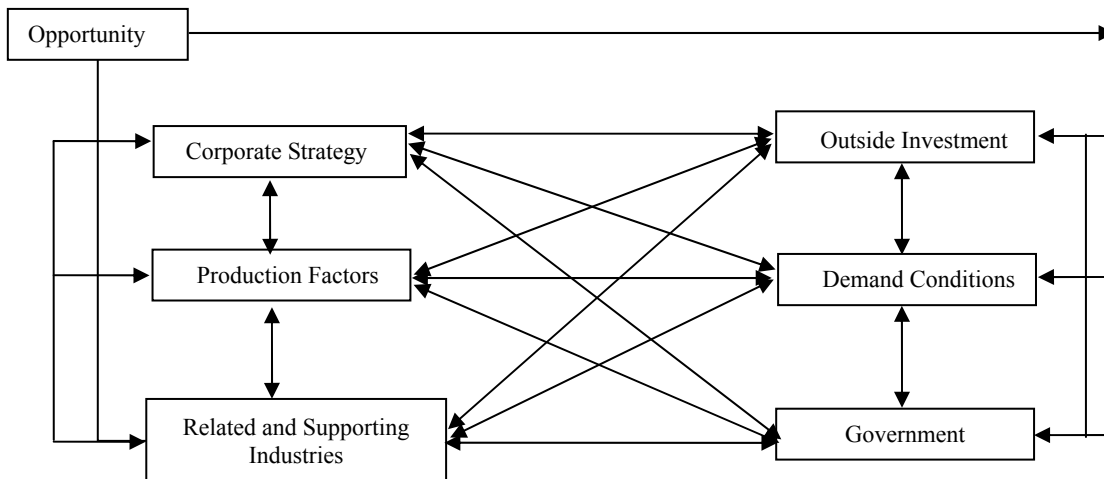


Figure 1 The Industrial Clusters' Competitiveness Model of High-Tech Industrial Zone

By summing the applicability and limitations of Porter theoretical model, in accordance with the theoretical framework of the Diamond Model, this paper further amends and extends the key elements that impacts industrial clusters' development of high-tech zones in building the competitiveness model of industrial clusters, which is closely related with national high-tech zones' features. Problems in clusters of high-tech zones are not only about the enterprises themselves, but closely related the government in site. Our national development in high-tech zones had short history, where still many deficiencies, therefore governments' guidance and support is needed.^[1] Moreover, the rapid development of high-tech zones heavily dependent on the investment from outside companies and governments. Therefore, in addition to

the four key factors that external opportunities production factors, demand conditions, corporate strategies and related and supporting industries, the role of government and external investment gets special consideration in this paper. Based on the above analysis, we constructed the industrial clusters' competitiveness model of high-tech zones, which is shown in figure 1.

Table 1 The Competitiveness Index System of Industry Clusters in High-Tech Industrial Zone

First-class index	secondary index
Production Factors	industrial employed population ratio
	average salary of industrial employees
	ratio of R&D employees to employed population
	living cost
	number of employees with master degree and above
	local universities' number
Requirement Condition	industrial yearly income
	growth rate of industrial yearly income
	industrial market share in nationwide
Enterprise's Strategy	enterprises' number in the industry
	yearly growth rate of enterprises' number in the industry
	the ratio of R&D fund to total income
	enterprise's management efficiency
Related and Supportive Industries	Financial support degree
	number of enterprises in cluster
	related degree with upside and downward industries
Government	support from local district government
	support from local provincial and city government
	support from national government
External Investment	investment mount from foreign countries
	growth rate of foreign investment
	direct investment mount in national investment
	growth rate of national investment
Opportunities	Development opportunities

3 The Building of the Competitiveness Index System

According to the analysis above, the paper builds the industrial clusters' competitiveness index system of high-tech zones from seven aspects: production factors, requirement conditions, Enterprise's strategy, related and supportive industries, external investment, government, and opportunities, which is shown in Table 1.

4 The Evaluation Method of the Competitiveness Index System

As the factors that affecting the industrial clusters' competitiveness of high-tech zones are numerous and complex relationship, the building of the competitiveness model is a typical multi-index problems^[2].

In this model, because first-class indexes are relatively independent to each other, AHP calculation is used to considering the weights. Various decision-making factors are analyzed by a combination of qualitative and quantitative processing. And the secondary indicators are related closely, so the principal component analysis is adopted to get a timely and concise economic process, which is conducive to seize the main contradiction and in-depth understanding.^[3]

4.1 Basic thoughts in AHP

This analysis method is a comprehensive analysis contains multiple levels' statistical research method. It makes analysis by adopted multiple index system with less comprehensive index method,

putting an economic problem into related N samples and P specific observation index. It can be drawn that P indicators are random vectors:

$x = (x_1 + x_2 \cdots x_p)^T$, therefore the sample matrix is:

$$x = \begin{bmatrix} \vdots & \ddots & \vdots \\ x_{n1} & \cdots & x_{np} \end{bmatrix}$$

And, $x_i = (x_{1i} + x_{2i} \cdots x_{ni})^T$, $i = 1, 2 \cdots p$.

Using the sample matrix x 's p vectors: $x_1, x_2 \cdots, x_p$, making linear combination, is:

$$F = a_1 f_1 + a_2 f_2 + \cdots + a_m f_m$$

This equation has the following two conditions: firstly, F_i and F_j is not correlation ($i \neq j, j = 1, 2 \cdots, p$); Secondly, F_1 is the biggest variance in the linear combination of $x_1 \cdots, x_p$; F_2 is the biggest variance among the linear that not related with F_1 's $x_1 \cdots, x_p$. And deduce like this, among $F_1, F_2, \cdots, F_{p-1}$, the biggest one is F_p .

4.2 Calculation process in principle component analysis

There are n samples and p observation variants in the model, therefore, complexity correlation in sample(x_{ij}) ($i = 1, 2, \dots, nj = 1, 2, \dots, p$) decides the complicated relationship among sample statistics. Using a simple method, by confirming m common factors, as let $F_1, F_2, \cdots, F(m \langle p)$ substitutes the complex information among the observation variables.

Common factor F_1 can be statistically expressed by observation variable x_{ij} :

$$F_1 = \sum_{j=1}^i b_{ij} x_{ij} \tag{1}$$

Variance contribution rate is:

$$c_i = \lambda_i / \sum_{i=1}^p \lambda_i \tag{2}$$

and, λ_i is the i common factor's characteristic root in the sample matrix X . Setting A is the sum of variance contribution rate,

$$A = \sum_{i=1}^m c_i \geq 85\% \tag{3}$$

Therefore, the sample score can be calculate by m common factors:

$$S = \sum_{i=1}^m F_i c_i / \sum_{i=1}^m c_i \tag{4}$$

Assuming there are k first-class indexes in this paper, and the calculation equation for first-class index S_k is:

$$S_k = \sum_{i=1}^m F_i c_i / \sum_{i=1}^m c_i \tag{5}$$

4.3 The basic idea of analytic hierarchy process

Analytic hierarchy process is a model of thinking in essential. This method is based on the scientific analysis and decomposing the complex issue into a series of indexes or factors, which are then re-decomposed into secondary or third-level and so on. After the layering, the comparison methods are used to study the weight of each-level's indexes and factors.

4.4 The calculation processes of analytic hierarchy process

The calculation processes can be divided into four steps: Firstly, establishing the total level system; secondly, building the comparison matrix among indexes; Thirdly, confirming the ratio relationships among indexes; lastly, listing the ratio of each index to the total index.

5 Conclusion

This paper argues that the industrial clusters' competitiveness index system of high-tech zones is not only related to external opportunities, enterprise's strategy, production factors, requirement

conditions, related and supportive industries, but also affected by government policies and external investment. The above seven aspects can be separately expressed by a number of secondary indicators. Therefore, the competitiveness index system of industry clusters in high-tech industrial zone can be built by 7 first-class indicators and 26 secondary indicators. Finally, the industrial cluster's competitiveness analysis model of high-tech industrial zones can be established by the combination of AHP and principal component analysis.

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A Study on the Marketing Channel Mode Innovation of Traditional Chinese Medicine Enterprises*

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Abstracts: With literature study and case analysis, this paper provides an in-depth analysis of existing main marketing channel modes of some typical traditional Chinese medicine enterprises of China, such as Kanion pharmaceutical, Shineway pharmaceutical, Dong'e E-Jiao, Tong Ren Tang. It argues that there are some common problems in these enterprises, for example, unreasonable channel structure, serious unauthorized distribution, low channel management level, the ineffective management of terminal market and so on. Based on the analysis of problems, some countermeasures for improving the marketing channel modes are put forward. Future research direction and implications for managing marketing channel are subsequently discussed.

Key words: Marketing channel mode; Marketing channel innovation; Marketing channel management; Traditional Chinese medicine enterprises; Case analysis

1 Introduction

Marketing channels are 'the sets of interdependent organizations which, by an exchange of outputs, are involved in the process of making a product or service available for consumption' and include organizations involved in manufacture, brand ownership, wholesale and retail (Reve T., Stern L.W., 1979).^[1] Marketing channel research is predominantly conducted in the Western world, marketing channel theories and practices may not be generalizable to Chinese markets. Despite the rapid growth of Chinese economies and their increasing importance to the global economy, the understanding of marketing channels in China is limited. This research reviews and integrates studies of marketing channels in the pharmaceutical context. We find the research on pharmaceutical marketing channels focuses on the channel mode, channel conflict, and channel relationships.

1.1 The study on medicine channel mode

According to the traditional theory of marketing channel structure, channel marketing channel is composed of a series of independent institutions and organizations, which have clear target and independent interest. In fact, these seemingly independent institutions are dependent on each other. Due to the interdependence between the marketing channel organizations, marketing channel should be regarded as a network system (Doyle J.D., Bottomly P.A., 2006).^[2] Since the marketing process is becoming more and more complex, the potential economic benefits of coordinated marketing system has become increasingly apparent (Rangan V.K., 2006).^[3] The enterprise can use the company type, management type and contract type three ways to effectively coordinate marketing channel system (Kaplan A., 2006).^[4]

In China, some scholars proposed that Chinese pharmaceutical enterprises combined the typical channel mode according to their characteristics. These enterprises take a variety of channel model, such as dealers' group system, distribution system combining direct channel, direct marketing system, etc. Chinese pharmaceutical enterprises mainly take the investment agent system and the system of factory outlets. From new medical reform perspective, they analyzed the advantages and disadvantages of these channel models. The mainstream pharmaceutical marketing channel model was pyramid, which had some disadvantages, such as high cost, lack of control, functions weakened, poor management, and so on (Wang Y., Yao Y.P., 2011).^[5]

1.2 The study on channel conflict

Channel conflict is that a channel member thinks that the other members harm its legitimate interests, and affect the realization of its aim. Conflicts often manifested as other non cooperative and malignant commercial behavior (Stern. L.W., El Ansary A., 1996).^[6] Mirroring the movement towards the relationship marketing paradigm, Hopkinson G.C., Blois K. (2013) considers the theory's empirical contribution to knowledge of power, conflict, trust and commitment in marketing channels.^[7]

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In China, some scholars summarized the causes of medical channel conflict. For example, Wang Y., Yao Y.P. (2011) pointed out both internal and external factors of enterprise caused the channel conflict, and the difference in interest between channel members is the main cause of medicine channel conflict.

1.3 The study on medicine channel relationships

Many scholars explored the importance of cooperation and coordination in marketing channels (Payan J.M., 2007).^[8] Zhuang, G., Xi Y., El Ansary A. (2008) explored the impact of inter-personal Guanxi on exercise of power in a Chinese marketing channel.^[9] Some scholars put forward that the relationships between channel members could achieve a transaction from a simple transition to relation by integrating the entire product supply chain and strengthening channel members relationships. Channel members could reduce the cost of sales, increase the operating profit, and improve the comprehensive benefits of marketing channels by constructing the stable channel alliance (Li K. F., 2011).^[10]

Although Scholars have conducted the related research to the medicine marketing channel, there is not special research on marketing channel mode of **traditional Chinese medicine (TCM)** enterprises. Because TCM enterprise marketing channel mode is special, we should make the theoretical research of the marketing channel mode of TCM enterprises in the future, and put forward the channel modes which are consistent with the actual situation of TCM enterprises in order to provide theoretical support for the improvement of mode of enterprise channel of TCM.

2 Analyses of Main TCM Channel Modes

There are four marketing channel modes of TCM enterprises, including the agent system, regional distribution system, direct marketing system, and direct and distribution system. With the development of TCM industry, TCM enterprises should innovate marketing channels. Their Channel modes are not confined to a single channel mode, but combination of several modes. This paper will analyze the main channel modes taking several typical TCM enterprises for example.

2.1 Agent system

Agent system refers that TCM enterprises choose to cooperate with one or several pharmaceutical commercial enterprises, which help the distribution of products, the development of sales channels, the establishment of marketing network, product marketing and after-sales service.

1) The type of agency. Agent system according to the area is divided into provincial, municipal, county agent system. According to the number of agents within the same region, agent system can be divided into exclusive agent system and multi-agent system.

2) The analysis of Shineway pharmaceutical agent system. Shineway pharmaceutical centralizes TCM product R&D, production, sales. Then we shall analyze its marketing channel mode.

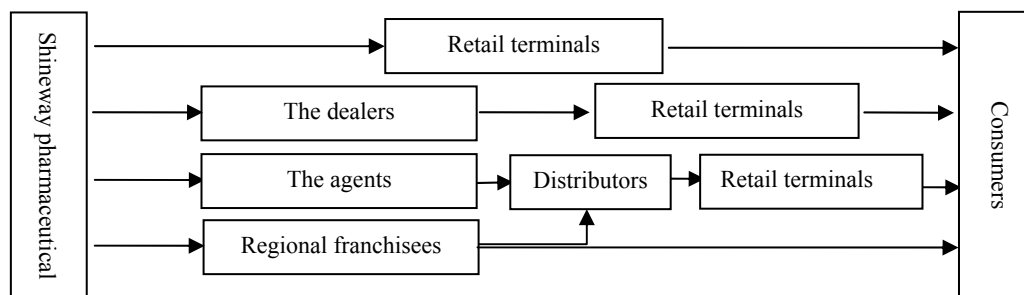


Figure 1 Shineway Pharmaceutical Channel Mode

According to its product characteristics, Shineway Pharmaceutical uses the Trinity channel model which relies mainly on the agent system. The using of agent system makes their products quickly enter the target market, increases market coverage, lowers sales and administration costs. Due to excessive levels of lead, it is difficult to manage channel and control channel. Because a lot of channel members maliciously compete, it is difficult to control the price of the terminal. The channel conflict causes to damage the interests of channel members and reduce its channel members' loyalty.

2.2 Regional distribution system

Regional distribution system is that TCM enterprises in a specific area select one or more pharmaceutical commercial enterprises as its middlemen, which help to develop target market, and use its resources to develop new markets and promote product sales.

1) Regional distribution system type. According to the number of pharmaceutical commercial

enterprises within the same region, regional distribution system can be divided into total dealers and distributors system.

2) The analysis of Kanion pharmaceutical regional distribution system. Kanion pharmaceutical is a TCM corporation which provides products R&D, production and trade of TCM enterprises. Then we shall analyze its marketing channel mode.

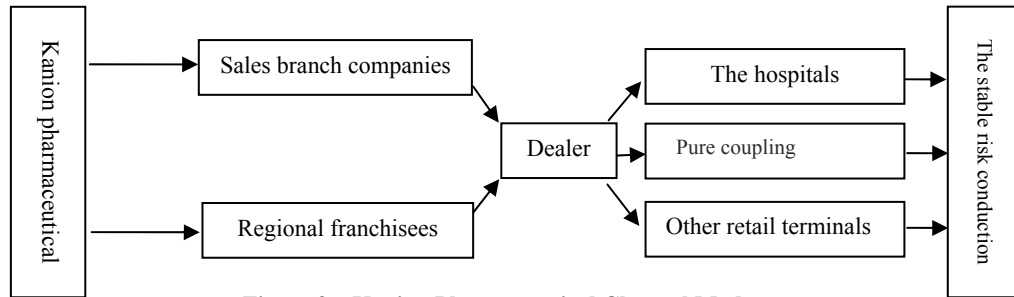


Figure 2 Kanion Pharmaceutical Channel Mode

The distribution system is Kanion pharmaceutical’s main channel model. Kanion pharmaceutical cooperates with 150 pharmaceutical business companies. There are primary dealers 150-160, two distributors 700-800. The cooperation between distributors and sales help to achieve rapid product distribution, and establish strong sales force, strengthen the links with the terminal, and improve the understanding and monitoring of the market. Meantime, the distribution system may bring a lot of problems, for example, sales channels is too long, which led to more channel inventory, low profitability, excessive huge sales offices, high management fees, serious fleeing goods problems, product terminal sales price confusion.

2.3 Direct marketing system

Direct marketing system is that TCM manufacturers without the channel intermediaries (agents, distributors, retailers), through self-built network, including the entity shop and network shop sell TCM products directly to consumers.

1) The Direct marketing system’s type. According to the direct way, it can be divided into entity shop and online shop franchise.

2) The analysis of Tong Ren Tang’s direct marketing system. Tong Ren Tang is a company engaging in TCM product development, production, sales and provision of medical services, and its mode of marketing channels is following.

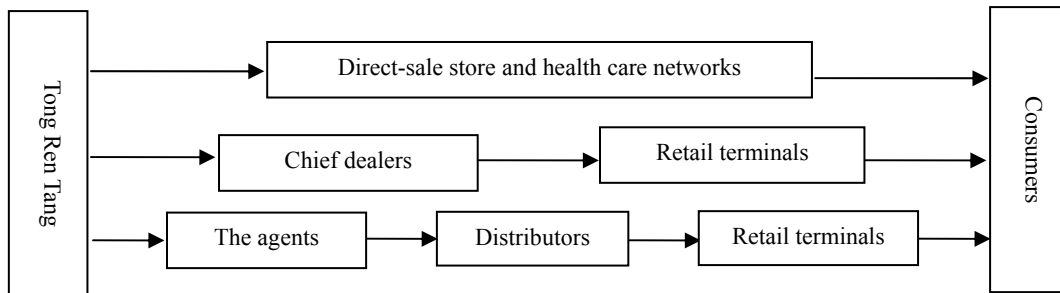


Figure 3 Tong Ren Tang Channel Mode

The direct retail channel and the traditional agency are Tong Ren Tang’s main model. It takes the chief dealer system for the weak products. Its sales network is throughout the country. It has the cooperation relationships with many domestic pharmaceutical business companies, and has more than 1500 franchise stores and more than 130 medical service networks. The using of direct system speeds up the product distribution, erects a direct channel of communication with consumers, and accurately grasps the market dynamics. Since the establishment of its many shops, the sales investment is huge, the management is difficult.

2.4 Combination of direct and distribution System

Combination of direct and distribution system refers that the TCM production enterprises’ distributors include dealers and retailers. In order to achieve rapid product sales, expand market share, TCM production enterprises combine with the distributors and retailers for product sales.

1) The type of combination of direct and distribution System. In accordance with the enterprise

channel focus, it can be divided into two combination system. One is based on distribution system, and the other is based on direct system.

2) The analysis of Dong'e E-Jiao binding system. Dong'e E-Jiao Co. Is a TCM production enterprise which provides production and sale of TCM product, health care products? Then we shall analyze its marketing channel mode.

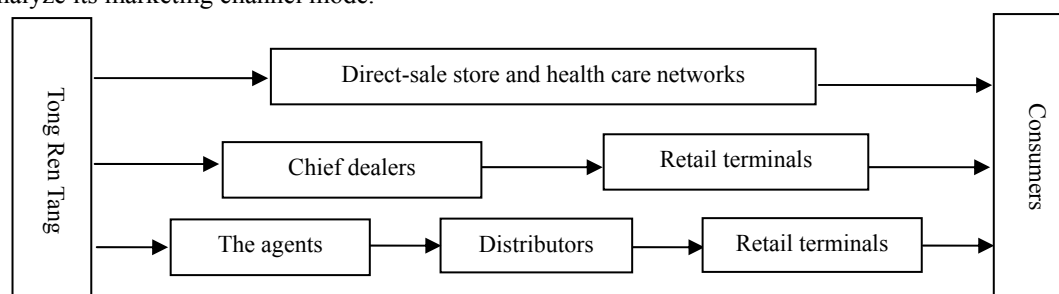


Figure 4 Dong'e E-Jiao Channel Mode

Dong'e E-Jiao mainly adopts distribution system and direct system. It uses the traditional form of networks in the distribution system, at the same time, it provides product for domestic large chain pharmacies through its own direct sales force without middlemen. The direct and distribution system helps to accelerate the sales of the products, establish a platform to communicate directly with consumers, accurately grasp the market dynamics. But there are some disadvantages. At first, it results vicious competition in product distribution process. In the second, it is difficult to manage channel members, and it does not attach importance to the development and maintenance of relationships. Thirdly, it is difficult to control product terminal price.

3 The Problems of Chinese Medicine Channel Mode

Because of the different situation of TCM enterprises, the problems of their marketing channel modes are complex and diverse. This paper combines some typical TCM enterprises, sums up the existing problems of the channel mode, and put forward the common problems of TCM enterprise channel mode.

3.1 Unreasonable channel structure

At present, the majority of TCM enterprises use regional dealer system or agent system, they usually choose distributors or agents in a particular region, for example, Shineway pharmaceutical's marketing channel levels up to level 4 or above, this results that the channel management is very difficult, members' control force is weak, the cost of sales and management is high, market information communication is not smooth. These problems are the common problems of Chinese Medicine channel pattern.

3.2 Serious fleeing goods

Fleeing goods is a common problem of TCM enterprises in product sales, which is general and serious. In order to guarantee the rapid distribution of products, Shineway pharmaceutical, Kanion pharmaceutical etc. usually choose a lot of distributors or agents. But in order to seek self-interest, some dealers sail goods across regions, which causes the market strife and price confusion, makes it difficult to control the terminal price, and also causes the enterprise reputation suffered serious damage.

3.3 Low channel management level

TCM enterprises are at a low level in the channel management and their management is unscientific. In channel management there are some common problems, such as business orientation. Enterprises do not attach importance to the development and maintenance of retail terminal, neglect the channel members training, ignore the relationship between channel members, take improper channel member incentive measures, and so on, which seriously restrict the development of TCM products and TCM enterprises.

3.4 Poor terminal management

First of all, the medicine retail terminal construction is not perfect, which restricts TCM product sales in all. Secondly, the attention on the retail terminal is insufficient. TCM enterprises only attach importance to product sales; do not pay attention to the relationship. In addition, the distribution of sales terminal resources is uneven. The difference between urban and rural is large. In short, terminal sales of TCM products are not perfect and poor management, which restricted the product sales.

4 The Countermeasures to Improve the Channel Mode

The improvements of channel mode of TCM enterprises should start from the existing problems. Combining with its actual situation, TCM enterprises should establish a marketing channel mode fitting the characteristics of its product. In this paper, combining with typical TCM enterprises, in view of their common problems, we will put forward some concrete countermeasures.

4.1 Integration of channel structure

First, flatten the channel structure. TCM enterprises should integrate the structure of marketing channel through making the gravity of the channel down, shortening the channel level as far as possible, reducing the length and width of the channel, adopting wide-short channels. This simplification can not only reduce the cost of sales, but also establish the rapid reaction mechanism, strengthen the control of the channel, reduce inventory in the channel, speed up the product distribution, and increase profitability of enterprise. In addition, make the channel links electronic. TCM enterprises should build modern management information system, establish perfect, smooth and rapid information channel, and improve the efficiency of product supply and distribution.

4.2 Strengthen the management of the fleeing goods

In order to solve this problem, in terms of products, provide code for each product to strict distinction; accurately grasp the product in order to control cross-regional fleeing goods. In terms of price, set strict price system, including clear ex-factory price, total price, the secondary distributor price, retail price, and provide the corresponding profits for the dealers at all levels. In terms of dealers, TCM enterprises can ask the dealer to strictly obey the contract to carry out business activities. In channel management, strengthen the channel member management, formulate strict and trans-regional punishment system, and punish fleeing goods.

4.3 Scientific management of channel members

To carry out scientific management of channels, the first thing is to introduce advanced management concept and methods. On the choice of channel members, strict selection criteria should be formulated; regional resources, sales and business reputation of the channel member should be taken into account. At the same time, regular professional training of channel member is necessary, which can enhance their identity on products and enterprise, and improve the loyalty. On the other hand, TCM enterprises should establish new type of channel relationship with pharmaceutical commercial enterprises and drug retailers, form the channel alliance. Finally, TCM enterprises should determine appropriate and reasonable incentive system of members, strengthen the sales enthusiasm of channel members, and build TCM products supply and marketing value chain together.

4.4 Pay attention to the terminal market

The importance of terminal market is increasingly attached by TCM enterprises. Tong Ren Tang spent a huge sum of money to build stores, to set channel gravity of the terminal down, to promote the rapid sales of the products. it is a successful stories. For the TCM enterprise which don't have the capability to build own terminal, measures should be taken by strengthening links with the retail terminal and making a meticulous terminal market, such as setting the systematic promotion plans according to the management characteristics of the retail terminal, strengthening cooperating relationship, forming the brand chain mode of cooperation to make up for the shortage of this aspect.

5 Conclusions

Basing on the understanding of pharmaceutical marketing channel, combining with some typical TCM enterprises, including Kanion pharmaceutical, Shineway pharmaceutical, Dong-e E-jiao, Tong Ren Tang, we analyze the current situation of TCM enterprises' channel mode deeply, summarize the problems of channel mode. We think that their channel structure is not reasonable, fleeing goods is serious, channel management is not science, terminal construction is not proper, management is poor. We suggest that TCM enterprises should integrate the channel structure, strengthen management of the trans-regional channels, do fine terminal market, and take other measures to relieve the existing problems of TCM channels to promote the sale of products and TCM enterprises' long-term development. At the same time, TCM enterprises should apply related marketing theory to guide the improvement of their marketing channel mode.

In the future, in terms of research on the channels of TCM enterprise, we should further improve the channel mode theory; build a systematic improvement project of channel mode. We should pay attention to channel relationship and channel conflict, and build perfect theory system of TCM channel.

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A Combination Forecast Model of the Creative Talents Demand Based on Ant Colony Optimization Algorithm*

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Abstract: Creative industry has become a new economic growth point and the principal aspect of the competition of comprehensive national strength. Creative industry is a talent-intensive industry which stresses individual creativity and innovation. This paper discusses the definition and characteristics of creative talents of the creative industry, applies the combination forecast based on ant colony optimization algorithm to build a new creative talents demand forecasting model, and uses the statistical data of personnel in culture industry of Heilongjiang province to make empirical prediction. Empirical analysis indicates that the forecast model can improve the overall performance of the combined forecasts and meet the actual demand of the creative industry's development for creative talents.

Key words: Creative talents; Combination forecast model; Ant colony optimization algorithm

1 Introduction

Under the background of the knowledge economy era, creative industry, as an emerging industrial development, has raised a wave of economy and made huge economic contribution all over the world. According to the data provided by Hawkins in the book of 'Creative Economy', the global creative economy creates the value of \$22 billion every day, increasing at the rate of 5%. A number of countries have regarded the creative industry as an emerging strategic industry and taken measures to promote the development of creative industry. Creative industry is knowledge-intensive, culture-intensive, technology-intensive and talent-intensive industry, the core of resource is creativity and innovation, therefore, the high-quality of creative talents with the distinctive characteristics of creativity and innovation is the key factor to accelerate the development of creative industry, promote the growth of creative economy, and motivate the prosperity of creative city.

With the booming of the creative industry, the demand for creative talents is also increasing. Although demand forecasting is of the utmost importance in creative industry planning and policymaking for both the public and business sectors, applications of combination forecast methods remain rare. There is great significance about the research on creative talents demand forecasting, on the one hand, to promote the balance of supply and demand of the creative talents, make sure that the development strategy of creative industry can be implemented successfully. On the other hand, by means of the analysis the development trend of the demand, provide important reference value for the government and creative business sectors to make the policy and planning, strengthen the creative industry management, at the same time, to arouse endogenous power of the creative economy and lay a solid talent basement.

In this article, we define the definition of the creative talents and analyze the characteristics from three aspects. Then, we take the creative industry of Heilongjiang province as an example and construct the combined forecasting of which the optimal weight is solved by employing the ant colony optimization algorithm. By means of the prediction error, we verify the effectiveness of the combined forecasting. Finally, we forecast the creative talents demand of Heilongjiang province in the next five years, which is meaning for the better implement the strategy of creative industry and creative talents in Heilongjiang province.

The rest of the paper is organized as follows. Section 2 outlines general notions of creative talents. Section 3 presents a complete description of combined forecasting based on ant colony optimization algorithm. Section 4 provides the results of prediction for the creative talents demand of Heilongjiang province. Section 5 provides the conclusions.

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2 The Definition and Characteristics of Creative Talents

2.1 The definition of creative talents

Creative talents are also known as the creative class that was first put forward by Florida(2002). He divided creative class into two parts: Super creative core and Creative professionals. Research on creative talents of China began in 2004. Different researchers defined the concept from various angles. From the viewpoint of talent type, Li(2007) considered creative talents as the elite talents, who owned independent intellectual property rights as the core, characterized by brain work, depended on professional or special skill. From the viewpoint of labor, Zeng(2011) regarded creative talents as the brain workers, who provide high added-value products or services by means of creativity and professional skill.

Above researchers defined the concept from different viewpoints, which provide an essential reference for this article. Based on the above research, this paper defines creative talents from the multi-viewpoint, creative talents refer to the talents, who possess creativity, high level knowledge, innovation spirit and innovation ability, engage in creative activities related to all aspects of the creative industry chain, turn knowledge, inspiration, idea or information into high added-value products or services by means of creativity and profession skills. Creative industry chain includes three stages, creative planning design, creative production and marketing. According to the stages, creative talents can be divided into three kinds of type, creative designers, creative producers and creative marketers.

2.2 The characteristics of creative talents

Although creative talents engaged in different jobs, there are some characteristics in common, such as character trait, job characteristic and geographic feature.

1) Character trait: With knowledge and high quality, the creative talents have creativity and innovation, and usually have inspiration and innovation idea and engaged in creative work. So due to such trait, members of the creative talents tend to be young and generally higher education levels. Furthermore, the creative talents possess shared values, such as respecting personality, cherishing freedom, emphasizing the realization of self-value and self-identity.

2) Job characteristic: The creative talents work mainly in the form of team, because that from an idea or inspiration to high added-value products or services, the process of creative industry development needs many different professional creative talents to complete. Moreover, good working environment affects the creative talents greatly. Creative talents regard job as only a part of life rather than the whole life. So, besides salary, they also pay attention to the cognition of supervisor, colleague relationship, work meaningful and flexibility, good prestige, company's policy and culture and so on.

3) Geographic feature: The creative talents have higher demand for urban living conditions, and tend to be gathered in the creative cities. Florida put toward the noted '3T' (Technology, Talent, Tolerance) theory of creative economic development. Then, another 'T'(Territorial assets) was added, this is so called '4T' theory. Glaeser proposed '3S'(Skill, Sun, Sprawl) theory, which also stressed the quality of place was meaning for creative talents, such as the 'sunbelt' is the important factor to attract the creative talents.

3 Method

3.1 Combination of forecasts

The concept of combination forecast started with the seminal work of Bates and Granger(1969). Given to individual forecasts of a time series, they demonstrated that a suitable linear combination forecasting may result in a better forecast either of the two original ones, in the sense of a smaller error variance. Throughout the years, applications of combination forecast have been found in many fields such as meteorology, economics, sales and price (Clement, 1989). The empirical results of the study (Song, 2009) show that combination forecasting is statistically significantly more accurate than the average single-model forecasts for all combination method. This provides a strong recommendation for forecasting talents demand in a creative industry.

Basically, given a set of single forecasting method from $i=1$ to n over m time periods $t=1$ to m , X_{it} , the problem is to determine the fixed weights W_i over the m periods for each forecasting method $i=1$ to n , which give the minimum squared forecast errors for the actual data values Y_t ($t=1$ to m). This can be formulated as a QP problem with the weights as the decision variables as follows:

$$\begin{aligned}
 & \text{Minimize} && \sum_{t=1}^m \left(\sum_{i=1}^n W_i X_{it} - Y_t \right)^2 \\
 & \text{Subject to} && \sum_{i=1}^n W_i = 1 \\
 & && W_i \geq 0
 \end{aligned} \tag{1}$$

The key of combination forecasting is how to choose the weight. Much work has been done on finding the optimal fixed weights for individual forecasts to minimize the within sample sum of squared forecast errors, such as Simple Average (*AVG*), Variance based (*VAR*), Inverse of the mean square error (*INV-MSE*). Deutsch, Granger et(1994) pointed out that updating weights produced substantially smaller out-of-sample squared errors than those obtained by fixed weights.

This paper further investigates the impact of combination forecasting on forecast accuracy by applying the ant colony algorithm to determine the combination weights for the signal forecasts.

3.2 Combination forecasting model based on ant colony algorithm

Ant colony optimization algorithm based on the foraging behavior of ants has been first introduced by Dorigo and Gambardella. The basic idea of ACO is to imitate the cooperative behavior of ant colonies. As soon as an ant finds a food source, it evaluates it and carries some food back to the nest. During the return trip, the ant deposits a pheromone trail on the ground. The pheromone deposited, the amount of which may depend on the quantity and quality of the food, guides other ants to the food source. Quantity of pheromone on the arc is decreased in time due to evaporating. Each ant decides to a path or way according to the quantity of pheromone. More pheromone trail consists of short path than long path. The technique is based on updating pheromone trail of good solutions and there are many ant models in this way. Continuous ACO algorithm has been introduced and used for optimization of benchmark functions and creative talents demand estimating.

First, transform a continuous search space to a discrete one by differentiating the continuous decision variables, which are so-called the continuous ACO algorithms (CACO). In this investigation, the CACO for the traveling salesman problem are modified to determine three parameters of a combination forecasting model as Eq.(1) in the discrete search space. The probability, $p_k(i, j)$ that an ant k moves from city i to city j is expressed as Eq.(2)

$$p_{ij} = \frac{\tau_{ij}}{\sum_{i=1}^n \tau_{ij}} \tag{2}$$

Where τ_{ij} is the pheromone level between city i and city j .

Once ants have completed their tours, the most pheromone deposited by ants on the visited paths is considered as the information regarding the best paths from the nest to the food sources. Therefore, the pheromone dynamic updating plays the main role in real ant colonies searching behaviors. The local and global updating rules of pheromone are expressed as Eq.(3)

$$\tau_{ij}(t+1) = \tau_{ij}(t) + \frac{Q}{f(i)} \tag{3}$$

Where $f(i)$ is the length of the shortest route.

More detail of the CACO procedure algorithms on this study is as follows:

- Initialization: Set upper bounds of three positive parameters. In this study, in order to discretion those continuous parameters, each digit of the parameters is represented by 100 cities, as follows Eq.(4). Thus, each digit contains 100 equally possible values from 0 to 1. Hence, three ant colonies are defined as W_i -ant colony for three parameters value searching. The numbers of cities for each ant colony are 101.

$$W_{ij} = W_{i \min} + \frac{(W_{i \max} - W_{i \min})}{100} \times j \tag{4}$$

- Assigning tasks to each ant colony: For step one, pathway-structure list of ant-colony would be generated. Each ant will randomly select a pathway from the pathway list in its associate colony and remember the values of the represented parameters. At end of the pathway, pass the three parameters values into the objective function and calculate the forecasting error. The shortest travel pathway in each searching loop would be determined based on the smaller forecasting error.

- Determine the numbers of ants and calculate the distance between cities: The numbers of ants are set to be 101 in each ant colony searching. The maximum number of iterations is set to 1000 to avoid infinite iterations.

- Stop criterion I: While the maximum number of iterations is reached, then stop the algorithm and the shortest travel path of the ants colony is an approximately optimal solution. Otherwise, continue to step 4.

- Calculate the visiting probability: If the maximum number of iterations is not reached, then calculate the probability that an ant k in city i moves to city j in accordance with Eq.(2). Repeat steps 1-3;

- Stop criterion II: If each ant has finished its pathway-structure list from the nest to the food source passing through all cities, then, the shortest path is an approximately optimal solution. Otherwise, conduct the pheromone updating process represented as to Eq.(3) to renew the reinforcement of pheromone, then ,go back to step 4

Notice that, in any iteration, while the shorter path is attained, the appropriate solution is determined, and for those parameters, new search space is then re-discretized.

4 Empirical Results

4.1 Data

There some agreement among academic researchers that the ‘hard core’ of creative industries branches include: Advertising, Architecture, Arts and antiques, Crafts, Design and designer fashion, Video, Film, Music and Photography, Visual and performing arts and music, Publishing, Computer games, Software and electronic publishing and radio and TV. Due to the difference of statistics in different areas, the data of creative talents is scarce. So, this article regards the personnel engaged in cultural industry as the creative talents, which occupies a large proportion in the creative industry, and adopts the data provided by Heilongjiang statistical yearbook. Table 1 lists the number of personnel in cultural industry in Heilongjiang province from 2002 to 2011.

Table 1 Number of Personnel in Culture Industry (Unit: Person)

Year(t)	2002	2003	2004	2005	2006
Number	12768	12700	12304	12574	12704
Year(t)	2007	2008	2009	2010	2011
Number	14297	14022	14517	16245	17416

4.2 Results of forecast models

This article adopts three single forecast models, respectively, Moving Average prediction model(MA), Exponential Smoothing prediction model(ES) and Gray prediction model($GM(1,1)$) to predict the creative talents demand of Heilongjiang province. Table 2 presents the actual value and predict values, as well as the Relative Error.

Table 2 The Predicted Values and Relative Error of Individual Forecasts

Year (t)	Actual Data (Person)	Predicted Value (Person)			Relative Error (%)		
		MA	ES	GM(1,1)	MA	ES	GM(1, 1)
2005	12574	12471	12329	12814	0.82	1.95	1.90
2006	12704	12539	12454	13388	1.30	1.97	5.39
2007	14297	13070	12634	13988	8.58	11.63	2.16
2008	14022	13830	14141	14614	1.37	0.85	4.22
2009	14517	14215	14378	15269	2.08	0.96	5.18
2010	16245	14825	14823	15954	8.74	8.75	1.79
2011	17416	16106	16456	16669	7.52	5.51	4.29

According to the above analysis and calculation, among of the three single prediction models, some prediction accuracy has been very accurate, but even so, in the different years, their performance prediction effect is still very unstable. So, based on the data provided Table 2, a combination forecasting is set up as follows:

$$\begin{cases} \min & Q = e_1^2 + e_2^2 + e_3^2 + e_4^2 + e_5^2 \\ s.t. & \sum_{i=1}^3 W_i = 1 \\ & e_1 = 14297 - (13070W_1 + 12634W_2 + 13988W_3) \\ & e_2 = 14022 - (13830W_1 + 14141W_2 + 14614W_3) \\ & e_3 = 14517 - (14215W_1 + 14378W_2 + 15269W_3) \\ & e_4 = 16245 - (14825W_1 + 14823W_2 + 15954W_3) \\ & e_5 = 17416 - (16106W_1 + 16456W_2 + 16669W_3) \end{cases} \quad (5)$$

Applying the improved ant colony algorithm to calculate the weights of each model, we get the weights as follows:

$$W_1 = 0.26 \quad W_2 = 0.27, \quad W_3 = 0.47$$

4.3 Performance of combination forecasting model

In order to validate the combination forecasting model is effective, we choose two indexes, Mean absolute percentage error (MAPE) and Root mean square prediction error (RMSPE) to evaluate the prediction effect, as follows Eq.(6) and Eq.(7). According to the above two error indexes calculated respectively three individual predictive error indexes and combination forecasting error indexes, the result as shown in Table 3.

$$e_{MAPE} = \frac{1}{n} \sum_{t=1}^n \left| \frac{P_f - P_a}{P_N} \right| \times 100\% \quad (6)$$

$$e_{RMSPE} = \sqrt{\frac{1}{n} \sum_{t=1}^n \left(\frac{P_f - P_a}{P_N} \right)^2} \quad (7)$$

Table 3 The MAPE and RMSPE of Prediction Results for Different models

	MA	ES	GM(1,1)	Combination Forecasting
MAPE	4.12%	4.36%	3.16%	2.58%
RMSPE	5.26%	5.73%	3.60%	3.08%

According to information of the table the two error index values of MAPE and RMSPE, the combination forecasting model error index values is significantly lower than the two individual forecasting model error index values. Thus shows that this proposed combination forecasting method can effectively increase the prediction accuracy.

4.4 Creative talents demand of Heilongjiang Province

By analysis and comparison, the combination forecasting model based on ant colony optimization algorithm has excellent accuracy, so this model can be used to predict creative talents demand of Heilongjiang province in the next five years, the predicted result is presented on the Table 4.

Table 4 The Creative Talents Demand of Heilongjiang Province (Unit: Person)

Year (t)	2013	2014	2015	2016	2017
Number	19419	19011	19863	21683	22655

According to the predicted result, the creative talents demand will increase at a steady growth rate. In order to prevent creative talents become the bottleneck of creative industry development, some measures are needed to take to promote the creative talents growth.

First, the local government should realize the importance of creative talents from strategically highlight, formulate a long-term program for creative talents development, as well as make a macro adjustment and policy planning so as to achieve the balance of supply and demand. Second, reform and improve the creative talents cultivating mechanism, accelerate the training of inter-disciplinary talent with specialty, capability and knowledge, who are not only proficient in creative industry but also skilled in creative management. Last, strengthen the cultivation of professional talents in the universities and colleges. Pay attention to train innovative education and original consciousness, promote the path of combining industry-university-research cooperation in Heilongjiang Province.

5 Conclusion

Creative talents who possess the traits of creativity, high level knowledge, innovation spirit and innovation ability are the key factor to accelerate the development of creative industry. The article has explored the definition and characteristics of the creative talents and put forward a new combination forecasting method based on ant colony optimization algorithm. The method is tested with the data from the number of personnel in cultural industry in Heilongjiang province. Empirical results indicate that the proposed combination forecasting can improve the forecasting accuracy effectively and provide an important reference for the government decisions in the development of creative industry.

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Industrial Competitiveness and Industrial Ecology: Case of RING Initiative in Japanese Oil-Related Industry

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Abstract: This paper analyzes the reorganization and reformation of the Japanese petro-related industry and industrial complex. Japanese petro-related companies have struggled to compete with foreign competitors enjoying overwhelming economy of scale and promoted business integration beyond firm's boundary for regaining competitiveness. The industry and Ministry of Economy, Trade and Industry jointly initiated a national project to address this issue by facilitating technology development for achieving highly efficient industry complex both economically and ecologically. By applying stag hunt game approach, we discuss the condition for successful coordination project and describe how subsidizing and business environment affect the coordination effort, which previous industrial ecology research fails to investigate.

Key words: Industrial ecology; Petrochemical complex; RING; Stag hunt game

1 Introduction

Assuming value maximization as firm's objective and stable regulatory constraints on environmental issue, energy and material conservation effort of firms cannot apparently come before economic rationality consideration, although energy conservation literature has insisted setting environmental objective having equal importance to economic one^[1]. Economic theory indeed doesn't preclude environment preserving activities, even when short term economic impact is uncertain, as far as those affect expected economic value which is the product of sustainable growth in the future. As energy saving activity and facility and /or product's energy efficiency can achieve competitiveness and thus economic value to firm at least short term, energy efficiency at macro level can be enhanced through competition. As such, Japanese industrial sector, with strong support from governmental body, had long been praised for achieving a balance between financial performance and energy/material efficiency by advanced technology^[2].

Despite overall favorable impression on the progress of the energy conservation efforts, Japan is still on the way to entrench energy/material exchanges, among geographically co-located firms, beyond organizational boundary which make up eco-industrial region in aggregate, so called industrial ecology¹². Previous research found multilateral energy/material exchange, including reuse of waste heat, water and by-product within a region evolved spontaneously, mainly driven by economic reason^[3,4], despite in reality industrial ecology efforts being mainly led by public sector^[5-7]. The literature meanwhile observes economic benefit works as stimuli but doesn't enhance mutual exchange itself and stress the importance of social capital or social proximity among corporate managers as decisive factor^[8,9], drawing much attention to social embeddedness of industrial ecology^[10]. Although we assent the importance of soft factors, analyzing those in isolation from economic benefit masks interrelation between economic factors and non-economic factors and successful industrial ecology cases give inaccurate impression of product of chances contingent on players' characteristics.. Standard finance theory tells us how to handle those soft factors within economic analysis. "Trust" or "openness" between stakeholders can resolve information asymmetry and suppress opportunistic behavior, consequently decreasing discount factor for a project which in turn raises likelihood of agreement on exchange.

¹ Eco town program, being inspired by "Zero emission research initiative," is a notable example. The program was initiated jointly by METI and MOE in 1997 and according to METI, it pursers the goal of "the construction of a resources-recycling economic society through the development of industrial industries by utilizing local industrial accumulations, the prevention, and the promotion of recycling of wastes based on the uniqueness of local districts"⁽¹²⁷⁾, p.2).

² The regional eco-efficient industrial system is sometimes referred to as "industrial symbiosis." We don't use this terminology intentionally as most cited definition by Chertow^[28] states "Industrial symbiosis engages traditionally separate industries in a collective approach to competitive advantage involving physical exchanges of materials, energy, water and/or by-products" (p.2). Our scope is broader and do not require the separation of industries among exchanging firms.

Nevertheless, existing industrial ecology studies concluded successful cases achieved remarkable economic performance as well as environmental load reduction from ex post analysis^[11-13]. Such case studies, while demonstrating best practice, only touched the tip of the iceberg and failed to analyze negotiation process toward exchange and thus incorporate risk inherent to coordinative projects. Moreover, those studies focused on economy of inter-firm exchange but did not pay attention to intra-firm alternatives, a noteworthy exception being done by Wolf et al^[14]. Intuitively, firms may prefer in house competing project if it would generate lesser economic benefit^[15]. There might be therefore enormous negotiations on multilateral exchange ending in failure even when (risk adjusted) economic benefits are expected while mutual understanding being fully nurtured. Given this, simple questions arise. How much expected economic benefits a project should have for reaching agreement? To what extent does required economic benefit in the absence of mutual trust differ from that in the case of strong trust? Is a firm indifferent between in-house project and cross-boundary one when competing projects have equivalent value?

To the best of our knowledge, only few previous researches, such as Andrews^[16] and Rozen et al^[17] with applying transaction cost economics framework, shed light on the factors which affect the fortune of negotiation over multilateral exchange in the context of industrial ecology. We developed analytical framework to investigate economic threshold which coordinative project should satisfy for filling this gap, reflecting on our involvement in a regional industrial ecology project^[18]. Although it may seem contradictory on the surface, this framework helps designing political measures to promote industrial ecology. Political initiative for industrial ecology implies the existence of untapped exchanging opportunities. Given the spontaneous nature of industrial ecology evolution, governmental initiative should not be interventive but supportive by means of subsidizing and creating forum to communicate. As far as additional industrial ecology provides public benefits, public spending for compensating coordinative risk acceptance can be justified but should be cost-effective. As discussed later, our framework gives guideline to determine adequate subsidy and further proposes intermediating value transfer between prospective firms by public sector or third party can raise likelihood of agreement with the given amount of subsidy.

Industry characteristics can significantly affect firm's attitude toward industrial ecology, more generally coordinative effort. Tightly coupled business activities between co-located firms can enhance information exchange and nurture trust which drive industrial ecology. In this sense, industrial agglomeration consisting of process industry such as petro-related industry, by its nature of process connectivity, would likely develop multilateral energy/material exchange spontaneously, as the agglomeration gets matured. However, contrary to widely held view^[19], Japanese petro-related companies had historically preferred individual energy saving effort and for beating price competition they had developed highly eco-efficient production system individually by developing unique energy conservation technology and technique, given relatively small factory size from global standard. Considering path dependency of system evolution, switching cost from intra-firm optimized system from regionally optimized system becomes excessive high, especially if the transition would take considerable time, making co-locating facilities reluctant to coordination. Although additional energy conservation effort can contribute to competitive advantage to some extent, newly established mega-scale petroleum and petrochemical complexes in emerging countries which realize overwhelming economy of scale soon blow such incremental energy saving effort away. Japanese petroleum and petrochemical companies as well as petro-related industrial complexes faced such severe competitive environment around the turn of the century, due to the declining domestic demand and accompanying excess capacity. From company's perspective, promoting coordinative project within existing local industrial region requires higher strategic justification than industrial ecology, as they have economically promising option of establishing sophisticated manufacturing unit abroad. This is particularly true for Japanese petro-related industry because they have mainly used costly naphtha as material for ethylene instead of ethane. Thus, as Esty and Porter^[20] stressed, even local material and energy flow optimization may not contribute competitiveness of corporation.

Meanwhile Japanese petro-related industry in unison created cooperative initiative called "RING (Research Association of Refinery Integration for Group-Operation)" to enhance the industry competitiveness and preserve local industrial complex supported by the government in 2000¹. Industrial ecology related projects, such as by-product multilateral exchange, were developed among others. As

¹ We analyzed RING initiative in the context of longitudinal evolution of petro-related industrial complex in Inaba^[29] and Inaba et al^[30].

will be shown, achieving industry ecology has not been the main objective of the initiative but has been pursued spontaneously (yet somewhat collaterally) for economic reasons, namely surviving in highly competitive global marketplace.

The purpose of this essay is to describe the progress of RING initiative referring to the analytical framework mentioned above. By doing this, we intend to analyze the progress of the industrial ecology within so called brownfield in the context of revitalization of matured industry, to which prior studies didn't give considerable attention. Next section introduces the analytical framework, generalized stag hunt game. Section 3 briefly describes RING initiative. Section 4 discusses the progress of RING within the framework and proposes further research.

2 Analytical Framework

We extended and generalized stag hunt game framework to analyze coordination problem. While some of prior studies adopted game theoretic approach to planning and evaluation of competing industrial ecology ^[21-23], our research focus on the economic condition of successful pre-investment process. Coordination negotiation, as can be seen in M&A cases, takes considerable time. Due to technological development, change in internal or external business environment, either party may find more attractive option or insufficient benefit reflecting production cutback even after agreement and thus the coordination can break down. Our framework allows examining the impact of those possible dynamics onto coordination. The following three factors are crucial in developing the framework:

- (1) Post-investment net amount of coordinative benefit
- (2) Pre-investment risk of coordination
- (3) Existence of other investment alternatives, particularly opportunities of intra-firm investment

It is obvious that coordinative benefit must be high enough to tempt firms into the joint project (factor 1). In the conventional literatures, the assessment of the coordinative benefit is based only on the post-investment cost and benefit. However, because coordination is considered critical to the success of the project, coordination related pre-investment factors like coordination related losses should be included in the analysis (factor 2). Moreover, the project will fail ex-ante if a firm moves alone to other internal opportunity which is expected to bring higher profit. Therefore, in general analysis, firms should be given the right to compare and choose their decisions of participating in the joint project or conducting its own internal investment (factor 3). Analyzing the spontaneity of coordination with or without this assumption will give different results. The novelty of our framework attributes to the inclusion of factor 2, referred as abortive coordination loss, which allows us to analyze the effect of social factors, transaction costs and internal investment opportunity set (including energy saving investment) in the context of coordination problem.

In game theory, coordination problem arises when coordination yields a net positive benefit to be divided between the partners, but it reduces a partner's payoff, if his counterpart does not coordinate. The simple version of this type of game is the stag-hunt game ^[24]. Stag-hunt game depicts a situation in which two hunters must decide independently whether to hunt the stag together or hunt rabbits alone without knowing the counterpart's attitude toward the coordination. Meanwhile, each hunter can get a rabbit by himself. Half a stag is better than a rabbit, but he must cooperate with his partner in order to succeed in hunting a stag. There are two rational outcomes (two Nash equilibria) for this game: hunters together hunt stag as a team, or each hunts a rabbit by oneself. Each would prefer to cooperate in hunting the stag, but if the other player's motives or actions are uncertain, the rabbit hunt is a risk-free alternative.

One concept for determining the equilibria in this kind of game is called payoff dominance that focuses on the payoff level of each equilibrium. Hence, an equilibrium payoff dominates or is more efficient than the other equilibrium, if and only if each player's payoff is greater in the former equilibrium.

However, during real negotiation process, whether to coordinate or not depends on not only their payoffs expected to be earned post investment but also abortive coordination losses if one partner withdraws, which can alter the equilibrium. Chassang ^[25] states that, by introducing incomplete information (i.e. risk) as ex post coordination to dynamic game analysis, "Payoffs upon miscoordination, which play no role when considering the Pareto efficient frontier under complete information, determine the extent of the efficiency loss (p.997)." Thus we exploit different equilibrium concept, called risk dominance which allows analyzing the effect of coordination risk on equilibria determination. Risk dominance concept intuitively depicts a situation where each participant is not sure whether the other

participant will play appropriate role in the equilibrium requiring coordination and then she may be motivated to choose the safer but less efficient equilibrium, given the existence of two Nash equilibria in a game. Technically, it is related to the risk associated with each equilibrium yet its estimation does not require the knowledge of participation probabilities (or the related distribution function) exogenously. With this setting, we formally show that there is always critical economic value for a coordinative project which motivates players moving to risk dominance equilibrium but coordination can fail even when all the relevant information are available. On the other hand, possibility of coordination will increase, *ceteris paribus*, by 1) transferring some portion of benefit between players, 2) changing the proportion of investment cost each player bears, 3) receiving subsidy from somewhere and 4) changing project size.

The interest of this paper is to examine the effect of abortive coordination loss, the product of coordination failure loss for each player, on the evolution of coordinative project within a (industrial and geographical) space over time. Broader strategic uncertainty of each player, for instance the uncertainty of continuous operation of a player, can largely affect the success probability of regional coordinative effort. While a challenge that players perceive in common, water shortage in outstanding industrial ecology case of Kalundburg, Denmark ^[12], can reduce abortive coordination loss, region specific issue by itself can drive coordination to the limited extent unless stable external environment. RING project highlights how broader challenge reduces abortive loss and nurtures industrial ecology.

3 RING Initiative of Japanese Petro-Related Industry

3.1 Background

Japanese petro-related firms had quest for cost advantage for surviving in fiercely competitive global marketplace. In the latter half of the 1990's, industry reorganization had developed, while they had simultaneously continued efficiency improvement at production site level. Positive investments in core business and growth business and participation in foreign industrial complexes had accelerated business integration and made reasonable contribution to enhance competitiveness. Nevertheless, the average scale of Japanese was not equal to their rivals oversea. Many companies were still independent and production facilities of even an individual company dispersed nationwide, mainly across eight industrial complexes, presumably due to the government's industry strategy. As such, Japanese petro-relate companies faced the reality of mediocre cost efficiency due to medium-scale production, excessive competition, surplus of production scale, and all of these factors resulted in disappointing low financial and stock price performance. Besides, coordinative efforts between production facilities belonging to different companies but locating in the same industrial district were underdeveloped due to the organizational, cultural and cognitive obstacles.

Meanwhile they had to address energy security and saving issues reflection of the two Oil Crises, given resource poor Japan's status. They had dealt by developing recycling technologies and consequently environmental and energy saving technologies of Japanese industrial sector, including petro-related firms, have been praised throughout the world. However, petro-related companies felt that further improvement in energy efficiency would not be achieved with isolated efforts. Accordingly, twenty companies in oil industry and chemical industry together to establish Research Association of Refinery Integration for Group-Operation (RING) in 2000 under the Research Association of Technology Law. RING, in close cooperation with METI, has facilitated group-operation projects in industrial complexes. The projects include unified management system and latest technologies development for achieving the goal of virtually single large scale regional production facility. Kashima, Chiba, Kawasaki, Chita, Sakai Senboku, Mizushima, and Shunan industrial complex developed coordinative projects in the context of RING initiative. RING initiative has gradually progressed in three stages so far, while the goal of each project at each stage varied reflecting uniqueness of each industrial complex. The first R&D projects (RING 1) had achieved certain results which worked as the proof of coordinative R&D potential in the each district. It had resulted that strong unity was caused among complex enterprises through these activities. Following this, the second R&D project (RING 2) was executed in 2003. Development of advanced, highly integrated technologies for reducing environmental burdens was performed there. In addition, the action to optimize entire petrochemical complex and carry out advanced function unification was executed in the third R&D project (RING 3) in 2006.

Only common interest could not cultivate coordination. METI thus decided to subsidize attractive projects as trigger and support the Association to mediate business cooperation yet indirectly for ensuring spontaneous and bottom up efforts. With this institutional setting, member companies started

personnel exchange, information sharing and analyzing operation flow with each other for exploring untapped opportunities. Beyond traditional energy saving and efficiency enhancing project, innovative ideas have spurred resulting in an upward spiral through cooperation between enterprises beyond the limit of single company business (See exhibit3).

3.2 Antecedent: Formation of Kashima Industrial Complex

The idea behind RING initiative was inspired by the successful coordinative operation in Kashima complex, one of the latest developed complexes. Open discussion field among participating companies examining the complex-wide issues was strategically organized at the earlier phase of its formation in the late 1960's, by Mitsubishi Chemical Corp., the dominant player in the complex. Kamesaburo Ikeda, the president of Mitsubishi Chemical Corp of the time, who had the considerable share of the credit for petrochemical industry development post WWII, was visionary enough to think about the long term development of the region as well as petro-related industry in Japan from the planning phase. Given the geographical and follower's disadvantage of Kashima region at that time, one of crucial tasks for him was to formulate real "industrial complex" more than simple neighboring which provided investing companies with international competitiveness through highly coordinated production flow, including joint ancillary facility and energy servicing entity, in close cooperation with Ibaragi prefecture. Among those joint facilities and companies, Kashima Joint Facilities Corp, which was established for resolving the conflict of interest among the co-locating business units and is still only one company specializing in managing/maintaining shared facilities of industry complex in Japan, represents systematically planned development in Kashima.

Ikeda particularly placed the importance on creating the opportunities where participating companies discussed district-wide issues at multilevel, from top executives to site workers. Exhibit 4 presents the current structure of promoting information sharing and coordination in Kashima. Corporate Liaison Council in Kashima Seaside Industrial Zone, which is steering body to enhance information sharing and discussion among companies, consists of "General meeting" (all companies), "Operational committee" (nine representative companies), "Environmental standing committee" (12 representative companies), and "Harbors standing committee" (11 representative companies). Senior executives of the representative companies assemble on a regular base (every two months) in Tokyo for discussing problems observed in the field. At middle and lower level, "Factory Meeting Committee," which is composed of "Six Companies Committee", "Administration and Environmental Measures Report Committee," "Labor Report Committee," "Production Report Committee," "Technological Report Committee" and "Security Measures Report Committee," proactively nurtures personal communication on site. Together with "Factory Meeting Committee," there is "Security Measures Liaison Council" ("Manager Committee" is under that). According to the function of their jobs, personal interchanges with same departments of other companies have been promoted in the Kashima complex. The development and interests of the Kashima complex has been shared in the field. Under such a system, they have undertaken actions on some problems, every day operations, and adjustment of regular repair etc. since establishing the complex. They have known well the circumstances of other companies, and always have recognized the advantage of joint management. The member companies naturally started to examine the possibility of multilateral energy and material exchange. METI decided to support the project and disseminate to other districts as a national project.

3.3 Progressive industrial ecology and industrial integration driven by RING

RING 1 projects (total project cost: 20 billion JPY) focused on developing foundations for integrated operation by establishing operation information sharing system, with the aim of nurturing a sense of community among members. RING2 promoted to develop technologies for efficient energy consumption and by product utilization toward industrial ecology. RING 3 aimed to progress coordinative technology development toward total optimization within industrial complex.

For instance, in Kashima industrial complex, Kashima Oil Co. and Mitsubishi Chemical Corp., as RING 1 project, undertook development of integrated operation technology allowing extensive utilization of refinery and petrochemical by-product, for enhancing mutual effective use of by-product material. And they succeeded to enlarge added-value of by-products. RING 2 projects in Kashima went further to execute research in which they efficiently collected olefin fraction of petrochemical raw material from off-gas generated as a by-product at the Kashima Oil facility. The result of this study is expected to be used as high-value-added raw material in the petrochemical sector. RING 3 project was to include other 2 companies and to create technology for highly efficient integrated production of petroleum and petrochemical products, by desulfurizing naphtha within the complex and then optimally isolating and supplying light naphtha fraction, which is materials for aromatic series in petroleum

refinery and ethylene and propylene in petrochemicals through efficient continuous distillation for relieving crude oil price risk.

These collaborative projects certainly encouraged firms to integrate operation further. For instance, Idemitsu Kosan and Mitsui Chemical established a LLP managing ethylene production facilities of both firms in Chiba complex in 2010. Another example was observed in Mizushima complex which led to management integration. Nippon Oil and Japan Energy started business partnership between contiguous refineries in 2006 and Nippon Oil and Nippon Mining Holdings, the parent company of Japan Energy commenced management integration in 2010.

4 Discussion

In the industrial ecology terminology, RING initiative purses to apply the successful planned eco-industrial park model to brownfield and transform it into efficient industry complex. It is still too early to evaluate the achievement of the initiative yet we can safely argue its progress is worth to observe for investigating how and why the initiative affects the transformation path of each industrial complex differently. However, in general, the idiosyncratic evolution trajectory of Kashima complex as a strategic niche implies transformation cost of brownfield, in our words abortive coordination loss, is expected to be high.

Our framework predicts coordination type of sharing utility/infrastructure or utilizing joint provision of services which is expected to be naturally organized for economic reasons^[25, 26], has relatively low abortive coordination loss and thus likely emerges at first phase of industry ecology formation. There are two reasons for that. First, after facility construction, even without coordination, one of them can still use the invested facility. Second, the overall effects from sharing utility/infrastructure are greatly reduced if the project is implemented by a single party (like fire-fighting equipment). The efficient operation in Kashima had not been secret to the industry members for long. The firms locating at Kashima complex has simultaneously have been operating at the other industrial districts together and the successive executives of those firms had met regularly and shared the information about the progress and the economics of the coordinated complex. If firms co-locating at other district which also operate in Kashima perceive the advantage of coordination over switching cost, such effort should already have to be observed. In reality, even coordination like Kashima Joint Facilities Corp mentioned above had hardly emerged in other districts, except joint power plant establishment with electric utility company.

Given this, political concern, to be cost effective, is to find critical value for coordination and subsidize project for filling the gap between the critical value and the expected project value. Although RING initiative commenced with less challenging and easy-to-operating projects jointly, reportedly many member companies were skeptical of the remarkable success of the initiative. Thus METI subsidized two thirds of project cost for RING project much higher than one half for typical coordinative energy saving project for alluring the firms. Even allowing for RING projects were not installation of existing technology but rather technology development thus risky, high subsidizing rate might reflect perceived high abortive coordination loss and presumably long term strategic objective behind. However, while our analysis supports more attractive subsidizing for coordinative project in general, high cost effective coordinative projects often turn out to have relatively high financial benefits of which concerned entities likely agree to cooperate even without subsidies. Our analysis thus predicts standardized grant tends to malfunction since it only gives excess benefits to attractive projects. This theoretical result suggests standardized subsidization differentiated the stakeholders' evaluation of the project across regions, which in turn affected abortive loss of succeeding coordinative projects. For instance, RING 1 intended to develop foundations for integrated operation like Kashima. In accordance to this objective, subsidizing ratio for Kashima, where abortive coordination loss might be low, should be lower if political objective is to evenly promote industry ecology.

Drastic industry reorganization changes rule of game and can promote coordinative efforts. However, it should be noticed that strategic importance of each industrial complex may affect abortive coordination loss in a mixed way. In other words, national or firm-wide level optimality consideration suppresses regional optimizing efforts. As there had been excessive ethylene production capacity, petro-related companies should inevitably eliminate and consolidate at least some ethylene plants which are the core of the complexes and should reconfigure regional supply chain network. Indeed, in the last few years, companies operating ethylene production announced shutdown or consolidation one after another and closure of the core facility would let co-locating firms move away. As coordinative material

exchange requires long term commitment to the participants, perceived possibility of the shutdown among players may raise abortive coordination loss. If RING member companies had considered regional optimization insofar as corporate level optimization enhancement while executing technology development in each complex had been a given, then project selection was largely affected by high abortive loss. The complex with high possibility of continuation would exploit more challenging and regional specific efficiency enhancing project. On the other hand, when the complex facing high uncertainty, for relieving abortive coordination loss, may tend to choose more generic project bringing temporal benefit and free from commitment of specific players. Consequently, even if the all development projects succeeded, the discrepancy of the degree of regional efficiency and industrial ecology will be enlarged between industrial complexes.

Industrial ecology and regional competitiveness are the two sides of a coin, especially for heavy industries. Thus industrial ecology research not counting for dynamics in business environment may keep the concept of industrial ecology stay in theory or at best observed eco-industrial regions as exceptional niches. Nevertheless we still

believe political initiative can turn brownfield into highly efficient eco-industrial park, but policymakers should pay enough attention to outside region dynamics as well as internal conditions. Comparing the longitudinal evolution and reformulation of Japanese petroleum and petrochemical complexes and investigating the consequence of RING will provide plenty of implications for putting industrial ecology into practice.

5 Conclusion

This paper applies generalized stag hunt game perspective to the progress of RING initiative. The efficient subsidizing strategy given different evolution trajectory of each industrial complex and the dynamic interaction between regional industrial ecology and industry reorganization, which the most extant literature fail to investigate, are argued. Theoretical description developed in this paper should be augmented with quantitative analysis yet we believe our theory offers the generic framework to investigate industrial ecology in business context. Although we don't discuss in this paper, our theory also predicts the existence of available internal energy projects and value transfer among players can affect the success of the coordination.

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Research on the Influence of Index of CSTP to TFP: Based on the Empirical Research of Provincial Panel Data*

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Abstract: This article collected and dealt with the dates of real GDP, capital formation, employment of 31 provinces, municipalities and autonomous regions in China between 2003 to 2011, through the unit root test, cointegration test and the model specific selection, utilizing the panel data model to get the Production Function, calculated total factor productivity(TFP) and its growth rates; then, bring “Index of Comprehensive S&T Progress”, surveyed by the Development Planning Department of National Ministry of Science and Technology, into the Production Function of panel data model to analyze the function and influence of “Index of Comprehensive S&T Progress” to TFP.

Key words: TFP; Panel data; Production Function; Index of Comprehensive S&T Progress (CSTP)

1 Introduction

The experience of the development of developed countries suggested that progress of S&T is the driving force of economic development, at the same time, the needs of the development of economy promotes the progress of S&T fundamentally, meeting with the development of the economic and social has become the target for the development of S&T, and the trend of interactive integration of S&T and economy is more and more obvious.

TFP (Total Factor the Productivity, TFP) is one of the important tools to study economic growth, and reflecting the technological progress of a country, region or industry, an enduring topic in the field of research of economic growth.

How to analyze and quantify the interactive integration of S&T and economy through econometrics model, and to promote this interactive integration with adopting the corresponding policies and measures, is a new problem in the field of macroeconomics. This paper intends to bring “Index of Comprehensive S&T Progress”, surveyed through 34 indexes by the Development Planning Department of National Ministry of Science and Technology, into the Solow Production Function, to analyze the function and influence of “Index of Comprehensive S&T Progress” to TFP, and to explore the preliminary quantitative interactive integration of S&T and economy.

2 Models, Method and Data Description

2.1 Panel data model

Panel data model are mainly the following three categories:

(1) Pooled Regression Model:

$$Y_{it} = \alpha + \beta X_{it} + \mu_{it}, \quad t=1, 2, \dots, T, \quad i=1, 2, \dots, N \quad (1)$$

(2) Individual-Mean Corrected Regression Model:

$$Y_{it} = \alpha_i + \beta X_{it} + \mu_{it}, \quad t=1, 2, \dots, T, \quad i=1, 2, \dots, N \quad (2)$$

(3) Unrestricted Model:

$$Y_{it} = \alpha_i + \beta_i X_{it} + \mu_{it}, \quad t=1, 2, \dots, T, \quad i=1, 2, \dots, N \quad (3)$$

To choice the kind of model will depend on the covariance analysis to check the following two assumptions:

$$H_1: \beta_1 = \beta_2 = \dots = \beta_N \quad (4)$$

$$H_2: \alpha_1 = \alpha_2 = \dots = \alpha_N, \quad \beta_1 = \beta_2 = \dots = \beta_N$$

Test statistics F_2 of H_2 is submit to the F distribution, namely:

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$$F_2 = \frac{(S_3 - S_1) / ((N-1)(k+1))}{S_1 / ((N(T-k-1)))} \sim F((N-1)(k+1), N(T-k-1)) \quad (5)$$

Test statistics F_1 of H_1 is submit to the F distribution, namely:

$$F_1 = \frac{(S_2 - S_1) / ((N-1)k)}{S_1 / ((N(T-k-1)))} \sim F((N-1)k, N(T-k-1)) \quad (6)$$

In (5) and (6), S_3 , S_2 and S_1 are the sum of squared residuals in (1), (2) and (3), N is the number of cross section, T is the times and k is the number of independent variables.

In addition, the stability of data must be considered in the process of regressions, that is whether the data have the unit root. Only the data have the same order, can the data enter the regression equations. If no stability, the data should be handled by difference.

2.2 Data description

Variable of output, were the regional real gross domestic product(real GDP, was nominal GDP multiplied with the consumer price index); capital, were the regional actual gross capital formation (actual capital K , total capital formation multiplied by the price index of investment in fixed assets); and labor, were the regional employment (L).

All the data come from annual statistical data of 2004 ~ 2012 of National Bureau of Statistics and monitoring data of progress of science and technology from 2004 to 2012 of Chinese Statistics¹.

2.3 Production function

Suppose the production function is:

$$Y_{it} = A_i L_{it}^{\alpha_i} K_{it}^{\beta_i} \quad (7)$$

Y_{it} , L_{it} , K_{it} respectively were the output, the inputs of capital and labor of region i in t period; $i = 1, 2, \dots, 31$; $t = 1, 2, \dots, 9$, respectively region s and periods; α_i and β_i respectively were the output elasticity of capital and labor; A_i was TFP of region i .

To take logarithm on both sides of (7), get:

$$\ln Y_{it} = \ln A_i + \alpha_i \ln L_{it} + \beta_i \ln K_{it} \quad (8)$$

Using the Panel Data Model to (8), the output elasticity of labor α_i and capital β_i can be gotten. Then making regularization:

$$\alpha_i^* = \frac{\alpha_i}{\alpha_i + \beta_i}, \quad \beta_i^* = \frac{\beta_i}{\alpha_i + \beta_i} \quad (9)$$

The TFP is:

$$TFP_{it} = \frac{Y_{it}}{L_{it}^{\alpha_i^*} K_{it}^{\beta_i^*}} \quad (10)$$

The rate of TFP growth from t_j to t_k is:

$$tfp_{it_i \sim t_j} = \left(\frac{TFP_{it_j}}{TFP_{it_i}} \right)^{\frac{1}{j-i}} - 1 \quad (11)$$

2.4 Production function contains “index of comprehensive S&T progress”

There are two intensions of S&T Progress: one is the progress of scale and level of S&T activities; the other is the progress of the influence of S&T on economic development. To monitor the status of activities of S&T in nation and regions, the Comprehensive Evaluation System of S&T progress², including 5 indicators of Level 1 (Environment of Progress of S&T, Inputs of S&T Activities, Outputs of S&T Activities, Industrialization of High and New Technology, and S&T to Promote Development of Economic and Social), 12 indicators of Level 2 and 34 indicators of Level 3 such as “Number of Professional and Technical personnel per ten thousand people”, was built by Development Planning Department of National Ministry of Science and Technology.

Put “Index of Comprehensive S&T Progress” into the production function (a region's “Index of

¹ <http://www.stats.gov.cn/tjsj/ndsj/>, <http://www.sts.org.cn/tjbg/tjjc/tcindex.asp>

² <http://www.docin.com/p-87803495.html>

Comprehensive S&T Progress” in period t):

$$Y_{it} = A_i T_{it} L_{it}^{\alpha_i} K_{it}^{\beta_i} \tag{12}$$

To take logarithm on both sides of(12)and regression with Panel Data Model, the output elasticity of labor α_i and capital β_i will be gotten; then normalization like(9), the $TFP2$ including “Index of Comprehensive S&T Progress” is:

$$TFP2_{it} = \frac{Y_{it}}{L_{it}^{\alpha_i} K_{it}^{\beta_i}} \tag{13}$$

(13) divided by “Index of Comprehensive S&T Progress”, the $TFP3$ not including the progress of S&T is:

$$TFP3_{it} = \frac{Y_{it}}{T_{it} L_{it}^{\alpha_i} K_{it}^{\beta_i}} \tag{14}$$

The contribution ΔT of growth rate of “Index of Comprehensive S&T Progress”, ΔI , to TFP2 from t_j to t_k is:

$$\Delta T = 1 - \frac{\text{Growth Rate of } TFP3}{\text{Growth Rate of } TFP2} \tag{15}$$

3 Empirical Research of Regional TFP of 2003 ~ 2011

3.1 Unit root test

With software of Eviews6.0 to test the stability of the panel data, the results are shown in Table 1.

Table 1 Results of Unit Root Test of Panel Data

		LLC	IPS	Fisher-ADF	Fisher-PP
Level	LnGDP	-0.52958(0.2982)	5.81307(1.0000)	9.01567(1.0000)	22.9536(1.0000)
	LnK	1.93618(0.9736)	6.58754(1.0000)	14.9710(1.0000)	48.8909(0.8871)
	LnL	-9.15507(0.0000)	1.30753(0.9045)	53.0397(0.7842)	96.0182(0.0036)
	T	-7.94894(0.0000)	-0.19680(0.4220)	69.3767(0.2507)	105.387(0.0005)
1st Difference	LnGDP	-21.0177(0.0000)	-8.64289(0.0000)	208.740(0.0000)	246.099(0.0000)
	LnK	-17.8577(0.0000)	-7.00685(0.0000)	179.520(0.0000)	284.674(0.0000)
	LnL	-5.00901(0.0000)	-2.44960(0.0072)	101.742(0.0011)	130.865(0.0000)
	T	-19.4846(0.0000)	-8.04062(0.0000)	193.331(0.0000)	247.793(0.0000)

From Table 2, all the level data of the variables were no stability based on 4 methods, but the 1st difference were stability at the 1% significant level, so the cointegration test can be done.

3.2 Cointegration test

Because of no stability of the variables, the Cointegration Test method proposed by Kao (1999) for the level and the 1st difference data of LnGDP, LnK, LnL and T of each region(as shown in Table 2).

Table 2 Results of Pedroni Residual Cointegration Test

Series: LNGDP, LNK, LNL				
Alternative hypothesis: common AR coefs.(within-dimension)				
	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-0.384390	0.6497	-1.580163	0.9430
Panel rho-Statistic	2.188224	0.9857	2.347550	0.9906
Panel PP-Statistic	-3.859823	0.0001	-4.688533	0.0000
Panel ADF-Statistic	-7.517640	0.0000	-9.282575	0.0000
Series: LNGDP, LNK, LNL, T				
Alternative hypothesis: common AR coefs.(within-dimension)				
	Statistic	Prob.	Weighted Statistic	Prob.

Panel v-Statistic	-1.604074	0.9457	-2.988641	0.9986
Panel rho-Statistic	3.886016	0.9999	4.043115	1.0000
Panel PP-Statistic	-4.585956	0.0000	-4.633340	0.0000
Panel ADF-Statistic	-7.594482	0.0000	-8.122360	0.0000
Alternative hypothesis: individual AR coefs. (between-dimension)				
	Series: LNGDP, LNK, LNL		Series: LNGDP, LNK, LNL, T	
Group rho-Statistic	4.392978	1.0000	6.228146	1.0000
Group PP-Statistic	-5.476492	0.0000	-6.130270	0.0000
Group ADF-Statistic	-9.977382	0.0000	-9.039054	0.0000

3.3 Determine model

According to the F test (results in Table 3) based on (5) and (6), the unrestricted models were chosen.

Table 3 Value of F Test to Choose Model

Value of F Test of $Y_{it} = A_i L_{it}^{\alpha_i} K_{it}^{\beta_i}$ (7)	Value of F Test of $Y_{it} = A_i T_{it} L_{it}^{\alpha_i} K_{it}^{\beta_i}$ (12)
F ₁ =4.8189541, F ₂ =29.190307	F ₁ =2.201027574, F ₂ =10.79386393

4 Results of Regression

With Ordinary Least Square (OLS), the statistics of regression models was shown in Table 4.

Table 4 Results of Regression Models

Statistics	(7)	(12)	Statistics	(7)	(12)
R-squared	0.998249	0.998418	Mean dependent var	8.724269	8.724269
Adjusted R-squared	0.997746	0.997955	S.D. dependent var	1.098405	1.098405
S.E. of regression	0.052147	0.049675	Akaike info criterion	-2.873820	-2.968437
Sum squared resid	0.587371	0.530527	Schwarz criterion	-2.053869	-2.135471
Log likelihood	463.8979	478.0970	Hannan-Quinn criter.	-2.544899	-2.634296
F-statistic	1985.901	2154.132	Durbin-Watson stat	1.803292	1.800993
Prob(F-statistic)	0.000000	0.000000			

5 Analysis of TFP

Table 5 Regional Indicators and Growth Rate from 2003 to 2011

Region	TPF Mean	TPF Growth Rate	TPF2 Mean	TPF2 Growth Rate	TPF3 Mean	TPF3 Growth Rate	ΔT	ΔT Order	ΔI Order
Beijing	5.705	0.073	4.705	0.060	0.063	0.036	40.90%	31	31
Tianjin	6.470	0.099	5.702	0.085	0.084	0.049	42.13%	30	29
Hebei	2.801	0.065	2.839	0.068	0.077	0.005	92.14%	7	8
Shanxi1	2.854	0.078	2.833	0.076	0.076	0.021	72.56%	24	21
Inner Mongolia	3.051	0.092	2.994	0.089	0.083	0.007	91.56%	9	2
Liaoning	3.689	0.070	3.579	0.065	0.069	0.023	65.14%	26	27
Jilin	3.351	0.083	3.315	0.080	0.080	0.028	64.69%	28	25
Heilongjiang	3.533	0.069	3.554	0.070	0.084	0.007	90.50%	10	6
Shanghai	5.260	0.060	4.661	0.053	0.062	0.019	63.21%	29	30
Jiangsu	3.433	0.067	3.325	0.063	0.061	0.009	86.53%	13	20
Zhejiang	3.326	0.062	3.273	0.059	0.065	0.009	84.84%	15	26
Anhui	2.190	0.066	2.190	0.066	0.061	0.007	89.68%	11	14
Fujian	3.282	0.070	3.261	0.069	0.071	0.009	86.44%	14	11

Jiangxi	2.324	0.072	2.322	0.072	0.069	0.012	83.25%	17	12
Shandong	3.011	0.062	2.998	0.061	0.064	0.005	92.35%	5	17
Henan	2.210	0.067	2.215	0.068	0.064	0.005	92.63%	4	7
Hubei	2.718	0.072	2.721	0.073	0.060	0.006	92.22%	6	4
Hunan	2.430	0.073	2.425	0.071	0.062	0.016	77.64%	21	19
Guangdong	4.492	0.062	4.360	0.057	0.073	0.018	68.10%	25	28
Guangxi	2.048	0.076	2.042	0.072	0.064	0.013	81.86%	18	13
Hainan	2.762	0.079	2.707	0.073	0.074	0.019	73.51%	23	23
Chongqing	2.041	0.075	2.013	0.070	0.046	0.004	93.59%	3	5
Sichuan	2.172	0.071	2.167	0.068	0.054	0.012	81.79%	19	18
Guizhou	1.617	0.069	1.625	0.066	0.053	0.008	88.59%	12	15
Yunnan	1.843	0.063	1.842	0.062	0.059	0.010	83.21%	16	24
Tibet	2.020	0.079	2.019	0.079	0.086	0.016	80.04%	20	9
Shanxi2	2.204	0.082	2.151	0.074	0.045	0.019	74.08%	22	22
Gansu	1.992	0.073	1.997	0.078	0.056	-0.000	100.00%	1	3
Qinghai	2.165	0.090	2.173	0.091	0.064	0.003	96.20%	2	1
Ningxia	2.116	0.096	2.081	0.093	0.061	0.032	65.02%	27	16
Xinjiang	2.718	0.066	2.724	0.066	0.075	0.005	91.73%	8	10
Mean	2.962	0.074	2.865	0.071	0.067	0.014	40.90%		

According to formulas of 3.3 and 3.4, the value and growth rate of TFP, TFP2 and TFP3 from 2003 to 2011 of 31 regions were calculated, and the contribution ΔT of growth rate of “Index of Comprehensive S&T Progress”, ΔI , to TFP2 (as shown in Table 5).

6 Conclusions

“Index of Comprehensive S&T Progress”, surveyed through 34 indexes by the Development Planning Department of National Ministry of Science and Technology, had given the comprehensive, integrated to reflect the S&T progress situation of various areas, so not only did it influence the output elasticity and labor and capital, but also its growth rate had the important influences to TFP2. Therefore, in order to achieve steady growth in real GDP, especially in the condition of environment optimization, the comprehensive S&T progress should be paid great attention. Only in this way, can we fundamentally guarantee the scientific development of economy.

Index of Comprehensive S&T Progress influence Production Function. From analysis results in Table 6, the output elasticity of capital and labor calculated through method of Ordinary Least Square (OLS) and standardization with production function (12), joined Index of Comprehensive S&T Progress, were different from those with production function (7), and the standard output elasticity of capital with (12) was greater than that with (7) (exception of Hebei, Heilongjiang, Henan, Hubei, Gansu, Qinghai, Xinjiang), then changed the production function.

Growth Rate ΔT of Index of Comprehensive S&T Progress influence Growth Rate of TFP2. According to ΔT , 31 regions can be divided into the following four groups:

Regions of Contribution below 70%: Beijing, Tianjin, Shanghai, Jilin, Ningxia, Liaoning, Guangdong;

Regions of Contribution 70 to 80%: Shanxi1, Hainan, Shanxi2, Hunan, Tibet;

Regions of Contribution 80 to 90%: Sichuan, Guangxi, Jiangxi, Yunnan, Zhejiang, Fujian, Jiangsu, Guizhou, Anhui, Heilongjiang;

Regions of Contribution more than 90%: Inner Mongolia, Xinjiang, Hebei, Hubei, Shandong, Henan, Chongqing, Qinghai, Gansu.

Only contribution ΔT of Beijing and Tianjin were lower than the average 54.43%, which showed that the Comprehensive S&T Progress had played a very important role in promoting the development

of economic and social.

“Index of Comprehensive S&T Progress” had given the comprehensive, integrated to reflect the S&T progress situation of various areas, so not only did it influence the output elasticity and labor and capital, but also its growth rate had the important influences to TFP2. Therefore, in order to achieve steady growth in real GDP, especially in the condition of environment optimization, the comprehensive S&T progress should be paid great attention.

Development of regional economic depends on comprehensive S&T progress. There were the orders of the contribution ΔT and growth rate ΔI of 31 regions in table 6, this two orders of most regions were consistent, that is, the high the growth rate of Index of Comprehensive S&T Progress from 2003 to 2011, the high the contribution to TFP2; but the low contribution to TFP2, the high of the starting value of Index of Comprehensive S&T Progress, the high level of comprehensive S&T. So to narrow the gap between regions, it is necessary to close the gap between regional scientific and technological progress.

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Chinese Cement Industry Transition, Status Quo, Policy Trend and Challenge

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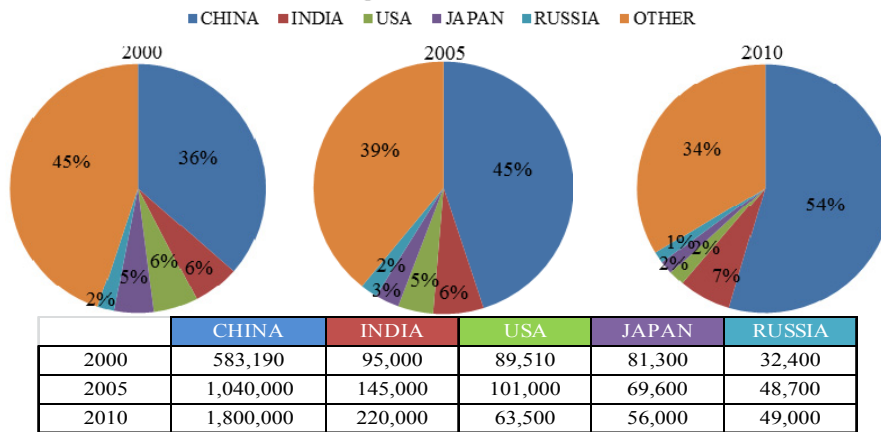
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Abstract: Chinese cement industry has been changed tremendously with economic development of China. This article reviews the history of Chinese cement industry and analyzes the current situation of cement industry from the political, environmental, and the other aspects by using the PEST analytic method. The challenges for the evolution of Chinese cement industries are also clarified.

Key words: Cement; Survey; Energy Conservation; Thermal energy; Environmental policy

1 Introduction

With the economic growth, China has become the “factory of the world”. Instead of that, however, it is now burdened with serious economic and environmental problems.



Source: Edited by Mineral Commodity Summaries USGS

Figure 1 Cement by Country Share of World

Cement production has expanded greatly. The world production of cement has increased from 1.6 billion tons in 2000 to 3.3 billion tons in 2010 (Figure 1). As the demand for cement in developing countries has increased, China’s share of world production has surged from 36% in 2000 to finally reach 54% in 2010, which accounts for more than half of production.

Reducing CO₂ from cement production and improving its energy efficiency are now nationwide propositions¹⁾. In order to improve energy policies in China, a plan to optimize the production system in the cement industry was implemented that has been targeting cement businesses from 2004 onwards to reorganize inefficient companies and weed out those that have kilns with low energy efficiency. According to these policies, the proportion of production using the New Suspension Preheater (NSP) has expanded to roughly 70%.

In 2006, Chinese government declared a policy to reduce the number of cement companies from 5000 to 2000. As the result of it, approximately 1500 production lines were closed by 2008, the volume of production was reduced by 52 million tons, and 1066 plants were removed²⁾.

These policies, however, have not been sufficient and there are still many natural resource and environmental problems in the industry. Chinese industry greatly affects the world’s resources and the global environment. Thus, it is necessary for China to receive support from developed countries, such as technology transfer regarding to energy and environmental management.

2 The Status Quo of Chinese Cement Industry

2.1 Cement classification and production methods

Cement consists of pulverized limestone, clay, silica, and iron raw materials. Cement clinker is

made by heating the above mentioned materials at high temperature. Portland cement can be obtained by the addition of plaster and pulverization.

Cement in Japan can broadly be divided into three types, “Portland cement”, “blended cement”, which is a combination of mixed materials of primarily Portland cement, and also “special cement”. The one mainly used in construction is Portland cement (Table 1, 2).

Table 1 Structure of Cement

Portland cement	=	Clinker	+	Plaster
Mixed cement	=	Clinker gypsum	+	Mixed material
Special cement				

Source: The Institute of Cement Association

Table 2 Type of Cement

Portland cement	Ordinary Portland cement High-early-strength Portland cement Ultra-early-strength Portland cement Moderate heat Portland cement Low-heat Portland cement Sulfuric acid salt Portland cement White Portland cement
Mixed cement	Slag cement Fly ash cement Silica cement
Special cement	Alumina cement Ultrafine particle cement Cement solidifying material

Source: The Institute of Cement Association

According to the Chinese National Standard (GB), general cement is classified into as shown in Table 3. Special cement is classified according to its use and performance.

Table 3 Kind of Common Cement China

Type	Sign	Component		
		Clinker	Plaster SO ₃	Admixture
Portland cement type I	P. I	95~98%	<3.5%	—
Portland cement type II	P. II	90~97%	<3.5%	<5%
Ordinary Portland cement	P.O	80~92%	<3.5%	6~15%
Slag Portland cement	P.S	25~78%	<4%	20~70%
Pozzolana Portland cement	P.P	45~78%	<3.5%	20~50%
Portland Cement flyash	P.F	55~78%	<3.5%	20~40%
Composite Portland cement	P.C	45~83%	<3.5%	15~50%

Source: The statistics by the number midoro network

Table 4 China Cement Kiln

- shows the typical cement production methods in China.

China cement kiln	Long kiln	Long hollow drying kiln
		Long wet kiln
		Retour kiln
		Suspension preheater kiln with Suspension Preheater (SP)
		New dry kiln outside cracking furnaces (NSP)
	Vertical kiln	Usually vertical kiln
		Machine vertical kiln

2.2 Cement manufacturing processes in China

Cement manufacturing can broadly be divided into five processes, such as (1) mining of raw materials, (2) blending and pulverization of raw materials, (3) firing, (4) finishing, and finally, (5) shipping (Figure 2).

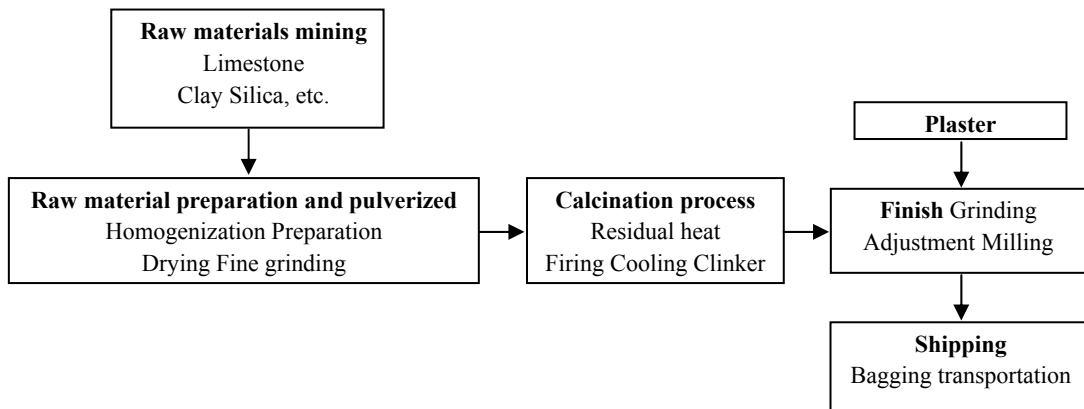


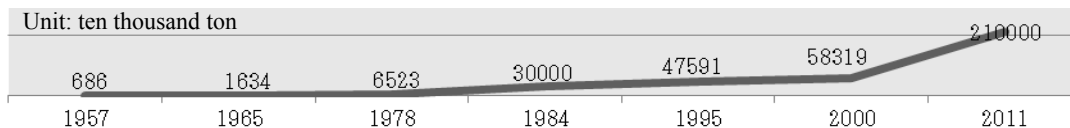
Figure 2 Cement Manufacturing Process Diagram

2.3 Changes in China’s cement industry

The cement industry has supported China’s socio-economic development through the supply of foundation materials for construction. Chinese cement industry has developed at very high speed over the approximately 63 years that have passed since the founding of the state of New China in 1949³⁾.

1949~1957	After the founding of recovery And Initial stage of development 1949: 34 companies, 1952: 2.86 million tons, 1957: 6.86 million tons, Imported from abroad: production line, 1957: The published standard cement
1958~1965	Great Leap Forward policy outcome And Economic adjustment stage 1958: 34% increase from the previous year, 1959: 27% increase from the previous year 1965: 16.34 million tons "Established one company large and medium-sized cement companies in each ministry properly The spread across the country 3.2 million tons stand kiln domestic
1966~1978	"Three line" construction And Stage of promoting "Cultural Revolution" 1970: Established rotary kiln standard 4.4×180m production line 1978: 65.23 million tons Cultural Revolution started, stagnation of economic activity, production of continuous decline Energy consumption and raw materials increase
1979~1984	Cement recovery of adjustment Announced the "About acceleration of cement industry development" Imports the new dry process production line from Japan and Romania NSP method is standard, I show how the development of the cement industry
1985~1995	The cement industry vigorous development stage Innovation to the new dry process kiln from the wet Cement companies listed, accelerate the development and expansion 1995: 593.99 million tons production capacity
1996~2000	Cement industry structure adjustment steps 1996: Change to modernization building materials industry 1998: To overproduction in the proliferation of small and medium-sized enterprises 2000: Lose the 3108 production line
2001~2011	New dry process high-speed development And Stage mergers and restructuring of industry 2002: Lose the 4894 line small kiln, 2007: Conducted mergers and reorganizations 2011: 2.1 billion tons

Figure 3 History of China Cement Industry



Source: Resized by each data

2.4 The current status of Chinese cement

According to the statistics on the cement industry by the National Bureau of Statistics of China, the volume of cement produced in 2012 increased by about 7% on 2011 to reach 2.21 billion tonnes (Figure 4).

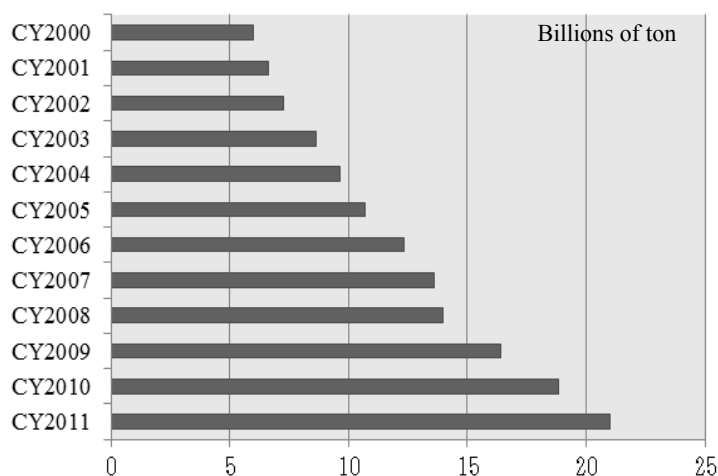


Figure 4 Annual Production of Cement in China
Source: National Bureau of Statistics of China

Due to the effect of the real estate restraint policies, from the latter half of 2011, the growth rate of cement production decreased. Amid a swelling stock due the downturn in demand, plants began to either stop or cut back production. Reflecting the trend in supply and demand, the price of cement then dropped continuously up until the end of 2012⁴⁾ (Figure 5).

2.5 Chinese government’s policies

The Chinese government has continued to uphold “industrial consolidation” and “environmental protection” as two major themes in the 12th five-year plan of 2011. As to the “industrial consolidation”, the Chinese government promotes the consolidation of the cement companies and increases the market share of the ten largest cement manufacturers up to 35% by 2015. As to the “environmental protection”, the Chinese government facilitates the replacement of small-scale, old-fashioned, and inefficient plants with large-scale, state-of-the-art, and efficient ones, with the consolidation of the cement industries.

2.6 The leading Chinese cement companies

The leading private companies in the Chinese cement industry are located by region, because of the logistic problems of the procurement of raw materials and distribution of products. Thus, the leading companies locate in the economically-developed coastal regions. Table 6 shows the five largest cement companies for clinker production volume in 2012.

Table 6 The Five Largest Cement Clinker Company in China, 2012

	Corporate group name	Location (China)	Production volume (Billions of tons)	Growth rate (%)
1	CNBM	Northern, Central Southwest, South	2.95	50.51
2	CONCH	Eastern, Southern	1.50	12.00
3	SINOMA	North, Northwest	0.72	29.17
4	JIDO	Central, Northern	0.67	26.87
5	CRCHL	Southern	0.54	3.70

Source: network number midoro

2.7 The energy consumed by the cement industry

The energy-saving methods of the cement production are the Suspension Preheater (SP) method and the NSP method, and their utilization ratios in some countries are shown in Figure 6.

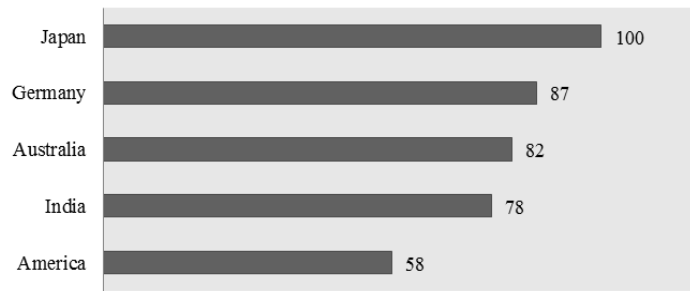


Figure 6 Penetration of SP • NSP (Production Volume and Capacity Based)

Table 7 shows the energy efficiency for cement production in China and the developed country (Japan).

Table 7 Advanced Level Compared to International Energy Use and Efficiency of China

	china	Advanced level international comparison
Cement energy consumption [kg ce (coal equivalent) / ton]	126	118 (Japan)

Source: China the Energy Statistics



Source: IEA China the Energy Statistics

Figure 7 International Comparison of Cement Energy Efficiency

2.8 PEST analysis for China’s cement industry

The PEST analysis was applied to the Chinese cement industry. The results are shown in Table 9 and it describes that the opportunities for and barriers to the expansion of Chinese cement industry can coexist.

Table 8 Energy Consumption of Various Production

Production methods	Clinker heat consumption (kJ/kg)	Clinker coal Consumption (kg ce/t)	Relative value (%)
NSP • SP	3269	111	100
Reporu kiln	4096	140	126
Vertical kiln	4180	143	129
Long hollow drying kiln	5434	186	168
Long wet kiln	5852	200	180

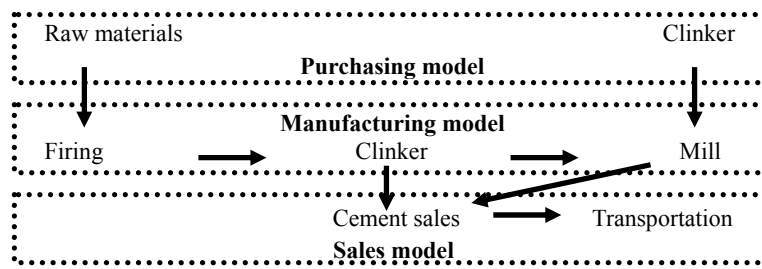
Source: China the Energy Statistics

2.9 China’s cement supply chain

Figure 8 shows the supply chain of Chinese cement industry. It consists mainly of the 3 parts such as purchasing model, manufacturing model, and sales model.

As manufacturing models, firstly, in the “single plant type”, the processes, purchase → clinker manufacture → milling → finishing → sales, and so on, are all completed at the same plant, the second is the “clinker + finishing plant type”, in which, while the purchase of raw materials and clinker

manufacture is completed in a suburban plant, milling → finishing → sales, and so on, is completed in an urban neighbourhood, and thirdly, the “finishing type” consists of just the processes clinker → milling → finishing → sales, and so on.



Figur 8 Industrial Chain of China Cement

Table 9 PEST analysis

Political factors	Due to policy, industry consolidation and reconstruction is accelerated
Economic factors	Expansion continues to infrastructure investment
Social factors	Promotion of energy efficiency
Technology factors	Birth and spread of new technologies

3 Problems Faced by Chinese Cement Industry

With the structural adjustment of the world’s coal industry due to restrictions on natural resources and energy, as well as the environment, the business is feeling pressure from such factors as the continuing high coal price, shortage of electrical power, a shortfall in rail transport capacity, and the high-level cost of fares.

Although the tendency of China’s cement industry to show a healthy increase is continuing, manufacturing technology is lagging when compared to developed countries, and a lack of investment in research and development means that the small capacity for innovation now presents a large obstacle (Table 10).

Persistent problems of imbalance exist: firstly, in the distribution of production; secondly, in the amount of fixed assets investments; and thirdly, in the distribution of total assets in cement.

Table10 The Comparative Cement Industry Technical

Item	Developed countries	China
Company size	World 60-120 million t Europe 70-80 million t Japan 260 million t	8 million t
Rate of production	France 3000 t / worker Germany 3000 t / worker Japan 15000 t / worker	District 160 t / worker National 280 t / worker
Kiln system Utilization rate	94%	89%
Clinker Heat consumption	World 2800kJ/kg Japan 2900kJ/kg	3900kJ/kg (Long kiln average)
NSP heat consumption	2888 kJ/kg Clinker	3555 kJ/kg Clinker
Clinker production Coal consumption	100kg Soot /t	175kg Soot/t
Cement manufacturing Power consumption	85kWh/t	115kWh/t
Clinker strength	70	60
Kiln dust emissions	25mg/ Nm ³	57mg/ Nm ³
Kiln exhaust gas NOx	200 mg/ Nm ³	500~1200 mg/ Nm ³
Kiln exhaust gas SO2	50mg/ Nm ³	200~400mg/ Nm ³

Source: China the Energy Statistics etc.

Eastern China, Southern China, Central China, and Northern China have become separate market leaders, respectively.

The top 10 companies in China only occupy 23% of China’s market share, whereas the top 10 companies in the world occupy nearly 50% of world’s market share, China’s poor industry-intensive

situation is thus evident.

The government has accelerated the transfer and weeding out of companies which do not conform to environmental policies, and has prohibited any new construction and expansion of cement companies that discharge large amounts of pollutants (Table 11).

Table 11 Chinese and Overseas Cement Plant Emission Standards Limit Comparison

Country	Dust (mg/Nm ³)		SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)
	Kiln	Chiller		
Germany	50	50	400	500
France	50	100	500	1200
U K	40	50	200	900
U S	70	40	750	900
Japan	50	50	750	500
China-1	100	100	400	800
China-2	150	150	800	1600
China-3	100	100	600	400

Source: China Cement Association

Note: China-1: Grade 2 Long kiln, China-2: Tertiary long kiln, China-3: Class vertical kiln.

The government has laid down goals for the cement industry to help build a recycling-oriented society that is energy and resource-saving. Business expansion is being constrained due to lack of policies and standards. Study on policy and financial support to the technological development and the installation of waste receiving and treatment facilities is underway.

4 Conclusion

The Chinese cement market is the largest one in the world, and is also an open up market. All the world's top cement companies have entered this market. In recent years, along with the strengthening of national policy on environmental protection and the improvement of production technique, the large Chinese cement companies have helped China cement industry to reach the global advanced standards gradually through both self-driven technology innovation and acquisition of international advanced technologies.

That said, when compared with international cement companies in the global cement market, China cement companies should further strengthen capabilities in the following areas including competitive edge, emerging- and resource-saving technologies, energy consumption, labor production, and utilization of resources and wastes. The following points help highlight the directions for further study and observation: (1) To consider the investment made by Japan's cement industry in China, (2) To consider the possibilities of transferring Japan's energy- and resource-saving technologies to China, (3) To consider the effects on the environmental protection if advanced technology were to be introduced to China, (4) To propose the required mechanisms to allow innovation in China's production.

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A Study on the FDI's Influence on the Technological Innovation Ability in Wuhan of China

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Abstract: Based on the analysis of the demonstration effect, competition effect, and training effect of technological innovation ability that FDI affects, the thesis uses cointegration analysis and error correction model, to analyze the relationship between FDI flow and technological innovation ability from 1990 to 2007 in Wuhan. The result shows that there is a long-term stable equilibrium relationship between FDI and technological innovation ability in Wuhan, however, the contribution of FDI flow to the granted patents is not obvious in the short run. There is a causal Granger causality between FDI flow of two-year lag and the number of patent authorization.

Key words: FDI; Technological innovation ability; Influence; Cointegration

1 Introduction

Technology innovation is the eternal subject of social survival and development, FDI plays an important role in promoting China's economic development since we join WTO. Many experts and scholars at home and abroad study the technological spillover effect and the influence of which to economic growth in the host country from different perspectives, the common view is for capital inflow countries and regions, FDI can not only provide capital to promote local economic growth, but also can produce the technology spillover effect, upgrade effect, trade effect, environmental effect and employment effect etc. Most economists emphasizes, FDI is one of the important indicators to explain China's sustained and rapid economic growth miracle and technological progress since more than 30 years. Generally speaking, the research on relationship between FDI and technological innovation ability, was explored by scholars at home and abroad the last 10 years. Although previous literature has involved it, which was mainly based on nationwide, lacking of regional research.

Wuhan began to take advantage of FDI since 1980s, up to 2007, actual utilization of foreign capital in Wuhan was 2250.05 million dollars, and foreign-invested enterprises in the proportion of the above-scale industrial added value reached 15.63%, the contribution rate of foreign investment total assets in the above-scale industrial enterprises is as high as 29.78%. Wuhan is the largest capital city in central China, which has advantages of good natural conditions, relatively good resource advantage, superior traffic communication position, relatively strong industrial base, intelligence-intensive science and education, and human resources, and so on, whose economic progress has been made. With the central China strategy, "two-oriented society" and Wuhan "1+8" city economic circle, the economic and social development in Wuhan will more and more depend on technology progress and innovation. Therefore, there is certain theory value and practical significance to take Wuhan as an example to make a research about FDI's influence on the technological innovation ability.

2 The Effect of FDI on Technological Innovation Ability

Generally, multinational enterprise is the carrier that FDI affects host country's technological innovation ability, FDI makes a far-reaching influence on technological innovation ability by operating multinational enterprise in host country. Multinational enterprises set up factories in host country in forms of Chinese-foreign joint venture, Chinese-foreign cooperation and wholly foreign-owned, which can offer technology to the host country subsidiary, and promote the technological innovation ability enhancement. At the same time, host country can make independent innovation by learning advanced technology from multinational enterprises, to promote technological innovation ability.

2.1 Demonstration - imitation effect

As there is technological gap between Multi-national Enterprises (short for "MNE") and the host country enterprises, the host country enterprises can enhance its technology and productivity levels by learning and imitate their behavior. This is also called the contagion effect. Foreign enterprises not only introduce new equipment and new products or new processing method into domestic market, but also brings dematerialization technique like product selection, sales strategy and management ideas etc. Under some circumstances, domestic companies can improve their productivity just by watching and

learning the neighboring foreign companies.

2.2 Competition effect

This effect occurred most among various manufacturers within the industry. Competition effect on the one hand, refers to MNE subsidiaries and the host country enterprises competing for the limited market resource, increasing the market competition, stimulating local manufacturers to use existing resources effectively, and promoting efficiency of indigenous technology; On the other hand, it means that in the industry with strong industrial barriers originally, due to the entry of MNE, monopolies has been eliminate to a certain extent, which can improve social welfare.

2.3 Training effect

We can confirm from the experience of developed countries, the competitive advantage of foreign capital is they can not be divorced from the human resource, fully materialized in equipment and technology. Therefore, the overseas investment projects' efficient operation of MNE, often combines with the development of local human resource. Such as local technical and management personnel work with experts who are dispatched by headquarter of MNE; Training local personnel; Local technical personnel take part in improvement work of technology, product and process and even R&D activities. Senior management personnel to learn and participate in the operation process of MNE's global network. It should be pointed out that, the researches of most scholars aimed at one of the channel of FDI's innovation ability in host country, without considering the relationship among the channels, lacking of systemic consideration. In addition, there is little theory research about the influence factors of technology spillover effect.

3 Cointegration Analyses of Data from 1990 to 2007 in Wuhan

3.1 The selection of indexes and data sources

When measuring technological innovation ability, the first problem involved is the index measuring technological innovation ability. Commonly used index of measuring the output efficiency of science and technology on the international are: patent, thesis of science and technology, high-tech products or technology-intensive products, technology trade, etc. Section 22 of the Patent Law provides that "patentable inventions and utility models, must possess novelty, inventiveness and usefulness." The article based on practical research, selecting the number of patents as an index to evaluate technological innovation ability of region in many of the scientific and technological output evaluation indexes.

In terms of FDI index, the article selects the index of actual utilization of FDI as FDI variable's index which was released by Wuhan Statistics Bureau. Since the actual utilization of FDI is priced in ten thousands of dollar, for convenience, the annual FDI raw data is converted to foreign direct investment in RMB price (RFDI) in this article, then taking the logarithm of RFDI values (LNRFDI). FDI flows and the number of patent authorization has been as the instead index finally, which is used to study the influence that FDI makes to innovation ability of region. It can be found that, LNRFDI and LNPTN change over time, therefore, it is a stationary time series, "spurious regression" phenomenon exists, the article used cointegration test of Granger-Johansen.

3.2 Model specification

The article made LNPTN as the explained variable, PNRFDI as the explanatory variable, the FDI and technological innovation ability model was set as follow:

$$LNPTN = \alpha + \beta LNRFDI + \xi \tag{1}$$

3.3 Model test and analysis

3.3.1 ADF test

Making ADF test to LNPTN, LNRFDI and DLNPTN、DLNFDI after first-order difference respectively, then draw the first-order difference time sequence diagram, the result is as follow:

Table 1 Stationary Test

Variable	Test types(I,T,L)	ADF test value	Critical Value	P Value	Results
LNPTN	(1,0,3)	0.107921	-2.666593*	0.9565	Nonstationary
LNRFDI	(1,T,5)	-2.167483	-3.297799*	0.4758	Nonstationary
DLNPTN	(0,0,0)	-3.124494	-2.717511***	0.004	Stationary
DLNRFDI	(0,0,3)	-2.312326	-1.96627**	0.0245	Stationary

Notes:Test types(I,T,L)shows respectively that whether there is constant term in ADF test (Intercept)、time trend item, and maximum lags.-2.717511*** means the value is critical value under the 1% significant level;-1.96627** means the value is critical value under the 5% significant level;-2.666593* means the value is critical value under the 10% significant level.

Although the time sequence of LNPTN and LNRFDI are nonstationary, however, their first-order differences are stationary. That means, time sequence of LNPTN and LNRFDI are integrated of order one (namely I (1) sequence). Therefore, the two times sequence may exist cointegration relationship, namely there is a long-time and stable relationship between LNPTN and LNRFDI.

3.3.2 Cointegration analysis

The article used E-G two-step method to make test to cointegration relationship between LNPTN and LNRFDI, the detail processes are as follow:

The first step: model estimation—Ordinary least squares method

Making regression to model (1) by EViews 6.0, the results are as follow:

$$LNPTN = -0.316421 + 0.522958***LNRFDI \quad (2)$$

$$t = (-0.169743) \quad (3.761860)$$

$$R^2 = 0.469348 \quad \bar{R}^2 = 0.436182 \quad F = 14.15159$$

According to above analysis, the ordinary least squares method that LNPTN conducted on LNRFDI, has got a significant elastic coefficient, on the whole, the model fits the sample data well, it indicates that an increase in FDI per unit, the number of patent authorization will increase 52.3%.

The second step: Unit root test of residual.

According to the estimated equation (2), we can get residual estimation:

$$U = LNPTN - 0.522958LNRFDI + 0.316421 \quad (3)$$

Using EViews 6.0 software, we can get residual diagram and residual sequence ADF test.

Table 2 Tset Result of Residual Stationary

Variable	Test Type(I,T,L)	ADF Test Value	Critical Value	P Value	Result
ξ	(0,0,2)	-3.335266	-2.717511***	0.0245	Stationary

Notes: “***” is the same meaning as 3.3-1.

Table 2 shows that ADF value is -3.335266, less than -2.717511 which is the critical value under the 1% significant level, thus residual sequence ξ reject the null hypothesis under the 1% significant level, the unit root is not exist, namely residual sequence ξ is integrated of order zero. According to the above results, we know that there is cointegration relationship between LNPTN and LNRFDI, and the cointegration vector quantity is (1, -0.522958, 0.316421). The test reflects on the flow of FDI and technological progress, we can find that in the long term, the elastic coefficient of RFDI to technological innovation ability is 0.522958, that means an increase in RFDI 1%, the number of patent authorization will increase 0.522958%. It indicates that the stimulating effect of FDI to technological innovation ability is not obvious.

3.3.3 Error correction model

According to the above analysis, the error correction model describing technological innovation ability makes long-time equilibrium adjustment with the change of FDI flow is:

$$\Delta LNPTN_t = \alpha + \beta * \Delta LNRFDI_t + \text{aecmt} - 1 + u_t \quad (4)$$

We select the four order lag variable at first, then eliminate some nonsignificant variables gradually, finally we get the error correction model after estimation as follow:

$$DLNPTN = 0.457621*** - 0.480393**DLNPTN(-2) - 0.544131***DLNPTN(-3) - 0.315339*DLNPTN(-4) - 0.235761*ecmt - 1 \quad (5)$$

$$R^2 = 0.885520 \quad \bar{R}^2 = 0.771039$$

We get follow conclusions from the above analysis: (1) There is a long-time dynamic equilibrium relationship between FDI flow and the number of patent authorization in Wuhan. (2) The number of patent authorization is influenced by itself and the change of FDI flow during a period of time. It can be seen from the equation (5) that growth change of two-year and three-year lag of numbers of patent authorization and FDI flow change of three-year lag whose influence to numbers of patent authorization are significant under the 5%, 1%, 10% significant level respectively. (3) The coefficient of error correction item ecm is negative, which conforms to the economic sense. If the previous period is more than this one, the economic system will produce a negative effect during this period, which can make the two variables of PTN and GDP achieve equilibrium in long run. On the contrary, if the previous period is less than this one, it will make a positive correction, all of the correction intensity are 0.235761, the correction coefficient indicates the degree of deviation from the long-term equilibrium relationship between the number of patent authorization and FDI flow short-term change is not great, namely the

equilibrium relationship between numbers of patent authorization and FDI flow makes little correction adjustment to unbalanced error current period.

3.3.4 Granger causality test

According to cointegration analysis, we know that there is a long-term equilibrium relationship between numbers of patent authorization of Wuhan and FDI flow. Making Granger causality test further, as Engle-Grange causality test only adapt to the stationary sequence, thus we use the data after first order difference; the result is shown in Table 3.

Table 3 Causality Test of FDI and Technological Innovation Ability

LAGs	DLNRFDI does not Granger Cause DLNPTN	DLNPTN does not Granger Cause DLNRFDI
1	1.59765(0.2284)	3.70663(0.0764)
2	7.57410(0.0099)	5.78409(0.0214)
3	30.9628(0.0002)	4.29580(0.0513)
4	1.57366(0.3356)	0.32338(0.8500)
5	1.45216(0.5556)	0.51146(0.7791)

Notes:The first sequence is lag phase, the second and third sequence is the null hypothesis of Grange causality test, In brackets is P value, out of brackets is F statistic.

The above table shows that when the lag period is two years and three years, under the 1% significant level, FDI flow constitutes the Grange reason of the number of patent authorization. As the same, under the 5% significant level, numbers of patent authorization of two-period lag constitutes the Grange reason of change of FDI flow. Under the 10% significant level, numbers of patent authorization of three-period lag constitutes the Grange reason of change of FDI flow.

4 Conclusions

4.1 Basic conclusion

From the cointegration analysis of time sequence data of the number of patent authorization in Wuhan and FDI flow from 1990 to 2007, we can find that there is a certain relationship between FDI flow and the number of patent authorization, although both of the increasing is nonstationary time sequence, they keep a long-term stable equilibrium relationship. In the short run, under the 5% significant level, each of the numbers of patent authorization of two-period lag and the FDI flow is the Grange reason; Under the 1% significant level, FDI flow of three-period lag is the Grange reason of numbers of patent authorization change; Under the 10% significant level, numbers of patent authorization of three-period lag is the Grange reason of FDI flow. Under other circumstances, there is not significant causal relationship between numbers of patent authorization and FDI flow, it shows that in short-term, the contribution of FDI flow to numbers of patent authorization is not obvious.

4.2 Countermeasures and suggestions

The economic development of Wuhan is a way of endogenous type development which relies on small and medium enterprises, private enterprises, the ability of introducing foreign capital is poor, which inhibiting the enhancement of local technological innovation ability. If a country or a region wants to possess real core competencies, and occupy the leading position in technological competition, getting rid of the dependence on external technology is necessary, it must rely on itself, enhance its technological innovation ability by independent research and development activities, namely carrying out independent innovation

4.2.1 Pay attention to the utilization quality of foreign capital

We should improve the foreign investment environment further, and expand the scope of drawing foreign capital, and improve the utilization level and quality of foreign capital. With the rising of central China, "two-oriented society" and Wuhan "1+8" city economic circle, the economic development model of Wuhan urgently need to change from endogenous type into endogenous growth combined with extroverted development coordinated development. Learning from the experience of the coastal provinces, taking active part in introducing foreign capital, and taking advantage of the advanced technology resource abroad, grasping the opportunity of international industrial division of labor and transfer, accepting and absorbing the transfer of foreign advanced manufacturing and R&D center. Therefore, Wuhan should strengthen the construction of infrastructure further, and in the basis of carrying on improving investment hard environment, striving to improve the soft environment for

investment. A foreign investment access system of unified, standard and open should be established, and the approval procedures for foreign investment should be simplified, and the work efficiency of examination and approval should be promoted, and we should improve the service to foreign investment enterprises, and improve the administrative environment further, in order to enhance the enthusiasm of foreign investment. Meanwhile, we should build a fair and effective market environment, to promote the transfer of technology from multinational enterprises to Wuhan, and increase the influence of technological innovation ability to Wuhan. Changing the way to use foreign capital from quantity to quality, and establishing a reasonable quality evaluation system of investment promotion, paying attention to the introduction of science and technology innovation investment projects, environmental friendly projects, and resource saving investment projects, to promote the introduction of advanced management experience and technology.

4.2.2 Encourage enterprises for independent innovation

The local enterprises in Wuhan on the basis of introduction, digestion and absorption, has achieved great success by imitating innovation to improve its technical level. However, the improvement of technology not only need external forces, but also need spontaneous source of technology, they can rely on itself to carry out independent innovation by independent research and development activities, and to get the core key technology, gain the competitive advantage. Though two ways of integrated innovation and introduction, digestion, absorption and re-innovation to promote independent innovation ability of enterprises and regions. In terms of strengthening the enterprise independent innovation ability, The most important is to enhance technological innovation power of enterprises, to make enterprises to actively become the innovative subject. However, independent innovation is an "accumulate steadily" process, with high investment, long cycle and high risk, which is hard to work. All of enterprises have strong dependence to the existing development model, and without powerful outside force or internal change, they will not change traditional path easily. From technology import to independent innovation, is the shunt of enterprises technical route. It must have strong external and internal cause to promote enterprises to decide to shunt. Generally speaking, external cause mainly comes from the external pressure and attraction of enterprises. For example, policy incentives from government, pressure coming from enterprise survival environment, the pressure of market competition, all of these will push enterprises to walk the road of innovation. Internal cause mainly comes from endogenous pursuit and passion, which shows in long-term strategy of company and entrepreneurship. Thus, in order to promote enterprises to become the innovative subject, government needs to and is making a series of encouraging policies, such as offering preferential policies for independent innovation enterprises, which fully shows the national determination of promoting enterprises to carry out independent innovation. But all of these are external because, if we can not mobilize intrinsic motivation of the enterprises and entrepreneurs, the government's call, the pressure of cadre examination may only make the enterprises "ordered innovation". it is difficult to believe that there is good effect to compete the innovation for "task assigned". Therefore, it is necessary for enterprises to formulate long-term strategy, and to strengthen culture and values of enterprises, keep strong entrepreneurial spirit, produce desire and passion for independent innovation endogenously, so as to promote the independent innovation power fundamentally.

4.2.3 Encourage R&D of foreign merchant to be localization

To promote FDI on technological innovative ability, we need strengthen the embeddedness of foreign capital enterprises in the host country, and encourage R&D of foreign merchant to be localization. MNE as the innovative subject can interact with domestic enterprises to improve the technology innovation. However, the achievement of this purpose is based on R&D of MNE to be localization. Nowadays, there are part of foreign investment enterprises which are value of some local governments' preferential policies, and set up factories in the mainland one after another, after enjoying the preferential, they will repeat the investment in another places, with little technology spillover to local enterprises, let alone have promoting effect on technology innovation of local enterprises. Therefore, if we hope to improve the positive promoting effect of FDI on technological innovation, it is necessary to make MNE take root in host country, only after foreign enterprises have strong embeddedness, will they take the advanced technology into production, and transfer which into the locality. Thus, Wuhan should improve policy measures to encourage foreign investment of high-tech industry and setting up R&D center, try to create foreign investment policy and market space which are suit for the development of high-tech entrepreneurial enterprises, promote R&D institution of MNE to be localization, and encourage MNE to set up R&D center in locality, and take part in developing patents. In addition, it is necessary to strengthen the foreign company integrated with the local industrial

enterprises, to help local enterprises finally achieve imitative innovation by introduction, digestion and absorption, and improve technical innovation level of local enterprises.

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Regional Difference Regression Analysis of Contributions to GDP by Three Types of Patent

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Abstract: Contribution to GDP by the output of patent is one of the most important indicators to measure the quality of regional economic growth. Using linear regression and ridge regression, this paper established functional model between the number of granted patent and regional GDP in four different regions. Research showed that in the region where industries are more prominent, its GDP will be more influenced by the output of patent and patent for utility models contributes most significantly to regional GDP. Based on the research results, this paper analyzed the corresponding reasons and put forward some suggestions in the perspectives of economic development stage, attributive character of patent, and regional economic structures.

Key words: Patent; GDP; A linear regression; Ridge Regression; Contribution

1 Introduction

Because of the unbalanced development of economy, the extensive growth mode becomes one of the major problems that the regional economic development in our country has to face in a long term. From the perspective of locations, resources and mechanism etc., scholars have had in-depth discussions about the internal causes of regional economic differences and brought up corresponding proposals and suggestions. In the era of knowledge economy, technological innovation has become the major driving force of promoting the regional economy. Patent, as an important manifestation of technological innovation, is not only one of the important indexes of comparing and measuring the status differences of regional technological innovation ability, scientific and technological level and marketization process^[1], but also an important indicator of revealing the regional differences and predicting the future differences of economic development.

Patent is legally-protected invention and greatest technical information sources-including 90%-95% of scientific and technical information in the world. Patent is not only an effective and convincing form of innovation output in a stage, but a basis of knowledge and technology in the next stage as well. In the transition from technology to benefit, despite of the problem of the knowledge transformation effectiveness, patent is still a generally accepted index and a credible measure both at home and abroad, from the perspective of using technological innovation indicating regional economy differences. The famous U.S. patent statistical analyst F Nalin had proved in 1994 that the number of scientific research patent had a close relationship with the economy of a country^[2]; Mark Croshby (2000) used patent to compare and analyze the innovation and development in countries like Australia and Canada^[3]. Domestic scholars Liu Hua (2002)^[4], Xu Zhuqing (2004)^[5], Fang Shu (2006)^[6], Zhang Jihong (2007)^[7], and Li Yemiao (2009)^[8] etc. made in-depth discussions about corresponding relationship between the number of patent and national or regional GDP. Looking through the works from experts and scholars, the research results are fruitful, most of which discussed patent as a whole, however in China, we divide patent into three types—inventions, utility models and designs, and those three types vary quite a lot in technological content, the contribution to and the influence on regional economy. Therefore the research of the correlation between patent classification and regional economy is a supplement of the current research. At the same time, it can deeper reveal the internal causes of the regional economic differences from the perspective of technological innovation, and further guide different regions to make corresponding measures and policies according to practical situations, which has important practical significance.

2 Relation Between Patent Licensing and Regional GDP

2.1 Regression analysis between the total number of granted patent and GDP

The objects of this paper were the 31 provinces and cities excluding Hong Kong, Macau and Taiwan, of which have been divided into the east, the central, the west and the northeast part. And the east part included Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan; the central part included Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan; the west part

included Inner Mongolia, Guangxi, Chongqin, Guizhou, Yunnan, Tibet, Shanxi, Gansu, Qinghai, Ningxia and Sinkiang; the northeast part included Liaoning, Jilin and Heilongjiang. The statistics of GDP were from 2001-2010 Statistical Yearbooks by NBS and the information of patent was from 2001-2010 scientific statistical data by SIPO and NBS.

On the basis of the former research both at home and abroad, we presumed that the logarithms of the number of granted patent and the logarithms of regional GDP may have the following power function relation:

$$LnG = a + b LnP \tag{1}$$

Where: G=GDP, P=Patent, *a* was a constant coefficient, showing the part of GDP which is not influenced by the number of patent; according to the change of function relation, coefficient *b* can be expressed as $LnG/LnP + a/LnP$, whereby a/LnP was a constant, therefore *b* was the flexibility coefficient of GDP about LnP , meaning *b* can reflect the influence that each unit change of patent can exert on GDP—how much contribution each unit of patent can make to GDP^[9].

Using Formula (2) to do the correlation test between the logarithms of the number of granted patent in four major parts and the logarithms of regional GDP, the results showed: the correlation coefficient in the east part reached 0.931, 0.927 in the central part, 0.932 in the west part and 0.943 in the northeast. All the coefficients of correlation were above 0.8, meaning that the logarithms of GDP correlated significantly with the logarithms of the number of granted patent.

$$r_{xy} = \frac{\sum(X - \bar{X})(Y - \bar{Y})}{\sqrt{\sum(X - \bar{X})^2 \sum(Y - \bar{Y})^2}} = \frac{n \sum XY - \sum X \sum Y}{\sqrt{n \sum X^2 - (\sum X)^2} \sqrt{n \sum Y^2 - (\sum Y)^2}} \tag{2}$$

Using SPSS, the results of the regression between the logarithms of the number of granted patent in four major parts and the logarithms of regional GDP were shown as Table 1:

Table 1 Results of the Regression According to Regions

Region	R square	Constant a	LnP Coefficient b	Sig.
East	0.867	3.247	0.643	0.000
Central	0.859	2.954	0.723	0.000
West	0.868	3.047	0.676	0.000
Northeast	0.888	2.102	0.795	0.000

The results showed that the degree of fitting of LnP and LnG in those four parts are all above 0.8, meaning the model had extremely good fitting degree; P values of the significance testing were all 0.000 < 0.01, approved by significance testing.

2.2 Regression analysis between the number of classified granted patent and GDP

The above analysis has proved the power function relationship between the total number of granted patent and regional GDP, however, patent has been divided into inventions, utility models and designs, besides those three types vary quite a lot in technological content, and the contribution to GDP may differentiate as well. To further understand the root causes of the economic differences in those four regions, we have to further go into the relations between GDP and those three types of patent separately. Taking logarithm of three types of patent and GDP respectively and the results of correlation coefficient were shown as Table 2.

Table 2 Correlation Coefficient Between Three Types of Patent And Regional GDP

	R(LnG, LnI)	R(LnG, LnU)	R(LnG, LnD)	R(LnU, LnI)	R(LnD, LnI)	R(LnD, LnU)
East	0.796**	0.950**	0.870**	0.887**	0.738**	0.890**
Central	0.820**	0.919**	0.856**	0.847**	0.716**	0.886**
West	0.914**	0.934**	0.861**	0.932**	0.833**	0.894**
Northeast	0.922**	0.932**	0.774**	0.838**	0.795**	0.876**

Note: **. meant significantly related at confidence level of 0.01(both sides)

According to the power function relationship between the total number of granted patent and GDP, we can presume that the number of granted patent by types and GDP share the similar function relationship^{[2]-[9]}:

$$LnG = a + b LnI + c LnU + d LnD \tag{3}$$

Where: G=GDP, I=Invention, U=Utility model, D=Design

However, according to Chart2: the logarithms of GDP correlated significantly with the logarithms

of the number of classified granted patent, and the logarithms of those three types had high correlation with each other as well. Because of the multi-colinearity among the explanatory variables, Ordinary Least Squares cannot be used; therefore we used ridge regression to build the model. Ridge Regression Analysis is a nonlinear partial estimation method which is dedicated to deal with collinear data. It can better tolerate the morbidity of data than OLS, because the regression coefficients are acquired at the cost of lowering the precision by losing part of the information and giving up the unbiasedness of OLS. The R-squared value of the ridge regression is a little less than it of the normal regression, but the significance level is always obviously higher than the normal one. Using SPSS to implement the model, input syntactic command as followed:

INCLUDE 'D:\SPSS\Ridreg regression.sps'.

RIDGEGREG DEP=LnG/ENTER=LnI LnU LnD.

After running, we can see from the ridge trace graphs that when $k > 0.3$, the ridge parameter of each variable has been basically stable, therefore, we chose k between 0.0 and 0.3, step $INC=0.03$, and did the ridge regression again, getting the charts (omitted) and the figures as followed:

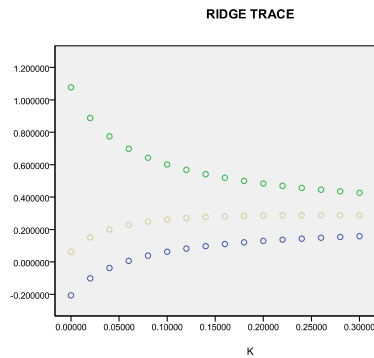


Figure 1 East Part

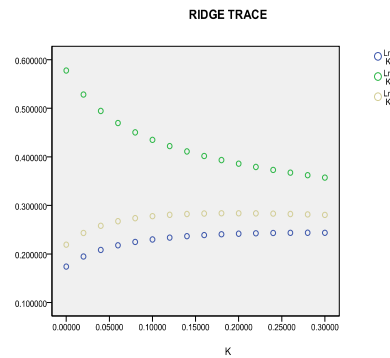


Figure 2 Central Part

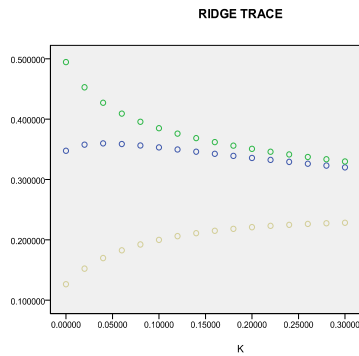


Figure 3 West Part

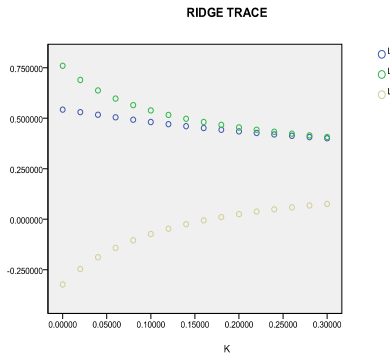


Figure 4 Northeast Part

The ridge regression coefficient has already been stable while the ridge parameter k was between 0.00-0.03; with reference to the multiple coefficient of determination R^2 , we did the ridge regression again to the four regions respectively, getting summarized analysis as Table 3 showed.

Table 3 Coefficients of Multiple Linear Regression Model According to Regions

Region	K	R square	Constant a	LnI Coefficient b	LnU Coefficient c	LnD Coefficient d
East	0.16	0.883	4.177	0.070	0.361	0.180
Central	0.12	0.857	4.053	0.153	0.327	0.200
West	0.16	0.882	4.115	0.255	0.243	0.153
Northeast	0.18	0.926	3.813	0.298	0.369	0.012

The above chart showed that the degree of fitting between LnP and LnG in the four regions were all over 0.800, meaning the model had extremely good fitting degree; besides the significance had been approved by F-test.

3 Conclusion and Reasons

3.1 Main Conclusion

According to Chart2 and Chart3, we can conclude as followed:

Firstly, the output of patent is closely related to the regional economy. In the region where industries are more prominent, its economy will be more influenced by the output of patent. Comparing the four regions, we can know that the least influence that the output of patent exerted on regional economy was in the east part (constant coefficient was the largest), while the most was in the northeast part (constant coefficient was the least).

Secondly, contributions of patent for utility models to regional economy were the most manifest, then patent for inventions, and the least was patent for designs.

Thirdly, in the east part, among the three types of patent, patent for inventions made least contributions to regional economy; in the central part, contributions made by patent for designs were much greater than contributions it made in other three regions; in the west, the contributions to GDP from patent for inventions and utility models were similar; while in the northeast, patent for utility models contributed most to GDP, and the contributions from patent for inventions were obvious as well.

3.2 Reason Analysis

Combined the history of development with the current situation of regional economy, we concluded that the internal causes of the above situation were from the following three aspects.

Firstly, the macro-economy determines and influences the contributions that different types of patent can make to regional economy. Thanks to over 30 years of reform and opening up, China has entered a specific historical stage that has rapid economic development, further industrialization and sustainable transition of growth mode and industrial structure. During this stage, there has been a rapid increase in high and new technology industries, but the traditional industries aiming at scale and profit are still the economical backbone and the main body of our country (in 2011, the industrial added value of high and new technology industries in our country amounted to 10.49 billion, which only accounting for 12.4% of the added value of the second industry). The traditional industries are now of high maturity and most of the key technologies of the industries and fields have already become recognized as a standard. The profit of the companies mainly comes from the back-end of the industrial chain and the lack of technologies is mainly acquired by introducing and trading. This kind of mode leads to insufficient motivation for companies to pursue the patent for inventions, but encourages companies to develop large amounts of patent for utility models tailor-made for Chinese market in the process of introducing advanced foreign technologies. As a result, statistics showed that patent for utility models contributed a lot to the economy. In a meanwhile, another reason for the small contributions that patent for inventions made lies in the lack of the capability of independent innovation of high and new technology industries. Under the state policy of strongly promoting high and new technology industries, until 2011, our country have established 88 national high-tech zones and a huge number of provincial high-tech zones; however, from the overall development, there have been several common problems such as low level of high and new technologies, lack of self-owned innovation brands, and weak industrial cluster effect. Most of the high-and-new-technologies leading companies in China are either introduced enterprises or joint ventures, and those companies always aim to take over the Chinese market, build technological monopoly barriers and realize maximum benefits, which means very few of them would engage in independent research. As a result, high and new technology industries flourish, but the growth of patent for inventions is slow and its contributions to GDP are weak as well.

Secondly, the features differentiate among different patent. Patent for utility models means new practical technical proposals made for the shape, the construction or both of the products. It is called gizmo or petty patent as well, since its creative and technological level is relatively low, however, because of its low R&D cost and short production cycle, it can better adjust to the market-oriented economy, therefore, its practical value is high and its effect on economy is the most apparent. By contrast, patent for inventions has higher requirements on innovativeness of technologies, and also requires more amounts of resources and time; meanwhile, the market application will be more difficult, the marketization cycle will be longer and the economic benefits will have an obvious lagging effect owing to the high technological and creative level. Currently, small and medium-sized enterprises dominate the Chinese market (SME account for 99.8% of the total number of firms, and the output value account for about 60% of GDP). The low utilization and development capacity of SME about inventions is also a significant reason why patent for inventions has limited influence on the regional economy.

Thirdly, the economic structure varies from region to region. The east part is the early-developing

region. In 2010, its GDP reached 23.2 billion, among which 10.29 billion were from the tertiary industry, accounting for 58.3% of the state overall output value of tertiary industry. The modern service industry, which can be represented by finance, logistics, commerce and real estate, is very prosperous and the economic structure is high and light. Apart from manufacture-related service industries such as information service trades and creative industry which are highly associated with the output of patent, more consumer service industries and some manufacture-related service industries have a relatively weak correlation with the output of patent. Meanwhile, the east part of China owns the most private enterprises, and it is the biggest region for private economy which relies mainly on the introduction and utilization of the mature technologies. The ability and motivation of those companies for technological innovation is insufficient and their preference for patent is to purchase mature patent or the transformation of patent for utility models. SIPO did a research about the application and the authorization of private enterprises' patent during 1985-2005 and the data showed that during the 10 year period, the application quantity for patent from private enterprises made up 1/3 of the total amount. However, among the applications, only 13% is patent for inventions, less than 1/7, moreover, the granted patent for inventions only accounted for 3.1% of the total granted patent. The poor quality of patent directly affects its contributions to regional economy.

The overall economy in the central, west and the northeast part share the similar structure. In 2010, the proportions of the first, second and the third industries were 13:52:35, 13:50:37, 11:53:36, respectively; and in the second industries, industry accounted for 87%, 84%, 88% of, respectively. The statistics of patent showed that in the region where industries are more prominent, its economy will be more influenced by the output of patent. Therefore, the influence of patent on the regional economy in the northeast part was the greatest and meanwhile it is the most important heavy industrial base whose heavy industries take up over 80%. Besides most heavy industries are traditional industries whose technologies are already very mature, so patent for utility models played a major role in the development of economy in the northeast part. In the west part, the proportion of extractive industries such as mining is much higher than it is in the central and the northeast part, besides, the reliance of and the motivation for patent with regard to this kind of resource-based industry is insufficient, therefore, the influence of the granted patent on the regional economy in the west is less than it in the central.

4 Implications and Suggestions

Patent is an important manifestation of technological innovation, and the contributions to regional economy made by the output of patent reflect the quality and the structure of the growth of the regional economy. The data showed that the four regions in China all had huge space to adjust and improve. The east part has already taken the lead in economic strength at home, and the future economic growth should depend on the leading realization of technological capacity and the increase of output and utilization of patent for inventions, guiding the development mode of industries from OEM to ODM, OBM, and even to OSM. As for the northeast part, the traditional heavy industrial base, we should actively promote the integration of information and industrialization and seize the major strategic opportunity of readjusting the industrial structure. Moreover, we should achieve significant technological breakthroughs, strengthen the civilization of important scientific and technological achievements, and promote the great-leap-forward development of industrial economy by big projects like the new large aircraft, manned space flight and new energy development. The economic scale in the central and the west part is relatively small, and they mainly rely on the traditional industries. Therefore, we can rapidly increase the economic scale by vigorously promoting the R&D of patent for utility models. In the meanwhile, under the condition of fully considering the constraints of environment and resources, the transfer of such industries from the east to central regions should be undertaken. The central region should exploit its intensive science and education advantages to the full, make some breakthroughs in strategic emerging industries and modern service industries, and further strengthen and promote the economic contributions made by those three types of patent.

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Evaluation of the Creativity of the Auto Industry in Liuzhou Based on Fuzzy Synthesis Method*

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Abstract: In the “eleventh five-year plan”, Liuzhou put forward to Change “Liuzhou Manufacturing” into “Liuzhou creation”. As a pillar industry of Liuzhou, to improve the creativity of the auto industry is an extremely important part to realize “Liuzhou creation”. So this paper tries to establish a creativity evaluation index of the auto industry with the fuzzy synthesis method and provides some reference opinions for Liuzhou auto industry to improve its creativity.

Key words: Auto Industry; Creativity; The Fuzzy Synthesis Method

1 Introduction

Because of its profession characteristic, auto industry has become an important symbol of the development level of national manufacturing industry. There are 192 manufacturers in Liuzhou for automobile and engineering machinery parts and components and some large related enterprises, such as SGMW and Liuzhou machinery factory. Be stimulated by a series of positive policy, such as the national reductions of small displacement car purchase tax and the car preferential sold to the countryside, in the first half of 2009, the car industry output value reached 34.635 billion yuan, a year-on-year increase of 36.49%. The booming automobile industry contributes great to Liuzhou’s industrial production growth. The gross industrial output value completed by large-scale automobile manufacturing accounted for 43.16% of the total industrial output value of Liuzhou. Its contribution to the increase of the gross industrial output value reaches up to 117.33%, and pulls the gross industrial output value increase of 12.80%.

The development of Liuzhou’s automobile and automobile parts enterprise is one of the key factors of Liuzhou’s industrial development. Therefore, in Liuzhou’s “eleventh five-year plan” science and technology development program, automobile and engineering machinery parts and components technical r&d and industrialization projects are prioritized as one of Liuzhou’s ten key projects. If Liuzhou wants to transform “Liuzhou manufacturing” to “Liuzhou creation”, auto industry creativity ascension must be paid enough attention to. To evaluate the creativity of the car industry can find out the present problems during the process of automobile enterprises’ innovation, and enterprises can solve these problems by improving their creativity continuously. So the auto industry’s creativity assessment is very necessary.

2 The Foundation of the Creativity Index System in Liuzhou’s Automobile Industry

In order to make the evaluation index system can accurately and objectively reflect Liuzhou’s auto industry creative reality, this index system closely combines with actual situations of the development of China’s automobile industry of the time, follows the inherent law of the creativity development of domestic and overseas automobile industries. It can not only objectively reflect the true situation of automobile industry creativity, but also can reflect the related factors which influence the automobile industry creativity. All indicators determined are related to the auto industry, and each step of the evaluation indicator system construction is under the guidance of the system view and integrates all relevant factors. It can reflect the evolution trajectory of the automobile industry creativity systematically and comprehensively. And it avoids the repetition of the index assessment. Its each index evaluation content is relatively independent, and there aren’t include-relationship, overlapping and similar parts between each other.

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This paper evaluates the creativity of the automobile industry from following four aspects: the degree of innovation and investment; the ability of management and innovation; the construction of the innovation environment and the innovation output. It is shown in Figure 1 below:

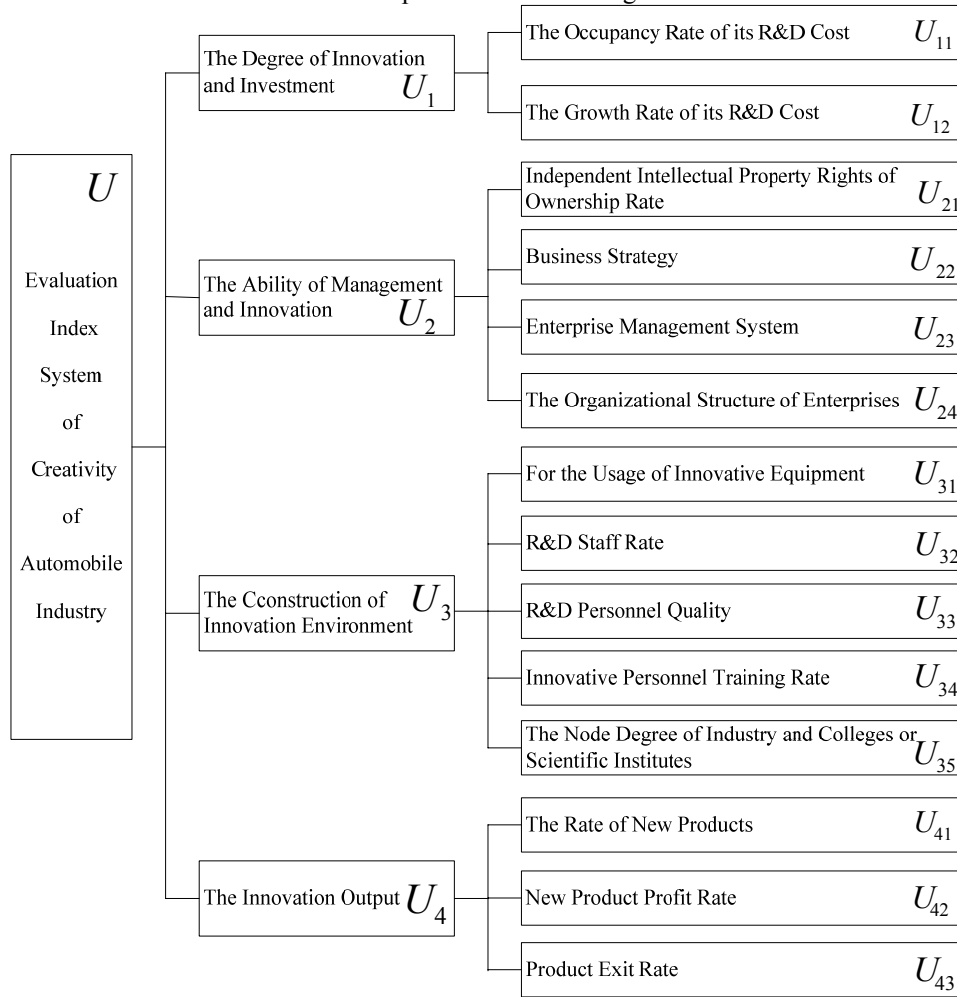


Figure 1 Evaluation Index System of Creativity of Automobile Industry Of Liuzhou

3 The Foundation of the Fuzzy Synthetic Evaluation Model

The evaluation indexes in table 1 contain qualitative and quantitative indicators, but not all of them can make accurate quantitative analysis, some indicators need to rely on the qualitative analysis and logical judgment made by evaluation subjects. To this kind of fuzzy phenomenon, we can use the theory and method of fuzzy mathematics to make fuzzy comprehensive evaluation. Fuzzy comprehensive evaluation model can make an overall evaluation to those uncertain rules, based on fuzzy mathematics theory and applying fuzzy transformation principle and the maximum membership degree principle, at the same time considerate and evaluate the various factors related to the evaluation object. The main steps are as follows:

3.1 Determining the Evaluation Factors and Evaluation Set

The evaluation set is divided into two levels. The first level is the general objective factors set U . It includes innovation investment degree U_1 , management innovation ability U_2 , innovation environment construction U_3 and innovation output U_4 these four primary indexes. The second level is the subtotals factor set. It includes 14 secondary indexes like the occupancy rate of its research and development cost U_{11} , the growth rate of its R&D cost U_{12} and so on.

The evaluation set is a kind of language description of all levels of evaluation index. It is a set of evaluation reviews. The evaluation reviews in this model can be divided into five grades. The specific comments collection is:

$$V = (V_1, V_2, V_3, V_4, V_5) = (\text{excellent, fine, so so, bad})$$

3.2 Weight Determining

This model adopts expert evaluation method and to be marked by experts with different disciplines background in view of the three main principles, and finally gains the weight.

(1)The innovation investment level, the management innovation ability, the innovation environment construction and the innovation output are all in the same important position in the creativity assessment of automobile industry. To despise any one of them will not provide the real auto industry’s creativity.

(2)In the innovation environment construction, scientific research innovation personnel’s quality is the most important. Only people’s active creativity can construct a suitable and innovative environment for scientific research to develop.

(3)How many innovation values a new product has and if it has some meaningful innovation or not, the most fundamental indicator is how much profit the new product will create.

According to the above three principles and integrated the expert opinion, this model weight is set as follows:

$$A = (0.25, 0.25, 0.25, 0.25) \quad A_1 = (0.6, 0.4) \quad A_2 = (0.25, 0.25, 0.25, 0.25) \\ A_3 = (0.1, 0.2, 0.3, 0.2, 0.2) \quad A_4 = (0.3, 0.4, 0.3)$$

3.3 The Determination of Fuzzy Judgment Matrix

Select some scientific research personnel and experts in auto enterprises to make up a jury to evaluate each single factor in the second level of the evaluation index system. In the construction of this model, we used a questionnaire survey. Based on the sorting and statistics to the results of the survey, we got a single factor fuzzy evaluation matrix.

$$R_1 = \begin{bmatrix} 0.5 & 0.4 & 0.1 & 0 \\ 0.3 & 0.4 & 0.2 & 0.1 \end{bmatrix} \quad R_3 = \begin{bmatrix} 0.2 & 0.4 & 0.3 & 0.1 \\ 0.2 & 0.5 & 0.2 & 0.1 \\ 0.2 & 0.5 & 0.2 & 0.1 \\ 0.2 & 0.2 & 0.4 & 0.2 \\ 0.2 & 0.3 & 0.4 & 0.1 \end{bmatrix} \\ R_2 = \begin{bmatrix} 0.2 & 0.3 & 0.4 & 0.1 \\ 0.3 & 0.4 & 0.2 & 0.1 \\ 0.2 & 0.3 & 0.3 & 0.2 \\ 0.1 & 0.3 & 0.4 & 0.2 \end{bmatrix} \quad R_4 = \begin{bmatrix} 0.2 & 0.3 & 0.4 & 0.1 \\ 0.2 & 0.3 & 0.4 & 0.1 \\ 0.2 & 0.3 & 0.3 & 0.2 \end{bmatrix}$$

From $A_1 = (0.6, 0.4)$, we can get the “innovation investment degree” evaluation vector:

$$B_1 = A_1 * R_1 = (0.42, 0.4, 0.14, 0.04)$$

From this we can see, the auto industry investment in innovation is in a good condition. To innovate, automobile industry spends a lot of money and the inputs on the innovation fund are increased year by year.

From $A_2 = (0.25, 0.25, 0.25, 0.25)$, “Management innovation” evaluation vector can be obtained.

$$B_2 = A_2 * R_2 = (0.2, 0.325, 0.325, 0.15)$$

From this we can see, management innovation ability of the auto industry is not good enough, there is further room for improvement. They should make efforts from the enterprise strategy, enterprise system, enterprise organization structure and independent intellectual property rights to better manage enterprises’ innovation ability.

From $A_3 = (0.1, 0.2, 0.3, 0.2, 0.2)$, “Environment construction innovation” evaluation vector can be obtained.

$$B_3 = A_3 * R_3 = (0.2, 0.39, 0.29, 0.12)$$

From this we can see, the construction of the innovation environment in automotive industry is good. This shows that the car companies already learned the importance of the introduction and the training to the scientific research personnel to improve the creativity of the automobile industry. In recent years, the automobile enterprises adopt corresponding measures to strengthen the combination of production, teaching and research to provide a good environment for the automotive industry’s innovation.

From $A_4 = (0.3, 0.4, 0.3)$, “Innovation output” evaluation vector can be obtained.

$$B_4 = A_4 * R_4 = (0.2, 0.3, 0.37, 0.13)$$

From this we can see, the innovation output of automotive industry is just so so, the enterprises need to speed up new product research and development, reduce the cost of new products, increase the profit of new products, and increase product exports.

At the same time,

$$R = \begin{bmatrix} B_1 \\ B_2 \\ B_3 \\ B_4 \end{bmatrix} = \begin{bmatrix} 0.42 & 0.4 & 0.14 & 0.04 \\ 0.2 & 0.325 & 0.325 & 0.15 \\ 0.2 & 0.39 & 0.29 & 0.12 \\ 0.2 & 0.3 & 0.37 & 0.13 \end{bmatrix}$$

$$\text{So, } B = A * R = (0.255, 0.35375, 0.28125, 0.085)$$

According to the maximum membership degree principle, we can see the creativity of Liuzhou's automobile industry is in a good condition. Compared with Guangzhou's automobile industry, the innovation output capacity of Liuzhou's automobile industry are relatively weak. It is closely related to their car types. Liuzhou should actively take measures to promote the class of their automotive vehicles to make a single car create more profits. Compared with Guangzhou, Liuzhou city still has some defect in the construction of innovative environment. It needs to optimize its innovation environment and vigorously introduce talents. While Liuzhou invests more in innovation, so that its automobile industry can obtain more resources and has more development potential.

4 Conclusion

In conclusion, the creativity of the auto industry is a connecting link between the preceding and the following in auto industry develop and construct. We can evaluation the Present Situation of the creativity of the auto industry throughout establish the evaluation index system and grasp the creativity status from the macroscopic, confirm improvements and corrective measures, so as to assurance the effectiveness of creativity input. What's more, specified the countermeasures in next development stage and made foundation of overstepping development.

This paper establish the evaluation index system of creativity of automobile industry of Liuzhou. Applicate the comprehensive evaluation method to evaluate the creativity, which make enterprise adopt the creativity strategy and continuously pursuing progress. Various aspects show that Liuzhou's automobile industry is booming. It is inseparable from the auto industry's good creativity. It also confirms the correctness of the data analysis in this paper.

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What Lead to the Successful Mobile Phone Game? —Story of Birds Who Cannot Fly but They Have Enough Angriiness

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Abstract: This article will consist of analyzing some factors which are the most important for the successful mobile phone game. There are going to be some common history of how mobile phone games are developed and how this whole game application business has started. Main focus in this article is based on analyzing and finding some key factors which are the most relevant for successful mobile phone game and how they can be designed. This article is not based on technical details of mobile phones and there is only some information which consists of a little bit of technical phrases. Angry Birds mobile phone game is excellent example of successful mobile game and it will be analyzed rather deeply in this article. Analyzing will not be based on only how to play game but whole Angry Birds phenomenon will be considered. Developments of mobile phone games have been very fast even though the first and nowadays classic mobile phone games (such as Snake) become in 1970s. Last year has been golden age for mobile phone game designers and this business area is still developing very fast. Rovio Entertainment is one of the winners so far. Since few years ago Rovio was close to bankruptcy and nowadays it is globally known entertainment media company. Rovio is behind the Angry Birds which is the most popular mobile phone game.

Key words: Angry Birds; Iphone application; Mobile phone game; Rovio Entertainment

1 Introduction

Designing successful mobile phone game may sound very simple task because smartphones does not offers very high technique to play the games. This is the tricky point when designers had to focus on create something especially which is at the same time very simple. Characters behind one of the most successful mobile phone game (Angry Birds) ever are birds whose are not able to fly or walk. This sounds as simple as it can ever be but how they can be so attractive and addictive to become global phenomena and spread to other business areas too.

This article is focused on analyzing why some of the mobile phone games are successful and some other does not have similar success. Aim of the article is to find if there are some elements which are repeated in successful games or are they just so well created. The first mobile phone games and even nowadays still many of them are not designed for smartphones. Normally games are designed to other game platforms such as personal computer or game consoles before and afterwards game designers are just copied or modified games to work in smartphones. One of the best known mobile phone games ever is the Snake which was released in Nokia 6110 –model. Nowadays the Snake is a classic mobile phone game but its history is similar as many other games too that it was firstly designed to be player by personal computer.

After the most of the mobile phones become smartphones also game designers realize that games are not so easy to modify from other platform to smartphones. Touch screens are one of the biggest reasons for this because control commands are so different when using touch screen comparing to buttons. Also at least some of the designers have realized that mobile phone games must be designed straight to smartphones if they want the game become successful. Other important element for mobile phone game is gamers profile and when and where those games are played. Normal mobile phone gamer is not willing to spend lots of time to learn how to play and they are not willing to watch tutorials before they can start playing the game. Mobile phones applications are used approximately less than one minute at the time so gamers are not willing to use lots of time for loading games. Also games cannot be based on some story because games concentration to play the game is not very high. Normally games are played when smartphone users are waiting something or they just have some extra time. Mobile phone games are not played similar as console games are when players focus is totally on game.

Angry Birds mobile phone is the one of the most popular game applications ever. Idea of game is very simple and player will achieve high results with a little bit of work when game will be addictive. Angry Birds is easy to learn and it can be played in very short-term. Nowadays Angry Birds is not anymore only successful mobile phone game, it is something bigger. It is phenomena spreading in many

other business areas also and only future will show us what kind of new things Angry Birds will be. Creators behind Angry Birds have told in many times that their dream is to be bigger than Disney. They want that Angry Birds is in future Disney 2.0. This is a huge dream and will it ever come true is something nobody knows at the moment but Angry Birds is already conquer so many areas and people hearts so why not.

2 Development of Mobile Phone Games

History of mobile games reaches over ten years, even there have been portable game devices since 1970s. Nokia released new 6110 - mobile phone in 1997. New mobile phone has also Snake-game, which is nowadays classic game and Nokia has estimated in year 2005 that there are about 350 million mobile phones which included Snake-game. Probably Snake is one of the most familiar and played mobile phone games. Idea of Snake is based same named video game which was released in 1970s and over the years there are published many different kind of versions of Snake. In fact Snake shows a very good which kind of mobile phone games are played and where those games are coming from. Usually mobile phone games are developed of games which are originally designed to be video games played by personal computer or video game console. Certain game cannot be said to mobile phone game only if it is possible to play game with your mobile phone. Game must take into consideration of special features and use of mobile phone. Real mobile phone game differs clearly of games which are designed to play only of portable game devices, such as Sony PSP and Nintendo DS. (Paavilainen, Korhonen & Saarenpää 2009.)

Original reason why Nokia added Snake into mobile phones was introduce mobile phones entertainment features and data transfer which based on infrared communication. Basic idea of Snake is very simple, player mission is to give directions to snake and try to eat snacks which makes snake to grow. Snake cannot be stopped so it must be steered all the time and if snake hits to wall or itself then game is over. After Snake there was installed to mobile phones lots of other classic games, like Tetris, Pong and Breakout. All the games were two colored since colorful screens to enter the markets. In 2003 Nokia released new mobile phone model (N-Gage), which include lots of gaming features. N-Gage reminded gaming devices from 1990s, like Atari Lynx and Sega Game Gear. N-Gage was not success in markets and afterwards is has been changed to be base for one of the Nokia's smartphone series. (Paavilainen et al. 2009.)

Current mobile games are mostly designed to mobile phones just take care of restrictions and they are not designed to take into consideration of mobile phones special features. Mainly game designers are fighting with mobile phones restrictions and they are not trying to develop mobile phones special features. Usually games have very modest audiovisual because devices have such a poor sound systems. Many of games which are designed in mid 2000s (like Tower Bloxx in 2005 and Nom in 2006) were based to hit one button in right time. Like it was earlier mentioned game is not a real mobile game it does not take into consideration of mobile phone special features. For example console video games are designed very accurate taking into consideration of consoles special features and these special features designated mainly which kind of games are designed to video game consoles. (Paavilainen et al. 2009.)

A real mobile game should consider the requirement of use mobile phone device and according to these it should also consider special features of device which are connectivity, socializing and the use of cultural. Nowadays mobile phones are all the time in network and this is reason why connectivity is the most clear special feature and it is also starting point for other special features as well. Even mobile phone devices are networked all the time, playing multiplayer games is not popular. Multiplayer games are very popular when games are played by personal computer or video game console. There is no mobile game which allows playing multiplayer games in real time, in other words synchronized games, so this is of course one reason why they are not so popular. Sociability is very important to mobile games and especially communication between players should be one of the starting points to design mobile game. (Paavilainen et al. 2009.)

Connectivity and socializing are supporting and essential related to each other. Mobile phone differs from so called static devices (like personal computer and video game console) clearly in culture of use. Mobile phones are always with user not depending on time or place. Normally using mobile phone is very short-term and the use of often interrupted. (Paavilainen et al. 2009.)

Average using continuously of one application is approximately one minute at a time, but anyway average using of mobile phone in a day is about one hour. Different kind of applications are used in different time of day, for example news applications are used mostly at morning, such as using game

application is the most active in evenings. Communication applications are used evenly during all the day time. (Böhmer, Hecht, Schöning, Krüger & Bauer 2011.)

Context of use mobile phones is posing challenges to game designer because in the beginning of designing they should consider many things, such as players cannot concentrate all the time to playing or playing games cannot cause too much distraction to other people whose are around the player. Playing mobile game may be interrupted by coming phone call and message. Communication is still principal use of mobile phones and it is not limited only to phone calls because communication possibilities with smartphones are versatile at which time game sessions might be very disjointed. (Paavilainen et al. 2009; Böhmer et al. 2011.)

The most restriction in smartphones is size of screen as this will affect what can be displayed in the game and game designer have to make a decision to focus on the action or the wider environment. Mobile games that are trying to put too much at once, the problem is that the player is not able to accurately detect what is going on in the game. For example in Splinter Cell –action game which is based on shooting scenes there are so much action and activities that the player is hard to detect from which direction the enemy shoots at him. (Duke & Westwater 2011.)

Using smartphones is based on touch screens and games which are especially designed to smartphones are using very accurate when player is using touch screen. In general, the problem occurs by the game controlling the touch screen when the mobile game is developed of game which was originally developed for the console game. This kind of situation usually game designer seek to emulate control system of console games and this leads to problems where controlling game with the touch screen is very hard and even it is foreign to user who has learn to use control command which is based on touch screen. Often sport games, like Madden NFL American football suffers from problems arise the fact that the control commands are attempting to move directly from one system to another. (Duke & Westwater 2011.)

Mobile environment is a limited factor in mobile games that game designer should keep in mind. Games played on smartphones are not suitable for those games that require several hours of gameplay. Mobile games are often played with intend to fulfill some short period of time, such as waiting to bus or train and those games that require more time are not suitable for mobile games. Angry Birds is a good example of successful mobile game, as it can be played in very short period of time and continuing play after interruption does not require any special actions. Smartphones is often played out in public places which are also likely to impact on what kind of games consumers are willing to play. (Duke & Westwater 2011.)

3 Secret of the Successful Mobile Phone Game

Demand for mobile phone games is very high at this time. Since the prevalence of smartphones, mobile game designers have developed the most curious and versatile mobile phone games. For consumers this is a great thing because consumers who are gaming enthusiast this offers possibility to try lots of different kinds of games. Unfortunately, the issue has another side also; consumers must wade through a jungle of games which is full of really bad games to find those few excellent mobile phone games. Some of the game designers are not able to figure out why some of mobile phone games are so popular with customers, so their self-designed mobile phone games proves to be only a waste of time and money. (Burton 2012.)

Burton (2012) concluded that there are a number of repetitive elements which the most successful mobile phone game includes. These elements are:

- simple game mechanics,
- a little bit of work should follow great results,
- game should proceed simply without deep tutorial or story and
- levels of game should be simply and short.

Simple game mechanics is emphasized even at that stage when you are looking at profile of mobile phone gamers. Major of mobile phone gamers are average mobile phone users. So this group is full of pretty ordinary consumers whose may not be playing personal computer games or console games at all. Ordinary mobile phone gamer play games its suits for him/her and playing can be ended very quickly, so these consumers does not explicitly arrange time for playing games, such as other platform gamers may be doing. For mobile phone gamers it is important that the game can be start as soon as they want to play and also ended when they are willing to and playing a game should not require any previous experience of playing games. Thus, to be successful game it is requiring simplicity and number of

commands must be minimized also. (Burton 2012.)

Playing mobile phone games should be easy to learn. It is one of the key factors for the successful mobile phone game. Smartphone users are not willing to spend time to learn how to play game. Correspondingly console game players are using lots of time to modify and customize settings, but such activities are not willing to do playing mobile phone games. Getting easily and fast started is one of the most important factors. Usually, the game is available in a free version (lite version), which should be easy to learn, simple and addictive game. If the game fails in one or several of these three factors, then the game is unlikely to be played again and the player will not be going to download full version of it, which normally is chargeable. Anyway consumers are not willing to either invest in a very large amount of money to chargeable games. (Duke & Westwater 2011.)

An interesting mobile phone game should offer great results with a little bit of work. Perfect example for this is the game Angry Birds. The player activates catapult by moving finger on the screen and then lifting finger on the screen will release the catapult. After effect is chaotic when there are lots of explosions, buildings collapse and birds will be released out of their cages. This satisfied players and will make them come back to playing game again. The most successful games, such as Angry Birds, Cut the Rope and Doodle Jump operates in a similar concept, there are very simple control commands and successful recipe is a simple tactic will lead to success, and that is not a coincidence. (Burton 2012; Duke & Westwater 2011.)

At the moment one of the most popular mobile phone games is called Tamago. Idea of this game is to download an egg on the smartphone screen which is to be broken by tapping the screen one million times. Next to the egg there is counter which counts every tap on and on every thousands tap will make a small crack to the egg. Tamago is considered to be very addictive game and some of the players feel this is good way to be less stressed. Some of players have already given up hope because there were nothing visible results. The simpler game may be difficult to develop.

The idea of mobile phone game concept may not be based on the complexity of the story or plot, such as it is in personal computer and console games which story is a meaningful factor. Mobile phone gamer wants to pass the level and after that player is able to end playing and come back afterwards and continue playing from the same spot. Idea of mobile phone game should be simple and possible plot may not have important role in terms of gameplay, as the player may easily ignore some important issues for the course of the game which may affect that passing a level is not possible anymore. (Burton 2012.)

Mobile phone games level should be concise and passing levels should not demand too long period of time. Game designers should take into consideration that player attention to the game is short-term, because there is lots of distraction when games are usually played, for example waiting the bus or train. This is reason why levels should be designed to be short enough to catch players' attention. If levels are too long and the player progression in the game is not going on, the player will easily get bored and will not come back to play anymore. In order to create user-friendly mobile phone game it should be easy to grasp and simple control commands. All in all behind the successful mobile phone game is simplicity of all related factors to a game. (Burton 2012; Duke & Westwater 2011.)

4 Rovio Entertainment Ltd and Angry Birds

Rovio Entertainment Ltd, better known as Rovio, is a Finnish company. It is established in 2003, when the company operated under the name Relude. In 2005 name was changed to Rovio Entertainment Ltd. Rovio is working in entertainment media business area and it is the well-known game design company. In 2009, Rovio was close to bankruptcy before they succeeded to develop well-known Angry Birds mobile phone game. Rovio was forced to downsize the number of employees from 50 to 12. Nowadays Rovio employs over 500. Rovio's headquarter is in Espoo, Finland; in addition Rovio has operation in Tampere also. The rest of world Rovio has operation in United States, China and Sweden. Rovio has three main persons who are the heart of the company. CEO is Mikael Hed and his cousin Niklas Hed is one of the co-founders. Peter Vesterbacka's official title is chief marketing officer, but he is the best known as the "Mighty Eagle". Rovio is now a world-wide company and employees represent more than 30 nationalities. (Rovio Entertainment 2013; Wikipedia 2013.)

Relude was established to contribute to success of the game King of The Cabbage World, which was developed by three students (Niklas Hed, Jarmo Väkeväinen and Kim Dikert) to mobile phone game contest, which was sponsored by Nokia and Hewlett Packard. After the contest Sumea company bought the game King of the Cabbage World and renamed it to be Mole War and the advertising it was

said to be the first mobile phone game than can be played in multiplayer mode. Before Angry Birds game Rovio (and Relude) published a total of 51 games. Some of the games were resold by millions to third party (such as Namco and EA). Rovio decided to create and design their own game, which original copyrights they will own. (Cheshire 2011; Magrigal 2011.)

Angry Birds is a random puzzle game where the aim is to fling birds using catapult towards a different kind of structure which are full of different blocks and some pigs. The aim is to hit directly to pigs or to structures so that they will collapse on top of pigs. The game idea is to destroy the pigs, and usually this requires destructing the structures around the pigs. The player has available a certain number of birds, which have different special abilities, such as the one birds is able to diffuse into a plurality of birds, a one birds may be used as bomb and one bird is able to use as rocket, and so on.

Rovio's problem was not to create and design good games, but company's the biggest problem was the marketing and distribution channels. Release of the first iPhone and thereby created App Store opened a new patch to reach consumers without that they had to negotiate with every mobile phone manufacturer separately. App Store opened the whole world, because with on single contact Rovio was able to reach worldwide distribution. Rovio realized that in iPhone platform environment there was very high competition, but if you succeed in that environment, then you are able to extend to other smartphone platform, personal computer and consoles as well. Rovio decided to focus on designing its own mobile phone game to iPhone platform and discard the other mobile phone platforms for a while. This plan was made long before idea of Angry Birds became. The aim was to conquer App Store, but before invasion to App Store they needed to analyze iPhone user profiles very accurate. They found that target group of iPhone users are all kind of persons. So they need to create and design mobile phone game that everyone can play it. Previous Rovio had focused mainly to design sci-fi and horror games, so this new idea differ lots of previous games. Rovio decided to change game designing criteria, in which case a new game should be extensible to other application platforms, but is should work like game which is designed to iPhone. Other factor was that game should be based on the physics, it should not include introduction section or tutorial, time to start and end game should be as short as possible to maximize satisfaction when game is played short period of time. The last factor was that there should be such icon, which will allow it differentiates in App Store. (Rovio Entertainment 2013; Cheshire 2011.)

In early 2009, Rovio's game design director Jaakko Iisalo introduced bird characters who did not have the legs and do not know how to fly, and they were looking very angry. Rovio's team began to wonder why the birds are so angry and even birds were very simple characters, they forced the team to think very much and they feel the characters to be somehow magical. Structure of the game and the characters evolved and changed a lot from the beginning to how consumers see them nowadays. The most significant changes during the development phase were that the birds initially responded to the colors of boxes and when the birds hit corresponding box it was crushed. Also the catapult which flings birds was added at the end of design project. Reason why there are pigs is that team needed to come up with the reason why the birds want to break down structures and idea for pigs green color appeared from news of swine flu. Green color reflects to a sick pig. Still team had to develop a story why the birds are so angry to the pigs whose seem to be very docile and wise; result for the birds' anger is that the pigs have stolen their eggs. (Cheshire 2011.)

Angry Birds was released in App Store on December 2009. The first few months was not success at all, Angry Birds was flop in the most profitable App Store markets. Rovio's strategy was not to achieve exponential invasion to the App Store, but the strategy was more of like a guerilla war to achieve better position first in smaller App Store markets. Rovio was realized that large markets would be difficult to break in, but success in the smaller countries markets did not needed to have large amounts of purchases. For example, the number one place on the Finnish App Store market needed only few hundreds purchases. The same situation was also in Sweden, Greece and Denmark. Nowadays, the UK and U.S. App Store markets are about 90 per cent of Rovio's total markets, but to get first purchase from these App Store it took to get about 30 000 to 40 000 downloads before from smaller markets. This amount of downloads is not particularly large, but it is still about four times what the average application normally sells. Rovio also used a help of self-publisher company (Chillingo), who had managed to take a number of applications in the App Store and Chillingo also had a good relationship with Apple. (Cheshire 2011.)

In February 2010, Apple approved the Angry Birds to UK App Stores front page in week of the game list. At the same time Rovio made a promotional video of the Angry Birds to Youtube-video service. This video was the second in history which was made of Iphone game. Today, this video has more than 17 million views. Rovio also added 42 levels to Angry Birds and released the first free

version of the game. These all were released within three days and after advertising Angry Birds rose from 600th to the first place in UK App Store, and in April Angry Birds achieved the first place in the United States. (Cheshire 2011.)

After the first Angry Birds release it took a few months that the game had become an international phenomenon, and today it is the all-time most popular chargeable application. Rovio has released eight successful games so far, they are; Angry Birds, Angry Birds Seasons, Angry Birds Rio, Angry Birds Space, Angry Birds Friends, Amazing Alex, Bad Piggies and Angry Birds Star Wars. Angry Birds success in mobile phone games has been expanding rapidly to other business areas also, such as entertainment, publishing and licensing activities. Angry Birds has become a beloved international brand. (Rovio Entertainment 2013; Cheshire 2011.) It is interesting to see how far birds can go without legs and ability to fly. Angry Birds have shown to whole world that with certain angry everyone is able to achieve dreams.

5 Conclusions

There are few main factors which reflect success or failure of mobile phone game. They all are as important and they cannot be ordered anyway. There they are just mentioned in random order. Story behind the mobile phone game should not have main or even essential role because mobile phone gamers do not have enough concentration to follow up stories or tutorials. This element has also other meaningful point because mobile phone game need to be easily ready to play; there not supposed to be long loading times and every extra tutorial will slow down to start playing. Game mechanics have to be very easy to learn. Gamers are not willing to spend their time to learn how to play game; they just want to start playing when they have time to do it. Easy game mechanics should also include easy control commands. Nowadays mobile phone games are played on smartphones and controlling games with touch screens offers many possibilities but also some restrictions. Control commands should be quite simply because as it was earlier mentioned gamers concentration is not totally focused playing games and normally gamers are doing something else at the same time. One key element to successful mobile phone game is to offer great results with a little bit of work. This element represents the main idea of mobile phone game because successful game is addictive and which is more addictive than gamer make some commands on screen and afterwards there are lots of actions on screen. Maybe the most important key element to successful game is that it should be simply and short in every way. Gamers are willing to play the game for a short-term and the must also allow some disruptions for example incoming call and incoming SMS message and the game should be easily to continue after some disruptions.

The history of mobile phone games is very short and they are at the beginning of their development. At the moment gamers are willing to play very simply games which offers just fun for short-term. Technology and innovations are developing very fast on smartphones so it may be totally different story after few years. Smartphones screen sizes are one of the biggest restrictions to develop wider stories but this may be changed very rapidly because bigger sizes screescreen seems to be trend at the moment in the most popular smartphones models, such as Samsung Galaxy S4 (screen size 5" versus Samsung Galaxy S3 screen size 4,8") which will be released soon. Nowadays consumers have lots of different kind of entertainment devices like smartphones, personal computers, tablets and game consoles. There may not even be demand to more developed games to mobile phones because consumers are willing to fill out extra times (for example waiting friends or bus) with playing mobile phone games. Then games are not needed to be complex and versatile but they need to be entertaining and addictive because it is so easy to download new game if gamer is not satisfied with it. Angry Birds have become phenomenon and there have been continuum when gamers have been able to download more levels or new game without need to find totally new game. Angry Birds have also spread to other business areas too so it is real phenomena and it is still conquering new business areas all the time. Creators behind the Angry Birds have dream to become like Disney 2.0. It is a huge dream and there are lots of people who are thinking they have to be totally out of mind. Anyhow they have succeeded so far with Birds who are not able to fly or walk but they have had enough angriness to become phenomena. Within next year there are going to be more Angry Birds moving around us or there are going to be something else which will entertain us.

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Research on the Predicament and Countermeasures of Opto-Electronic Information Industry Cluster Development in Wuhan East Lake High-Tech Development Zone*

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Abstract: This paper takes the opto-electronic information industry cluster in East Lake High-tech Zone as the research object. Firstly, we depicted the development status quo of electronic information industry cluster. Based on which, we then analyzed the problems in the opto-electronic information industry cluster including lack of coordination and linkage mechanism, short in prospective studies, poor stability of the backbone R&D personnel, and lack of benign soft environment which is essential for the development of industrial cluster. Finally, we put forward countermeasures and suggestions from perspectives of building basic research and development platform, improving the industry chain of opto-electronic technological innovation, stabilizing the backbone of R&D personnel, and establishing supermarket platform of professional service.

Key words: East Lake High-tech Development Zone; Opto-electronic information industry; Industrial cluster; Industrial chain ; Independent innovation capability

1 Introduction

The industrial cluster is a new trend of the industry development to adapt to the global economic and increasing competition, and an organization of the industry space which is to create their own relative competitive advantages. The other organizations are difficultly compared to the industrial cluster which has a group of competitive advantages and economies of scale. It is of great significance to research the industrial cluster for the rationalization of the economical layout, the optimization of resource allocation, forming the competitiveness of regional economic. Since the 1980s, the theories of industrial cluster flourish, causing the widespread concern in theoretical circles at home and abroad. Based on the high-tech park development strategies of industrial cluster, many countries and regions made high-tech parks become a new growth point of economic development, which highlights the positive effect of high-tech parks in the regional economy.

Based on the opto-electronic Information Industry in Wuhan East Lake High-tech Development Zone, the “Wuhan·Optics Valley of China” is the first national opto-electronic Information Industry base approved by the Ministry of Science and the National Development and Reform Commission in 2001. As one of the leading industries in Wuhan East Lake High-tech Development Zone, the opto-electronic Information Industry has formed an industrial cluster of specialization and collaboration including the optical communication, laser, information networking, opto-electronic products, and so on after several years of construction and development, which created the conditions to form an industrial chain that the upper, middle and downstream are interrelated. But the development of opto-electronic Information Industry still exist some difficulties. Selecting the opto-electronic Information Industry Cluster in Wuhan East Lake High-tech Development Zone as a case, the paper analyses the problems of its development in-depth and proposes some corresponding countermeasures and suggestions.

2 The Status of Opto-Electronic Information Industry Cluster in Wuhan East Lake High-Tech Development Zone

The industrial cluster refers to an organic system on a specific area forming by some interrelated (complementary or competing) enterprises and institutions concentrating in a certain geographical area, which has characteristics like the structural integrity of the upper, middle and downstream (from raw material supply to distribution channels or users), a sound industrial system of peripheral supporting, flexibility and so on. The cluster includes a number of interrelated industries and other entities which

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play an important role on competition. Therefore, the enterprises in the clusters establish a close relationship which is both competitive and cooperated through the specialization and collaboration. The clusters also include some corresponding supporting mechanisms that provide ancillary services such as the local government, industrial associations, financial services and training institutions, etc. So, the clusters are a kind of soft production complexes and represent the regional core competitiveness. Since the Wuhan East Lake High-tech Development Zone was approved as a “National Opto-electronic Information Industry Base” in 2001, it has achieved remarkable success to develop the opto-electronic information industry cluster replying on the national and local support, the traditional opto-electronic information industry base in the region and the regional abundant resources of technology and education.

Table 1 Main Economic Indicators of East Lake High-Tech Zone Opto-electronic Information Industry

Indicators	2011	2009
General Income	145000 million	83562 million
The Average Annual Growth Rate	30%	30%
Domestic Market Share	More than 50%	50%
The Number of Enterprises	About 1000	828
Research and Development Institutions	700	454
Employees	200 thousand	95474

(Data source: According to the network data and the statistical yearbook of Wuhan East Lake High-tech Zone arrangement)

2.1 Opto-electronic Information Industry clustering within the region distinctive characteristics

Up to 2011, opto-electronic Information Industry reached 145 billion yuan of total revenue in Wuhan East Lake High-tech Development Zone, the average annual growth rate of over 30% in the past five years, its fastest growth compared with other industries, it has been among the world-class industry clusters. Optical fiber cable, optical devices, lasers and other products share of more than 50% in the domestic market. In which, the Production scale of fiber-optic cable is the world's first, formed a complete industrial from rods, drawing to cabling, domestic market share of over 66%, international market share of 25%. East Lake High-tech Development Zone is China's largest production base of optical devices research and development and laser industry base, optical devices products in the domestic market share of 60%, international market share reached 12%. Laser and other related products in the domestic market share of over 50% for 11 consecutive years. At the same time, in the opto-electronic Information Industry, the number of enterprises above designated size increased year by year, by the end of 2012 already exceeded more than a thousand. In which, Laborers technology, Yangtze Optical Fiber, Tianyu Information has been identified as a national innovation-oriented enterprises, FiberHome selected the first batch of national technology innovation demonstration enterprise. In addition, Consumer electronics, optical display, semiconductor lighting, photovoltaic solar energy industry is accelerating the development. Geo-spatial information, networking, smart grid, cloud computing and other emerging industries achieved initial success. The scale of software and service outsourcing industry rapidly expand, digital creative industry is booming. Huawei, ZTE, Lenovo Group, Deutsche Telekom, France Telecom, Wuhan Tianma and other famous enterprises settled in Optical Valley Technology Industrial Park. Opto-electronic Information Industry has shown rapid development momentum in Wuhan East Lake High-tech Development Zone.

2.2 Regional innovative resources provide effective intelligence support to the development of clusters

“Wuhan-Optics Valley of China” is a national and provincial key projects, planning area of 224 square kilometers, approximately 90 square kilometers have been built, gathering 42 colleges and universities, 24 national key laboratories, engineering technology centers, enterprise technology center, more than 700 technology development institutions, more than 200,000 professional and technical personnel and more than 70 million college students, 51 academicians, in which 10 academicians are leader of opto-electronic Information Industry. Up to 2013, Wuhan East Lake High-tech Development Zone has introduced and nurtured 431 high talents(including Hubei Hundred, national Thousand Talents Program, East Lake 3551 Talents Scheme), the number of Dr. is 4294, talents of opto-electronic Information Industry proportion accounted for one third. Opto-electronic Information technology is based on cutting-edge knowledge, the universities and research institutions just to be able to provide a

high level knowledge-based talents and high-level management talent to the opto-electronic Information Industry. "Wuhan-Optics Valley of China", relying on universities and research institutions to provide a strong talent and technology advantages, is second only to Beijing Zhongguancun and Shanghai High-tech Industrial Development Zone, China's third largest intelligence-intensive areas.

2.3 Industry cluster network system based on innovation network has been initially formed

As of 2012, East Lake High-tech Zone has 20 photoelectron information incubator industries, and being the representation of them are Wuhan East Lake New Technology Venture Center, Wuhan laborers technology business incubator and Wuhan Students Pioneer Park. The total hatching area are 1,624,000 square meters, and more than 700 enterprises are in incubation. The degree of specialization is higher within the region, and the core enterprises have a stronger driven effect. The products cover almost all of the photoelectron field and it forms the leading enterprises such as Fiberhome technology group, Yangtze optical fiber and cable company, Chinese science and technology, Yangtze River communication and Roton electronic. Other SMEs are complement to the industrial cluster. These enterprises not only compete with each other, but also promote the mutual development. What's more, due to the technology spillovers and the flow of talent and production coordination, these enterprises promote the development of related industries, and jointly create industrial clusters brand.

3 The Problems of Opto-Electronic Information Industry Cluster in East Lake High-Tech Zone

3.1 Enterprises in the cluster has not yet formed a complete industrial chain labor-division system, and are lack of coordination linkage mechanism

In addition to a small part of large cluster photoelectron enterprises, most SMEs can only be regarded as "assembly plants". A large number of electronic devices and integrated circuits are imported from abroad. Enterprises in the cluster lack the necessary coordination linkage mechanism, including the connection of product supply and demand mechanism, the collaboration of research and development mechanisms, strategic alliances, etc. In order to obtain profits, the large companies try to suppress the price of supporting parts which SMEs provide. Without any cooperative support, the SMEs has no corresponding increase in technology and management. Similarly, the international manufacturers also want to profit through lower prices way, rarely cooperating with companies to develop products within the cluster. In addition, the enterprises within the cluster have no real specialization. With the coordination of industrial chain being poor, the enterprises has not yet formed the mutual recognition of the cooperative system which is based on common cultural background. Due to the low business relatively, enterprises in the cluster are lack of technical cooperation and exchanges, and the efficiency of cooperation of industrial cluster reduce seriously.

3.2 Being lack of prospective studies, most enterprises are still in imitative innovation

The R&D capability of Wuhan photoelectron information industry cluster exists defectiveness. Very few enterprises have advanced technology. Only in the Yangtze, Fiber home technology and several big laser enterprises have advanced technology in optical communication, optical fiber and cable and optical devices. But they only keep pace of the advanced foreign technology. There is no advantage in innovation and R&D. Investigation shows that more than 80% of the enterprises in the cluster are absorbed in innovation results, rather than the innovation process itself. Not to mention the prospect, the enterprises have a serious shortage of independent innovation ability. Prospective studies are mostly pre-competitive basic research, generic technology research and the product innovation for future technical precipitation. It usually forms the new technical standards. If enterprises want to make achievements in technological innovation, firstly they should measure whether the prospective study of their own businesses meet the future market. Only do the enterprises' research is based on market development, they can lead the market. At present, the independent intellectual property rights of enterprises in the cluster is extremely insufficient. The core technology is shortage and the key technology is controlled by others. The overall level is not optimistic.

3.3 The stability of opto-electronic information industry's R&D team backbone talents is poorer

The stability of opto-electronic Information Industry's developing R&D team backbone talents is poorer. On one hand, the "internal brain drain" phenomenon of the opto-electronic Information Industry's R&D team backbone talents is serious. For the opto-electronic Information Industry has the characteristics of big investment and long cycle, and the fact that wuhan has rich human resources, most of the global important opto-electronic information companies set up R&D center in wuhan. But wuhan does not have independent intellectual property rights, so as to the R&D dominant position was

dominated by others, leading to a large number of "internal brain drain" phenomenon. A lot of excellent R&D backbone talents' and team's innovation ability was solidified in the existing R&D system framework of multinational enterprises, so they can't form the atmosphere for local enterprise to jointly overcome the difficult. On the other hand, the domestic enterprises lack of first line R&D talents. In recent years, along with the return of the returned oversea Chinese talent and team, the gap of R&D leading talents in domestic opto-electronic Information Industry is not effectively filled yet. Enterprises in the cluster generally show that many "sea turtles" choose the university scientific research institution or self-employment, but the number of who choosing the first line enterprise in domestic industries is not that much. In addition, despite the industrial park of East Lake High-tech Development Zone having a more perfect hardware supporting measures and relatively high quality human resource base, the attractive is also slightly obviously insufficient when compared to the investment attraction condition and the rich treatment for the foreign capital enterprise in Beijing, Shanghai and other places. According to the survey, if there is a better development space and a higher salary, more than forty percent of the team backbone R&D talents will choose outflow. Therefore, the quality and quantity of the domestic enterprise backbone R&D talent and R&D team are in the condition of slow growth.

3.4 The soft environment needed of industrial cluster's development is missing

According to the survey, some respondents said that the leading talents who want to establish a business with in Hubei province, not only do the research or start a company, but also do something in the fire control, environmental assessment, water, electricity, communications department is closely related and so on. For the relatively insufficient government professional service platform, the leading talents especially those from the colleges and the research institute was tired by the administrative affairs. It is essential for the government to provide training, coaching and mentoring for the leading talents, including the product approval deadline, industry listed process consulting, industry norms, administrative examination and approval, the investment and financing, etc. All the problems are caused by the absence of government function in East Lake High-tech Development Zone.

4 The Countermeasures and Suggestions for Promoting the Development of Opto-Electronic Information Industry in East Lake High-Tech Development Zone

4.1 Building basic development platform in opto-electronic information industry

The government set up basic development platform based on the industry chain or industrial cluster in order to effectively integrate the same or similar industry's science and technology resources. So it can share the scientific data and literature of science and technology, provide professional technology and technology incubation services etc, avoid inter-industry bulk type and segmentation development model, strengthen the transverse connection and exchange mechanism between enterprises by opening the instrument equipment and research base. Moreover, it can inject vigor for the enterprise, reduce the cost, increase the appeal for R&D talents, and then realize the purpose of driving talent gathered by industrial development.

4.2 Valuing the exploitation of advanced technology and perfecting the innovation industrial chain of opto-electronic technology

Wuhan opto-electronic industrial cluster should base on leading and special industry such as Optical fiber and cable, photoelectric device, laser equipment to form a tech-innovation industrial chain which is inter-pervasion, inter-dependent and upstream and downstream complementary, making industrial cluster more sizable and stronger. They should build local networks with collaboration to arrange project according to the formation of industry cluster, and attach great importance to the union, also pay attention to the cooperation of big, small and medium-sized enterprises, division of labor based on specialization and the well-equipped website system. Foster a technology environment, financial environment, logistics environment and humanities environment within the group according to allocation of resources in the market, shaping the mechanism of mutual coordination, cooperation and division of labor, fulfilling the role of the leading enterprises such as Fire Science & Technology, HUST Science & Technology, speeding up the development of cutting-edge technology, and gaining more patents, breakthrough of technology and industry.

4.3 Designing attractive salary system and execution system to stay the cores of research and development personnel

First, implement the plan of holding stock shares of core developers, getting personnel and enterprise development prospects together, sharing the benefits and taking the same risks. Second, allocating income due to scientific and technological achievements. Researchers can obtain certain

proportion of economic benefits if their scientific and technological achievements can apply in factory production successfully, which creates economic benefits in the continuous 3-5 years. Third, establish the Outstanding Contribution Awarding Fund. Outstanding research and development personnel can gain a large amount of reward if their work is sufficient and leads significant social effect. Fourth, enhance the intensity of spiritual motivation. Award the work staff honorary titles such as professional and technical experts, technical leaders, to stimulate developers to both keeping foraging ahead and working hard.

4.4 Building photoelectron information industry specialization service supermarket

First, pioneering innovation, integration of optoelectronic information field management consulting, administrative examination and approval, coordination and transactional proxy advantage resources. Boosting demand docking with the resources, to build brand, enhance the open sharing of resources, to provide patent data, the current national standard and industry standard queries. Second, the integration of optoelectronic information enterprises in research projects across the country, establishing the talents database of experts in the field, published online network platform functions such as optoelectronic information industry newsletter. Once again, building a diversified investment and financing service system. Optoelectronic information field, establish property right trading platform, and actively introduce risk investment funds and venture capital management companies, set up the province of photoelectron information industry investment fund, key support with independent patent technology product research and development and industrialization.

5 Conclusion

This paper takes the opto-electronic information industry cluster in East Lake High-tech Zone as the research object, through visiting many representative opto-electronic companies in Optics Valley, we summed up the development characteristics, existing dilemma and possible solution of current opto-electronic information industry cluster. The main conclusions are as follows:

The clustering feature of opto-electronic information industry cluster within the region is distinct; regional innovation resources provided effective intelligence support for the development of the cluster; industrial network system which based on innovation network has been initially formed. But the development of opto-electronic information industry cluster still exist some difficulties, including enterprises in the cluster has not yet formed a complete labor division system of industrial chain, lack of coordination and linkage mechanism; most enterprises are still in imitative innovation, and lack of prospective studies; Backbone talents in R&D team of opto-electronic information industry is less stable; soft environment required for the development of industrial clusters is missing. Therefore, this article put forward countermeasures and suggestions from perspectives of build basic research and development platform, improve the industry chain of opto-electronic technological innovation, stable the backbone of R&D personnel, and establish supermarket platform of professional service.

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Market Risk and Its Prevention of Discontinuous Technological Innovation

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Abstract: In the 21st century, enterprises are marching toward the fourth generation of technological innovation, represented by the DTI (Discontinuous Technological Innovation). More and more companies have realized that DTI is an important strategic choice to conduct enterprise technological innovation, build technical shields, win new industrial markets and achieve market share breakthroughs. This paper analyzes the features, symptoms and origins of DTI market risk, suggesting to prevent DTI market risk by engaging leading users, combining production, teaching and research, predicting scientifically, testing market demands and establishing strategic alliance based on industrial chains.

Key words: DTI, Market risk, Risk prevention

1 Introduction

Technological innovation, divided into CTI (Continuous Technological Innovation) and DTI (Discontinuous Technological Innovation), is the key point for a country's economic growth and a company's technological advance. Based on the evolving trend of international technological innovation, our world is embracing the fourth generation of technological innovation featuring DTI. DTI, through reorganization of existing knowledge, changes in production techniques and procedures, changes in potential consumer demand patterns, has become important means for today's high-tech enterprises' international competitiveness in developed countries; Thanks to DTI, many companies have achieved a leap forward in technology, got rid of the technical control of others in market competition and created innovation opportunities to produce both new products and new production processes. By opening new market opportunities to companies, DTI is crowned as the driving engines of companies. Although CTI has its own strengths, it is easy to be beaten by DTI (Jill Keyes, 2000). As mentioned by Peter Drucker, we are now in a DTI era, CTI can only be used by companies to maintain their market superiority after the success of DTI.

According to the data, although DTI has 20% success ratio to take back the technological innovation investment and obtain the corresponding returning profit, DTI is also a high risk activity characterized by its systematic and complicated process. As is shown in the research findings by E. Mansfield in 1981, only 60% of research and development by technological companies succeed, among them, only 30% products end up selling to the market. What's more, only 12% of these products win consumer assent. Therefore, if a company wants to gain profits from its technological innovation project, it should take effective means to eliminate or reduce market risk as a priority. In a word, studying DTI market risk management is of vital significance to advance China's independent innovation ability and realize technological advance.

2 Current Situation of DTI Research Both at Home and Abroad

Alfred P. Sloan Foundation from US Rensselaer Polytechnic Institute (RPI) and IRI have a cooperation team working on discontinuous innovation research. After studying a number of cases, they found that success lies in the discontinuous innovation process. Therefore, they concluded that both DTI and CTI would face uncertainties from market and technologies, but uncertainties from resources and organization only belong to the innovation of new business. Growth opportunities matrix proposed by H. Ansoff validates that uncertainties from the market and technologies are vital for DTI. Leifer also conducted a conclusion on the features of DTI life circles. To analyze uncertainties in DTI, Rosenberg proposed six interdependent uncertainties, namely, uncertainties in the competitive market, uncertainties in the innovation technologies, uncertainties in the systematic reorganization, uncertainties in realizing short term profits, uncertainties in satisfying consumer demands and uncertainties in existing competitive technologies. According to Soude and Moenaert, four uncertain factors, namely, competition opponents, consumers, production technologies and costs, will cause huge uncertainties in DTI projects. From the risk perspective, Lynn found that DTI suffers a lot of uncertainties from technologies, market and time arrangement. As mentioned by Hite and Hesterly, uncertainties from task

environment prevent companies from gaining access to the required resources. Bstieler summarized the major effect of environment uncertainty and the regulatory role based on his empirical research. Hareberg discovered the characteristics of non-continuous technological innovation are to put the product from the old market cycle to a new market cycle. According to Richard, Gina and Mark, DTI distinguished its life cycle from CTI as its uncertainties and discontinuation. Lambe and Spekman held that DTI is related to the external links of companies. Foster and Sarah Kapland found that companies which control market channels while proceeding DTI simultaneously can control the invincible position in the market. As we all know, consumer demands are discontinuous in the market. Christian believes discontinuity innovative products should focus on the future needs of consumers through constantly refined methods and it is for more effective to take consumer environment as the foundation than take the consumer characteristics as the foundation. Song and Montoya-Weiss believe that difference in product innovation has an impact on the development process and performance of new products. Marisa Maio and Mike proposed a multiple prediction technique on the effectiveness of combination theory and the philosophy of multiple views.

Compared with overseas studies, research on DTI by domestic scholars is only still in its infancy with relatively fewer corresponding results. According to Liu Yulin, as DTI is established on the basis of new knowledge or knowledge fusion, DTI is much more difficult than CTI. Xu Hejun and Gao Jian think that DTI provides new product values to consumers in the new type of market. After analyzing the relationship between the four modes of technological environment scanning and DTI, Jiang Lihui and Zhang Pengzhu believe that the enterprise's cohesive force when facing market risk decides its DTI decision-making power and control to the innovative risk. Li Anmin designed a new mode of market management after analyzing features of product research and development process, and vertical collaboration research and development form in combination with the features of potential consumers engagement for DTI. This new mode, from the perspective of enterprise knowledge theory, explains the technological and market uncertainties of DTI, knowledge interaction and fusion, knowledge accumulation and creation in the DTI process. Si Chunlin discusses CTI and DTI from both technology and market, holding that discontinuous innovation will adjust and upgrade the existing market structure after its success. Based on the analysis of DTI connotation and features, Ren Jing and Zhu Fangming conduct a special research on DTI in traditional advantage companies, pointing out their setbacks and countermeasures.

From the above analysis, scholars both at home and abroad have developed lots of research on DTI concepts, technological features, market research methods, and so on, which serve as a good basis for future DTI research, but we can also find that studies on DTI market risk prevention are far from sufficient. This thesis studies features and origins of DTI market risks and gives corresponding preventive measures.

3 Features and Origins of DTI Market Risk

3.1 DTI market risk

The DTI market risk refers to the possibilities or chances of non-continuous innovative product not adapting to the consumer market demand and not accepted by the mass market. Such risks originate from enterprises' incomplete understanding of the potential needs of users, unawareness of a potential market and uncertainties of how future market can be transformed into technology and product knowledge. Due to wide time span of the whole DTI process, any link has a high degree of uncertainty, from research and development, selection, project planning, specified marketing strategy, market analysis, sample trial manufacturing, small-scale trial to widespread promotion. The DTI market risks, mainly including the extension risk and the market environment risk, are composed of risks arisen from the preparation stage to the marketing stage.

Continuous risks accumulated in the entire project implementation erupt at the marketing stage most probably. Several situations may lead to continuous risks. Firstly, if a company fails to develop a targeted market research and investigation at the initial stage of a new project, continuous risks may arise. Secondly, if a company fails to develop a tailored research and development for consumers at the new DTI product research and development stage, technical risk will spread to market link which will directly be transformed into market risk. Thirdly, at the new product formation stage, if the product fails to be advanced or useful than the original ones in its quality or concepts, consumers would not be satisfied. Or if there exists some craftsmanship problems, production cost may be too high. All the situations may lead to the eruption of market risks, finally leading to the failure of whole DTI project.

Fast changing market environment will also bring market risk to DTI. First, changes in the macro-environment, such as the legal and regulatory environment, changes in the national policy environment and impact of changes in the production environment on innovation projects; Second, market uncertainty due to changes in the demand and supply for new product acceptance; Third, market entry timing uncertainty which may lead to a blocked marketing channel, causing overstock or dead stock. Fourth, consumers' needs or preferences for products change, thus leading to poor sales; Fifth, fake products or duplicated products of competitors flourishing, which will result in decreased market share of generic products and in product backlog and slow sales of marketing channels Sixth, the industrial chain changes, which leads to fluctuation in the supply and price of raw materials, which will have an impact on DTI, making technical innovation of product faced with sales crisis.

3.2 Features of DTI market risk

DTI is opening up new potential markets for new technologies in orbit, it also faces a high degree of technological uncertainty and market uncertainty, so market risk has its unique characteristics. Firstly, irreversibility. DTI testing starts from the market and ends up with the market, therefore the DTI project needs to formulate effective market risk management to contain each kind of risk from technological innovation, project initiation stage, research and development stage to production stage. Only through continuous improvement and enhanced vigilance can the occurrence of such risks be effectively prevented or corrected. Secondly, source ambiguity. DTI project faces market which cannot be precisely quantified, therefore it is ambiguous. Thirdly, high risk. Since DTI is discontinuous technological innovation rather than original technical improvement, it is faced with bigger technical and market uncertainties.

3.3 DTI sources of market risk

DTI market risk derives from various aspects, among which five main sources may lead to market risk: discontinuous technologies, consumers, competitors, companies and a macro external environment. Firstly, discontinuous technologies causing market risk is shown in the following ways, including discontinuous technologies failure to meet market demand, discontinuous technologies bringing uncertain market opportunities, and discontinuous technologies being uncertain in diffusion extent and tracks. Secondly, market risk brought by consumers. As DTI products end up in satisfying the consumer demands, products which are popular among consumers are successful ones. Since consumer is a vital factor to influence DTI market risk, it is indispensable to develop some research and investigation on consumers. Thirdly, market risk brought by competitors. After DTI products are promoted to the market, they are likely to be imitated or pirated by CTI products, as a consequence, profits are reduced for those new products on market. Companies suffer from gains reduction, with market shares and market returns of the company being impaired, which is manifested in changes in the number of companies, existing competitor strength, potential competitor and substitute condition. Fourthly, market risk caused by companies themselves. As companies are executors of DTI, successful companies should have good marketing strategies, smooth marketing networks, scientific market investigation and analysis, accurate product market positioning, and ample funds, otherwise, companies would find it hard to promote their DTI projects. Strengths and management levels of companies are also vital to the success of DTI products, which can be shown in their effectiveness of marketing strategies, scientific nature of market investigation, accuracy of market positioning, closeness between companies and their supply chain, and funding supply. Fifthly, market risk brought by the macro- environment mainly shown by political environment, economic environment, social environment and technological environment.

4 DTI Market Risk Prevention

4.1 Engaging leading users

Since leading users reflect potential needs of mass consumers to companies in a quick and clear manner, it is necessary for companies which are initiating innovation projects to know the potential demands and thinking pattern of those leading users. During the development stage, companies should strengthen the engagement of leading users and know more clearly about their needs. Only in this way can companies produce popular products, reduce future market risk and increase their profits. As is shown in figure 1, firstly, after predicting the potential market trend, a DTI group is formed, which develops a further market investigation, collect information, expound future trend and potential needs of consumers. Then, an innovation project with its personnel, time and funds will be decided after companies analyze innovation opportunities and business target. At last, an innovation group is set up. Secondly, DTI group positions their leading users, and selects and invites proper ones to engage into this

innovation process to offer help on consumer needs and other information. In this way can innovation group develop products which will be popular in the market based on the information provided by those leading users. More specifically, needs and ideas of products provided by leading users will be studied and developed by the group. After the product is successfully developed, leading users will try them and give their feedback. Then, companies will upgrade their products based on these feedbacks to their satisfaction. Thirdly, after products get their qualification, companies can organize production, marketing and market development.

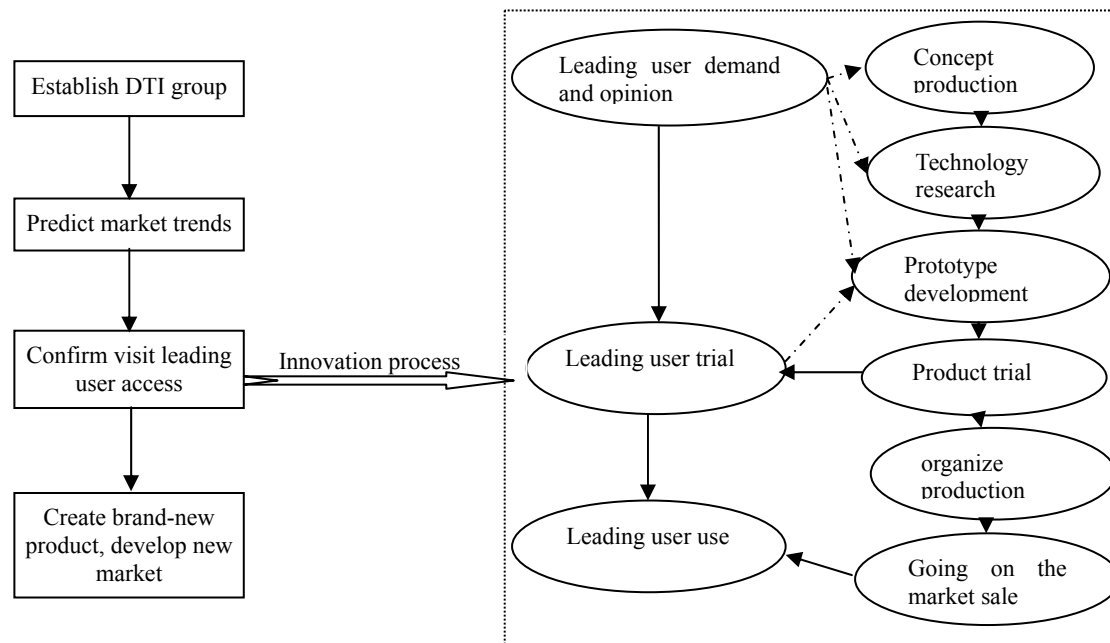


Figure 1 Process of Engaging Leading Users

4.2 Combining production, teaching and research

¹As the consequence of high degree of market risk, and slow progress of discontinuous technologies, DTI products usually have a long period, even the whole period of cooperation with universities or scientific and research institutes. Universities or scientific and research institutes will analyze their respective profits and confronted market risks they starting a segmented cooperation. At the stage of technology preparation, a combination of production, teaching and research will be developed mainly by universities or scientific and research institutes, as they can develop their specific technologies advantages and development abilities, which means they focus more on the technological level. In this stage, companies mainly assemble information collected from feedbacks from leading users and share them with universities or scientific and research institutes. At the stage of technology development, technologies which meet the demands of mass consumer market will be transferred into products, therefore, technical personnel and research resources will be exchanged. Finally is the stage of technical production with enterprise as main position. With the development of new products, enterprises need to have sufficient funds, sufficient workers and strong market channels to promote products, thus gaining profits.

4.3 Scientific prediction and test of market demand

Scientific market demand forecast and precise market test involve the following aspects. Firstly, predicting market demands requires covering all the necessary estimation or data, collecting ideas from key shareholders and keeping their original ideas. Secondly, market test refers to develop trial sale through a selected channel for a product in a specific small area. According to the rule of Chinese market, the trial sale of product will be arranged in coastal areas or the provincial capital of central China as consumers in these areas can represent potential needs of most consumers. If the products sell well in those cities, they can be launched into the national market. Market test enables companies to

¹ Ge Ruyi. Zhang Pengzhu. Continual technological innovation industrial-university collaboration evolution model study [M]. China science and technology forum, 2008

know if their technology has satisfied consumer needs, and find wrong supposition and unexpected results. In this way, companies can adjust incorrect behavior, define user preferences and target market positioning. Moreover, market test can predict how large consumer group is and whether they can distribute products on a large scale or not. If new products fail to pass a market test, companies should stop production and curb market risks as early as possible.

4.4 Establishing strategic alliance based on industrial chains

To reach common profit goal, allied companies will assemble their respective strengths and good resources, thus developing new innovative products, exploring a new consumer market and winning more profits for companies. In implementing DTI process, it is of vital importance to establish strategic alliance based on industrial chains. Technology patent owners will provide strategic theory research for products, material suppliers producing products with mature and stable production lines, consumers giving feedback on products through improved sales and service channel, and technology patents developers improving their quality to meet market demands again. Thanks to the complementation of advantageous resources of all allies, values of resources are maximized. The whole ally has become the symbol of the industry. Therefore, seeking cooperative industrial chain partners can Enhances the competitive advantage of entire alliance, complete the development of discontinuous innovative product jointly and reduce market risk.

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Analysis of Synergy Development System of New Energy Automobile Industry

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Abstract: This paper has made a research of the development of new energy automobile industry (NEAI) by means of synergetic theory. NEAI is regarded as a system, a performance function is proposed for analysis of the new energy automotive industry. At the same time, collaborative development models are used to analyze the synergetic relationships between new energy automobile industry and other subsystems. After the new energy automobile industry development system meet disturbance, how to dynamically adapt and adjust so as to keep the coordination development will require intensive study by means of the synergy mechanism.

Key words: New energy automobile industry; Synergetic theory; Synergetic development

1 Introduction

Wang et al. ^[1] analyzed the industrialization of new energy vehicles in the policy problems facing the technology research and the product standard infrastructure problems, and carried on the thorough system's research. Du et al. ^[2] developed an enterprise collaborative management system based on synergetic theory. This system is used to make an integration of enterprises, upstream and downstream resources so as to achieve comprehensive collaborative management of all kinds of resources in addition to the manufacturing, inside or outside the business. Liu et al. ^[3] analyzed on the status of China's new energy automotive industry collaborative innovation, and constructed a theoretical model of the new energy automotive industry collaborative innovation by means of the modular theory. Pan ^[4] illustrated the need for the development of new energy vehicles in China, and demonstrated a detailed analysis of the current domestic and foreign new energy vehicle development status quo, and clearly pointed out a few questions of the development of new energy vehicles, focuses on the development of new energy car policy recommendations.

Above mentioned methods are qualitative analytical methods. Therefore, in this paper, the concept of "functional structure" in ^[5] is introduced to quantify the collaborative relationship between new energy automotive industry and other corresponding industries.

2 Function Analysis of New-Energy Automobile Industry Development System

2.1 Basic evolution equation of the system based on synergetic

According to synergetic theory, basic evolution equation of the system is q and its different-order derivative equations. The general form of the equation is $q(X,t) = N(q(X,t), \nabla, \alpha, X, t, F)$. This equation has the following characteristics:

(1) It can be represented by the state variables. q , which is a function of both coordinates and time, is the representation of the system's state variables in the equation. Since synergetics is an enormous one, it consists of a great number of subsystems. The number of state variables used to describe behavior of the system can be huge. Given this, for simplicity, state variables are always used to represent this.

$$\mathbf{q}(X,t) = (q_1, q_2, \dots, q_n)$$

(2) All-order derivatives of state variables are related to state variables itself and as basic evolution equation of the system are nonlinear. They reflect the interaction of the internal different factors of system.

(3) Factors such as diffusion or wave transmission to be deal with is in a heterogeneous medium. Space derivative should be included in the basic equations, Hamiltonian operator and Laplace operator. Basic evolution equation using the form of partial differential equation:
 $\Delta = \partial^2 / \partial x^2 + \partial^2 / \partial y^2 + \partial^2 / \partial z^2$

The evolution behavior of the system can be studied by determining the dependence of state variables to space-time. From a mathematical point of view, the basic equation can be solved in principle, as long as the appropriate initial conditions or boundary are given.

2.2 Functional function of new-energy automobile industry system

The function of new-energy automobile industry system is reflected in four aspects: the status of new-energy automotive industry itself, the status of economic subsystem, the status of social subsystem, the status of ecological subsystem. According to the basic evolution equation of the system, the function of new-energy automobile industry system can be expressed as $TF = f(S_1, S_2, S_3, S_4)$, where S_1 is the status of new-energy automotive industry, S_2 is the status of ecological subsystem, S_3 is the status of social subsystem, S_4 is the status of ecological subsystem.

To improve the value of TF , intense research of $f()$ function must be done. However, since the specific form of $f()$ function is hard to proof in the tier of theory. But if we consider it from the specific meaning of $f()$ function, since the function of new-energy automobile industry system is continuously changing, it is always continuously differentiable although the speed of TF varies. We can get the expansion of TF as $TF = f(S_1, S_2, S_3, S_4)$, and then let $M^i, i = 3, 4, 5 \dots$ $\mathbf{I} = [1, 1, \dots, 1]$, a variation method is adopted for TF function $\delta TF = TF - f(S_1, S_2, S_3, S_4)_0 = \mathbf{I}(\mathbf{M}^1 + \mathbf{M}^2 + \dots)\mathbf{I}' = \Delta_1 + \Delta_2$

In the above formula, $\Delta_1 = \mathbf{I} \cdot \mathbf{M}^1 \cdot \mathbf{I}'$ means contribution of improvement of each of the four subsystems which is a direct role in contribution to δTF , $\Delta_2 = \mathbf{I} \cdot \mathbf{M}^2 \cdot \mathbf{I}'$ means contribution of subsystems after they coupling between every two subsystems which is a second role in contribution to δTF and $\mathbf{I} \mathbf{M}^i \mathbf{I}'$ is i th role in contribution to δTF . $\sum \mathbf{I} \mathbf{M}^i \mathbf{I}'$ means the sum of contributions of interaction of the i th items. In this way, the following situations may occur: Case1 $\Delta_1 > 0$, $\Delta_2 < 0$, $|\Delta_1| > |\Delta_2|$, $\delta TF > 0$; Case2 $\Delta_1 > 0$, $\Delta_2 < 0$, $|\Delta_1| < |\Delta_2|$, $\delta TF < 0$; Case3 $\Delta_1 > 0$, $\Delta_2 > 0$, $\delta TF > 0$; Case4 $\Delta_1 < 0$, $\Delta_2 < 0$, $|\Delta_1| > |\Delta_2|$, $\delta TF < 0$; Case5 $\Delta_1 < 0$, $\Delta_2 > 0$, $|\Delta_1| < |\Delta_2|$, $\delta TF > 0$; Case6 $\Delta_1 < 0$, $\Delta_2 < 0$, $\delta TF < 0$. The first two situations indicate that the status of subsystems improved while the overall function is destroyed. But case1 is a little better because it still does some contributions to the overall system as $|\Delta_1| - |\Delta_2| > 0$ while case2 is made a negative contribution as $|\Delta_1| - |\Delta_2| < 0$. Case3 is the best situation, the function of both the overall system and subsystems are improved. In Case4 and Case5, function of subsystems are weakened while improve the function of the overall system. Besides, in Case 5, improvement of the overall system's function is bigger than in Case4. Case6 is the worst one which the function of both subsystems and the overall system are destroyed.

On the basis of the above analysis, we can conclude that the improvement or attenuation of subsystems can lead to the decline of function of the overall system, but it can rise. The essence of improvement of the system's function is weather the changes of subsystems is collaborative or not, from which we can get the biggest value of Δ_1 and Δ_2 .

3 Synergy Analysis of New Energy Vehicles Industry Development System

According to the above analysis, the realization degrees of function of new-energy automobile system depend on the coordinative degree of its subsystems' changes. In other words, the essence of the development of new energy automotive industry is the process of coordination and co-evolution of new-energy automotive industry itself, economic subsystem, social subsystem and ecological subsystem. For example, linkage of the subsystem: $H = h(h_1(s_1), h_2(s_2), h_3(s_3), h_4(s_4))$, where, H is coordination of new-energy automotive development system, h is collaborative coefficient. Performance of collaborative of subsystem itself:

The new-energy automobile industry is of high-input industry needs substantial capital investment which is depend on the market risk of the high-tech industry and the character of high-tech's knowledge intensive and talent-intensive. As new-energy automobile industry is high-tech industry, fast in technology update speed, large in equipment investment, short in product life cycle, enterprise needs a large number of investments to achieve economic scale quickly and meet the needs of the development. Some of new-energy automobile industry is strict controlled by the government. Product development conditions and quality of products have a great affection on public security and new-energy automotive

safety. So the government has strict regulations in this industry. For example, we have strict statutes, regulations, quality specifications, and marketing approval in the development, production and sales. Industry regulations and industrial policies are important factors to influence the development of new energy automotive industry.

Effective organization and integration of industry resources and elements can lead to a good market performance using appropriate market behavior in a rational market structure. We can achieve the function of subsystems through adjusting the structure of the system. The industrial structure of new-energy automobile is made up of the ownership of productions of the new-energy automobile industry, industrial demand, factor supplies, trade and investment. Adjustment and optimization of the industrial structure can improve the function of subsystems and promote development of industry. The behavior subjects includes the core behavior subjects-enterprise within the industry and intermediate behavior subjects-government organizations, academic institutions and intermediary organizations related to corporate activities. The innovation ability of enterprise is built in industrial administrative level. Industrial development is the highest level and the end-result of enterprises development.

The coordination between the subsystem of new energy vehicles industry and economic subsystem bring satisfactory economic benefits, the new energy auto industry has a good economic benefit, which is the most direct power of the industrial development and the most basic requirements. Only when enterprises think that the industry brings them to the expected economic benefits, they will invest in the industry. The synergy between social subsystem and new energy vehicles industry is refers to the industry to meet the requirements of the local people, drive the development of relevant industries, solve the problem of employment, improve the level of income and life quality, improve the culture and health conditions, promote the balanced development of society, plays a positive role for social progress and development. Generally, direct economic benefits easy to appear, but from the perspective of the whole society, is more emphasis on social benefits. Figure 1 has shown us that the car sales enjoys an continuous increasing due to the growth of GDP which contribute a lot to the nation's need of cars.

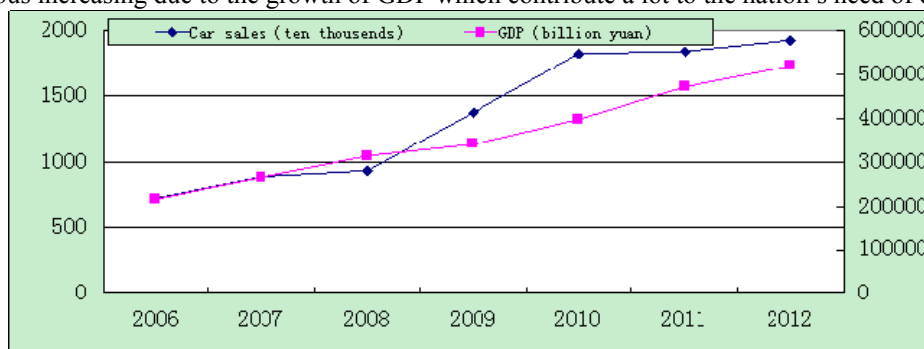


Figure 1 The Trend of Car Sales and China's GDP During 2006-2012

The coordination between new energy vehicles industry and ecology is refers to the industry sectors by means of the rational allocation of resources to achieve profits, and the continuous changes of the regional and national ecological environment policies to adjust their behavior, improve the utilization rate of resources, environmental protection measures, reduce waste emissions and pollution of the environment, improve the ecological environment of external influence. Which will significantly affects the costs and benefits. In the long run, industrial development of the external economy will gradually internalize so that synergy between new energy vehicles industry and ecology will reduce the external economy, which is conducive to the sustainable development of the industry. Overall coordination development of new energy automobile industry is that the developments of the new energy vehicles industry itself, and the economic, social and ecological subsystem are synergetic, such as reasonable composition, technological innovation, organizational innovation and market innovation synergy development, industrial core competitiveness are simultaneously improved, which conforms to the social needs, solves the employment problem, improves the living standards, maintains public health security, save resources, reduces pollution, and maintains the ecological balance. Synergies between each other can realize the sustainable development of new energy automotive industry. For example, Fig.2 shows car sales of EV and HEV in China during Nov.2011 to August 2012, from which we can see the prospects of HEV is better than EV. Because the general used of EV needs infrastructure construction such as charging stations which is mainly collaborative with EV products.

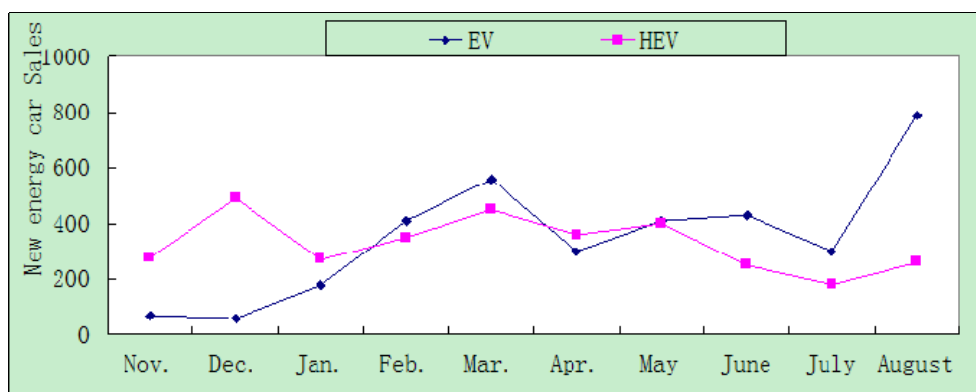


Figure 2 Car sales of EV and HEV in China During Nov.2011 to August 2012

4 Conclusions

The synergy theory was introduced into the research of new energy automobile industry development in this paper, function analysis and coordination analysis were also carried about new energy automobile industry development system, and put forward new energy automobile industry coordinated development pattern. But between the subsystems of new energy automobile industry development system, how to make the government guide ability, science and technology support ability, the market supply ability and the enterprise competition ability cooperate much more. Due to the openness, flow resistance, complexity of the system, the system always meet all kinds of interference, old collaborative state must be broken, system evaluate to a new state. After the new energy automobile industry development system meet disturbance, how to dynamically adapt and adjust so as to keep the coordination development will require intensive study by means of the synergy mechanism.

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Research on the Innovative Design of Tourism Products in Jingzhou of China

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Abstract: This paper mainly discusses the innovative design of tourism products in Jingzhou China. With probing into the current condition of the tourism products in Jingzhou, the paper adopts the SWOT approach to demonstrate the strengths, weaknesses, opportunities and threats of the innovative design of tourism products. Based on the exploration of the traditional artistic and cultural features in Jingzhou, the paper proposes the positioning strategies of innovative design on tourism products in Jingzhou, and determines its design concepts, major consumer groups and design style. With the combination of the macro and micro analysis, the paper provides a sensible insight into the innovative design of tourism products in Jingzhou.

Key words: Tourism product; Product innovation; Design orientation.

1 Introduction

Product innovation is the main focus and major difficulty in the development of modern enterprises and regions. Due to lack of rigorous and unified definition about product innovation, Organization for Economic Cooperation and Development (OECD) states that product innovation is a kind of technical adoption of products with the aim to provide advanced or better service for product consumers. Professor Fu Jiayi from Tsinghua University credits that the purpose of product innovation is to get new or improved products. Professor Hu Shuhua in Wuhan University of technology announces that product innovation has a very wide range of content which includes functional innovation, formal innovation and service innovation, corresponding to the stage of product planning, the stage of design and manufacturing, and the stage of market entry. From the above-mentioned opinions, product innovation is the focus of industrial enterprises and the target of regional product planning and design. Therefore, the thesis mainly deals with the innovation design of tourism products in Jingzhou.

As a famous historical and cultural city, as well as the birthplace of Chu culture, Jingzhou has abundant tourism resources. However, present tourism development in Jingzhou is still at an early stage. Among the great reasons, the most important one must be insufficient design and research on local tourism products. If full understanding about the unique characteristics of Jingzhou's tourism resources were done and deepening exploration of Jingzhou's tourism products were made, distinct and attractive design could be achieved to promote and facilitate the tourism and economic development in Jingzhou, and could assist Jingzhou in setting up and spreading city image.

2 Present Status of Tourism Products in Jingzhou

2.1 Status analysis

At present, Jingzhou's tourism products can be basically divided into the following categories:

Tourist handicrafts: Hu Zuo Niao Jia Drum (the drum with tiger-shape seat and bird-shape stand); Hu Zuo bird (A flying bird on the tiger-shape seat); Lying Deer; Jing Satin, etc. Being significant symbols of Chu culture and revealing great commemorative functions, the above handicrafts possess regional characteristics and distinctive Chu cultural features.

Tourist goods: Honghu feather fan.

Tourist food: Jiangling eight-treasure rice pudding (stewed glutinous rice with bean paste, lotus seeds, preserved fruit, etc.) Jiu Huang cake (traditional food in Jingzhou which gets the name due to beautiful color of chrysanthemum around the Double Ninth Festival); Sha Daoguan Chicken; Jingzhou fish cake, etc. This kind of tourist food, as the above mentioned, usually has a strong flavour, a long history, exquisite allusions, beautiful legends and certain reputations. They commonly possess elegant craft and beautiful packaging, novel style and distinctive commemorative and practical meanings.

However, Jingzhou's tourist commodities generally lack variety and high quality. Therefore, foreign and domestic tourists always find it difficult to purchase satisfying tourist goods in Jingzhou.

2.2 Existing problems in the exploration of tourism products in jingzhou

(1) The tourism commodities which can reflect regional characteristics, such as handicraft articles

or local special products are nearly under insufficient development or undeveloped.

(2) As far as the developed products concerned, a class of phenomena, such as going after the far-away at the expense of the near-at-hand, or a turtledove taking over the nest of a magpie, is of common occurrence, due to one-sided pursuit of profit.

(3) There is no systematic and programmed administration on the developed products. Moreover, the supply and marketing are sometimes disconnected.

(4) The quality and packaging of tourism commodities need to be further enhanced.

(5) Originality and elegant taste are required.

(6) Propaganda and notability are to be promoted.

3 SWOT Analysis Method in the Innovative Design of Tourist Commodities in Jingzhou

3.1 Analysis of strengths

Jingzhou's strengths lie in its profound cultural deposits. Jingzhou is one of the well-preserved ancient cities in China. It is located in the intersection of three kinds of culture which include Chu culture, the culture of Three Kingdoms and water culture. As multicultural convergent points attract more and more domestic and international attention and exploration, their significant value grows to be recognized by more and more people. In particular, the fusion of the novel *Romance of the Three Kingdoms* and the historical facts of the wars among Wei, Shu and Wu becomes the great wealth of Jingzhou. In addition, Jingzhou is rich in historical and cultural tourism resources. The strength activated by the integration of history and culture seems a powerful magnet.

The surrounding cities, such as Wuhan, Yichang, etc. are inferior to Jingzhou, as far as Jingzhou's abundant cultural connotation, deep Chu culture basis, and moving stories of the Three Kingdoms concerned.

3.2 Analysis of weaknesses

Firstly, the foundation for product development is weak. Concerning product type, Jingzhou has developed various tourism products for sightseeing, leisure, festivals or significant events. However, a transitional and promotional tourism product chain has yet to be formed. In Jingzhou, only static display is provided to promote the vast majority of tourism products. Tourists can only appreciate the illustration of scenic spots and listen to the explanation given by tour guides, but seldom participate in interactive activities, which contributes to low interest and low re-travel rate of tourists.

Secondly, tourism marketing does not reach the designated requirements. As a special industry, tourism needs effective promotion and marketing, because of the immovability of the tourist attractions.

3.3 Analysis of opportunities

Firstly, Hubei province sets the Three Kingdoms culture tourism as the key to cultivate and develop. In order to launch the Three Kingdoms culture tourism hotlines, great efforts are exerted in integrating resources and attracting extensive investment. Besides, the Three Kingdoms culture is hot recently throughout the country and around the world. As a key part of the Three Kingdoms culture, Jingzhou need to usher in this rare exploring opportunity and broad developing space.

Secondly, vigorous support is given by authorities to develop the tourist industry in Jingzhou. Without effective support of the government, it is impossible for a city to establish well-developed tourist economy. Moreover, it has already been confirmed that Jingzhou municipal party committee and municipal government has incorporated tourism development into the national economic and social development plan, and will support its development as the important pillar industry.

3.4 Analysis of threats

Firstly, regional tourism is now faced with great pressure of competition. Jingzhou is surrounded by Wuhan East Lake, the Three Gorges, Zhangjiajie, and Wudang Mountain. These scenic spots, having had high popularity and great reputation at home and abroad, all belong to state-level scenic spots or world cultural and natural heritages.

Secondly, as the tourist market becomes fully open, and more and more tourists from all over the world will gather in Jingzhou, tourism hardware and software facilities are confronted with great challenges. Six basic requirements of travel consumers from different countries and different regions are needed to satisfied, including food, housing, transportation, travel, shopping and entertainment. In actual reception activities, the obstacle of the language is another difficulty to overcome. A large number of high-caliber reception personnel are needed, such as tour guides, hotel service personnel, and even common residents of the city.

4 Design Strategy of Jingzhou's Tourism Product Innovation

In view of the present situation of tourism products in Jingzhou and the existing problems, the innovation design of Jingzhou's tourism products should lay great emphasis on the refinement of the traditional art and culture. At the same time, it should make sure the design orientation of the tourism products which involves design concept orientation, consumer groups orientation, and design style orientation.

4.1 Analysis of the traditional art and culture

First, Great emphasis is put on romantic and abstract forms in Jingzhou culture. Though there are some realistic and recurrent forms, Jingchu artistic forms are mainly romantic and abstract. They reject the faithful copy of objects and don't follow strict programs or rules. They reflect and display the diversity of objects by using metamorphic and exaggerated forms. For instance, Hu Zuo Niao Jia Drum (the drum with tiger-shape seat and bird-shape stand) has light-footed and graceful form

(Figure 1). It embodies a sense of music by adopting the symmetry structure of mortises and tenons. The body of the phoenix exhibits a smooth S curve and is full of a sense of movement. On the contrary, the tiger-shape seat's fruity modeling gives a stable and steady expression to the viewers.

Second, it has the beauty of decoration. Lacquer, one of the Jingchu arts, is the best artistic form to exhibit the beauty of ornament, because of its distinctive decorative patterns. In addition to the skillful use of C shape line to form a variety of continuous patterns, Jingchu lacquer often adapts the general pattern composition principles to designing different shapes flexibly. Besides, the beauty of Jingchu lacquer lies in its dynamic pattern expressed by decorative lines. For example, the pattern of painted lacquer coffin is made up of flexible curves of different length.

Third, it has spectacular color beauty. Jingchu lacquer mainly adopts two colors, red and black, occasionally supplemented by yellow, green, blue, white and so on. A kind of spectacular beauty appears by the bright contrast of the color of red and the color of black. Jingchu lacquer's colors not only emphasize the contrast of the color applied in large blocks, but also pay attention to the subtle color change and transition.

4.2 Design concept orientation

Tourism products work as the medium to transfer abundant information of the tour destinations. Well-made tourism products give visitors a pleasing feeling, and provide visitors' relatives and friends with a preliminary understanding and a good impression of the sightseeing places, because tourism products display regional concentrated culture essence. As for the design concept, Jingzhou tourism products should have four design concept orientations as follows.

First, local characteristics

Tourism products lack personality and follow the same pattern. Enterprises which produce and market tourism products do not have strong brand awareness, which provides opportunities for peddlers of lucrative short cuts to counterfeit. They don't implement effective management for their brand and scale operation of new products, so tourists always feel confused when purchasing. "Special" consciousness should be the directive principle for design. Tourism products should be "distinctive" and "unique". They should express ethnic characteristic and regional characteristics, and they should play a part in spreading knowledge, attracting interests, and conveying memorial concepts.

Second, high quality awareness

Although tourism products are small products, it never means they can be crudely made. Enterprises should have quality awareness when they design and produce tourism products. A crudely-made tourism product, even though it has great originality and innovation, will definitely damage the image of the city and will certainly affect sales.

Third, cultural connotation



Figure 1 Hu Zuo Niao Jia Drum

Culture is the connotation and soul of tourism, while tourism is the carrier and manifestation pattern of culture. For tourists, to travel is to experience the local customs. "Local" goods are more attractive to tourists because of different life style and concept contained in them. Therefore, it is essential to blend local culture with the design of tourism products.

Fourth, convenience

Tourism product design should also take the distinguishing features of tourism into consideration. Tourists often have to travel long distance and have to change vehicles frequently, so tourism products must be small, light, fast and flexible, and make sure they can be easily carried and well preserved.

4.3 Major consumer groups orientation

According to the analysis of the tourist market issued by Jingzhou City Tourism Bureau, Jingzhou Three Kingdoms culture theme park has great potentiality and good market prospects. Details are listed as follows:

1) On average, the total number of tourism reception in a year is more than 4,000,000.

2) After the theme park is built up, the tourist market can be subdivided into four parts:

One is the central area of Jingzhou City. If the total number of the residents in central area is 750,000 and only 5% of them come to visit the theme park each year, the tourists will be 40,000.

The second part is the potential tourists in the surrounding counties or cities which are under the authority of Jingzhou. If the total population of these counties and cities is 5,700,000 and 3% of them will visit the theme park, the tourists will be 170,000.

The third part is the transit visitors who will visit Three Gorges and nearby attractions. The tourists in this part will be 450,000.

The fourth part is the overseas market which mainly includes the tourists from Japan, Korea, Southeast Asia, Europe or the United States. The largest number of tourists amounts to 130,000.

Through data analysis, it is concluded that major source of tourists in Jingzhou should be from local and surrounding provinces and cities. Domestic tourists are in the majority, and the rest are foreign visitors or transit visitors.

In consideration of the long-term development of Jingzhou tourism, overseas visitors who have a certain economic ability and are interested in the Three Kingdoms culture should be the target consumer group of tourism products design.

4.4 Design styles orientation

The key of the innovative design of Jingzhou's tourism products is to reflect the Jingchu features. There is great connection between the unique cultural and natural environment in Chu places and the occurrence, development and evolution of Chu culture, which derives from the cultural exchange between the north and the south. Therefore, the style orientation of the innovative design of Jingzhou's tourism products can keep to the following principles.

Firstly, affective, and imaginative type

Secondly, unrestrained and bizarre type

Great attention is put on emotional expression and the development of free personality.

Thirdly, lively, romantic and free type

Fourthly, relaxed, exquisite and dynamic type

Advocate the beauty contained in the natural movement of life and think highly of delicate and deep feelings.

5 Conclusion

This study aims to reflect the cultural characteristics of Jingchu. Detailed analysis has been done to demonstrate the strengths, weaknesses, opportunities and threats in the exploration of tourism products in Jingzhou. Besides, the research probes into the artistic features of Jingchu culture and proposes rational positioning strategies for innovative design of Jingzhou's tourism products, including design concept positioning, target group positioning and design style positioning.

Based on the combination of macro and micro analyzing methods, this thesis provides insight for innovative design of tourism products in Jingzhou, and offers effective instruction to enhance the level of Jingzhou's tourism products, satisfy various demands of tourists from all walks of life, and highlight the distinctive characteristics of Jingzhou's products.

Synergy Innovation Pattern on New Energy Vehicles Industry

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Abstract: This paper analyzes China's new energy automotive industry collaborative innovation on the basis of a synergy theory, and then a modular theory is introduced to construct synergy innovation model to analyze the development strategy of new energy automotive industry. China's new energy automotive industry should improve standard system, cultivate leading enterprises, and increase investment on research and development. Moreover, the vehicle and parts enterprises should strengthen the capability of the collaborative innovation, so that the collaborative innovation capability of the whole industry chain can be promoted.

Key words: New energy vehicles; Development strategy; Synergetic development.

1 Introduction

With non-renewable resources dwindling, environmental pollution and other problems have become increasingly prominent, China's automobile industry bear Enormous pressure on energy saving, rationalization structure adjustment of automotive products become urgent to meet the needs of sustainable development of society. The white paper (China's Energy Policy) issued by the state council mentioned that our current dependence on foreign oil has reached 57%, while nitrogen oxides of the motor vehicle emissions have also been accounted for over 40% of total emissions, which cause to occur frequently some areas of regional of air pollution problems, resources and environmental problems to be solved. New energy vehicle development is an important measure to realize energy conservation and emission reduction in recent years, state and local government has issued a series of incentive policies to support the development of this emerging industry.

The demonstration project of 2009 "Ten City 1000 cars" to promote the application of new energy vehicle was started. The range of efforts to support and benefit administration should be subsequently implemented, deepened and expanded. 2010 in some pilot cities, "regarding the development of the private purchase of new energy vehicles subsidy pilot" program is implemented. In June 2012 the State Council issued the "energy saving and new energy automotive industry development plan (2012-2020)" is aimed at vigorously promoting, fostering and developing new energy automotive industry. At the same time, 2012 is a deadline year of " ten city thousand cars " policy, some cities have introduced policies to support and foster new energy vehicles, such as Shanghai, the former 20,000 new energy vehicles are free of charge on the card, Guangzhou issue a limited license for cars, however, provide the new energy Auto with an open green channel. Therefore, the development of new energy automotive industry has again been a huge boost. In this period of time, new energy auto, such as plug-in hybrid electric vehicle (PHEV), Pure electric vehicles, and Fuel cell vehicles, these new energy automobiles are obtained a very good development as Figure 1 and Figure 2.

At present, lots of literatures analyzed Current situation and strategy of Chinese new energy automobile industry, Zhang et al. ^[1] built a collaborative innovation model of new energy automotive industry chain. In this framework, the automobile companies play the role of helmsman industry, automobile industry, as whole, including systems integration design rules and new energy professional standard functional criteria of two parts. Jiu ^[2] expounded that a unified standard system of new energy vehicles is of strategic importance to improve the development of new energy automotive industry, therefore, the standardization and internationalization are promoted as soon as possible. Li ^[3] proposed that a leading enterprises should be prior cultivated, and then the development of a leading enterprise drives synchronous development of other corresponding enterprises. Liu et al. ^[4] analyzed on the status of China's new energy automotive industry collaborative innovation, and constructed a theoretical model of the new energy automotive industry collaborative innovation by means of the modular theory. On basis of the above mentioned analysis of the new energy automobile, in this paper, the concept of "Synergy Theory" in ^[5] is introduced to quantify the collaborative relationship between new energy automotive industry and other corresponding industries.

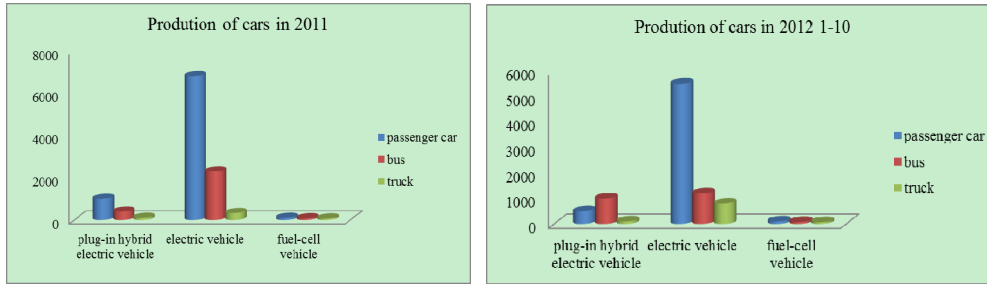
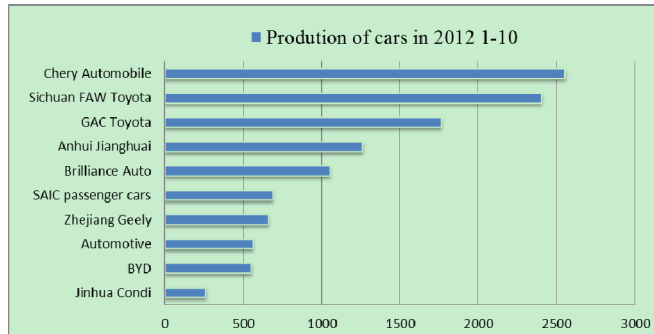


Figure 1 New energy automobile production situation



2 Modular Construction of New Energy Automotive Industry for Synergy Innovation

China’s new energy automotive industry has formed a “three vertical and three horizontal” development layout. From the perspective of the modular division of labor, specific modular forms includes a multi-function powertrain control system module, motor and control system module, battery and its management system module, the traditional components module sub-module. Among them, the complete vehicle enterprise is commonly regarded as helmsman module, in Fig.3. System Module is the new energy automotive industry chain is the most critical aspect is the new energy vehicles is different from conventional cars core areas. Automobile companies are core aspects of the whole industry chain are responsible for the power train control system and other modules for system integration, which is the ultimate vehicle control integration.

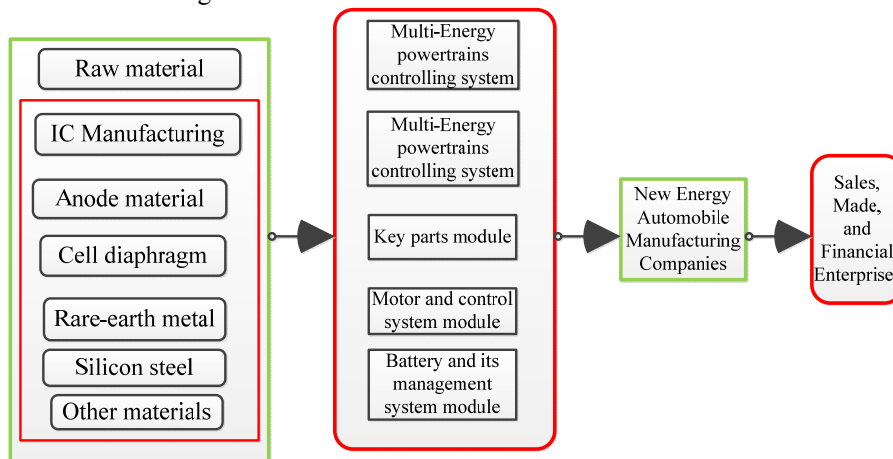


Figure 3 New energy vehicles industry structure under the condition of modular division

Development requirements of China’s new energy automotive industry for synergy innovation are mainly based on the following three aspects:

The first is that key technology bottlenecks require enterprises to strengthen the chain innovation and cooperation. New energy automotive industry each module is a technical chain, which has involved

a wide range of technical research and development, innovation difficult, technically closely linked features. Independent research and development of individual enterprises are often stretched to closely, jointly work from upstream to downstream enterprises. Consequently, development goals and technological breakthroughs can be obtained.

The second is that technical standards are unified so that collaborative and innovative ways can achieve the required standards formation of industry. lots of new energy vehicles companies currently exist at china, but the industry standards of new energy automobile are not unified, modular design deficiencies, each enterprise only seeking its maximal self interest, which lead to drastically contest with industry-standard, finally resulting in duplication of resources configuration. A competition of international standard of new energy vehicles can objectively require the unification of the domestic industry standards as soon as possible.

The third is that synergy innovation ways can facilitate collaborative research and development, cost reduction and efficiency improvement of industrial research. New energy automotive technology complex issues of individual enterprises to carry out technological innovation activities alone, research and development costs remain high. By industry collaborative innovation method, costs and risks of innovation in the industry chain effectively can diversify and enhance the efficiency of the overall innovation industry.

3 Synergy Innovation Analysis on China’s New Energy Automotive Industry

3.1 Industrial innovation synergy design elements

From synergy innovation decision to end of synergy innovation in the whole process, in accordance with principles of the order parameter of synergetics, in this paper, industry synergy innovation dimensions will be divided into innovation goals synergy, interest in equity arrangements synergy and relationship capital synergies. Among them, equity arrangements synergy and capital synergies can provide innovation goals synergy with contractual and non-contractual guarantees; innovation goals synergy show real value of equity arrangements synergy and relationship capital synergies. Since any one industry chain is closely related to the external environment, therefore, changes of the external environment synergy will have an impact on the effect of industry synergy innovation. Therefore, this paper, industry innovation synergy evaluation criteria includes four aspects: innovation goals synergy, equity arrangements synergy, relationship capital synergies and the external environment synergy. The specific form is listed in Table 1.

Table 1 Synergy Innovation Structure Factors of New Energy Automobile Industry

Objection Layer	Criterion Layer	Indicative Guideline
Synergy Innovation	Innovation objection synergy	Innovation Goal Congruence
		Innovation Goal Value
	Equity arrange synergy	Innovation investment and benefits to match
		Innovation income and risk matching
	Relation Capital synergy	Trust relationships among enterprises
		Synergy culture of industry innovation
	External Environment Synergy	market competition environment
		Policy environment of government

3.2 Sample data dealing with method

For the purpose of describing relationship of the mutual influence of different modular factors F_{ij} is introduced to depict the effect of f_j on f_i , however, no synergy degree of factor f_{ij} can be expressed as $f_{ij} = F_{ij}/e$, e is level number. No synergy matrix is used to measure the mutual effects of between systemic elements, k_{ij} denotes results of influence of the them, it can be expressed as $k_{ij} = (k_{iIdeal}^j - k_{iActual}^j) / k_{jIdeal}^i$, here, k_{iIdeal}^j is an ideal match value of the k_j expectation k_i , $k_{iActual}^j$ is an actual match value of the k_j expectation k_i , k_{jIdeal}^i is an ideal match value of k_i expectation k_j , $k_{jj} = (k_{jIdeal}^j - k_{jActual}^j) / k_{jIdeal}^j$, k_{jj}^j is an optimal match value of itself k_j ,

$k_{jActual}^j$ is actual match value of itself k_j . And then, the total no-synergy degree can be expressed as

$$m_{ij} = k_{ij} / \sum_{j=1}^n k_{ij}$$

. By means of the above mentioned expression and some given parameters from the

product enterprise, no synergy degree can be obtained. At given the corresponding parameters of some enterprises, no synergy degree, constraint degree, absolutely no synergy of industrial chain of various subsystems are show in Table 2.

Table 2 Each Subsystem No Synergy, Constraint Degree and Absolutely No Synergy

Evaluation index items	Innovation objection synergy	equity arrange synergy	relation capital synergy	external environment Synergy
No synergy	0.4890	0.4912	0.5260	0.5362
restraint degree	0.4720	.04652	0.5210	0.4910
Absolutely no synergy	0.8960	0.9028	0.9552	1.0102

4 Conclusions

Therefore, in the future course of development, China's new energy automotive industry should focus on accelerating the development of technical standards and upgrades, and strive to become the industry standard national and even international standards, furthermore, enhance innovation synergy targets, reversing no synergy of equity arrangements. Meanwhile, the favorable conditions and relevant industrial policies of state can be fully utilized to strengthen division of labor and collaboration of the various industrial chains so that the efficiency of industrial synergy innovations can be significantly improved.

(1)Improve the standard system; accelerate the process of internationalization of industry standards. Standard system and the promotion of new energy automotive industry is the most important development.

(2) Cultivate leading enterprises to joint development of industry leading enterprises.

(3)To increase R & D investment should strengthen technical cooperation between enterprises modular. New energy vehicle technology research and development with high investment, long cycle characteristics, high yield but also faces enormous technical risks.

(4) Government should be active involved in the industrial technology innovation and building a service platform.

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Digital Workflow of Standard Inspection Processes in Automotive Manufacturing

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Abstract: Standard inspection process is the standard of all the quality inspection activities. SIP establishes the validation station through the key position in manufacturing process, inspecting according to standardization, preventing defects escape, making the manufacturing process quality visualized, and providing the basis for improving the product quality continuously. Therefore, SIP station is the most basic quality information collection units. This paper describes quality standard for inspection and the standard inspection process in automotive manufacturing.

Key words: Standard inspection; Quality standard; Automotive manufacturing

1 Introduction

Inspection is, most generally, an organized examination or formal evaluation exercise. In engineering activities inspection involves the measurements, tests, and gauges applied to certain characteristics in regard to an object or activity. The results are usually compared to specified requirements and standards for determining whether the item or activity is in line with these targets^[1]. SIP station records the quality testing information in various manufacturing process, feedbacks timely, and ensure the next operation complete successfully. The information which SIP station is the only source of quality information in manufacturing process.

2 Quality Standard for Inspection

An inspection is defined as a process that evaluates, reviews and analyzes the programs and activities of providing information to managers for decision making. Inspections may be used to provide factual and analytical information, monitor compliance, measure performance, assess the efficiency and effectiveness of programs and operations. A key aspect of inspection quality control is adequate supervision. Supervision provides important judgment and an additional level of oversight to the work done by subordinate, often less experienced, staff. Supervisors should work with inspection team members to reach agreement as the work. The team also should have a clear understanding of the purpose of the inspection. The standard for inspection planning is intended to ensure that appropriate care is given to selecting inspection topics and preparing to conduct each inspection, to include coordinating inspection work and avoiding duplication^[2].

Inspections should be organized around the business enterprise; that is, the various inspectorates should ideally coordinate their activities to ensure that all relevant risks are properly addressed. Inspection management systems are increasingly common in developed economies, although most are implemented within single agencies and one agency often has several systems in place for several processes^[3].

The inspection organization needs to ensure that the personnel conducting an inspection collectively have knowledge, skills, abilities, and experience necessary for the required assignment. Inspection organizations should have a process for recruitment, hiring, continuous development, and evaluation of staff to assist the organization in maintaining a workforce that has adequate. The nature, extent, and formality of the process will depend on various factors, such as the size of the inspection organization, its work, and its structure^[4].

3 Quality Vision for Automotive Process

Quality assurance and high-precision position detection systems for component handling applications are essential items in the automation engineering. Intelligent vision systems provide the key to higher productivity, greater efficiency and total quality assurance. The required precision and speed are achieved during production, and offer significant potential for enhancing the efficiency of automotive manufacturing. Vision systems must deliver 100% availability and reliability. There also

have to be user friendly and suitable for industrial environments. It takes a great deal of basic know-how and applications expertise to develop these machine vision systems [5]. Machine vision systems make an indispensable contribution throughout production. This starts early in the process, for example during stacking and unshackling of body parts exiting a press, which are then moved to a rack. In generally there are so many processes to check quality of the product such as stacking the body parts, parting removal, assembly of mounted parts, application of adhesive, gap alignment and flush mounting, body cavity protection, paint finish protection, installation of door seal and multiple final inspection.

If the requirement is zero defect quality, then manufacturing must assure that defect will not be produced in the first place. This mean that the process must be capable of the producing the required quality consistently and with a close to zero defect as possible. Manufacturing must do all it can improve the process to achieve this and then monitor the process to make sure it remain under control [6]. The goal of automotive manufacturing is to produce zero-defect cars that are correctly assembled. After the cars have passed through all of the process inspection stations, a final check is made at the end of the line. Integrated machine vision identifies items such as wheels, rims and type labels, checks that they are complete and properly installed and performs a plausibility check based on the model information [7].

4 SIP Station in Production Line

In the SIP station, all the production shops are under the control of the quality department in every major process. The press shop uses the way of sampling inspection, and other shops use the way of full-inspection in order to ensure the quality of the previous process. Once it finds quality problems, it needs to be checked forward and backward until repeated problems which are no longer found and the products are regarded as eligible. All the workshops have two inspection lines (A and B). All the workshops have to check their process quality with SIP and the products pass the qualified inspection will be sent to the inspection line to finish the final process. This process procedure for the SIP station shows in the figure.1.

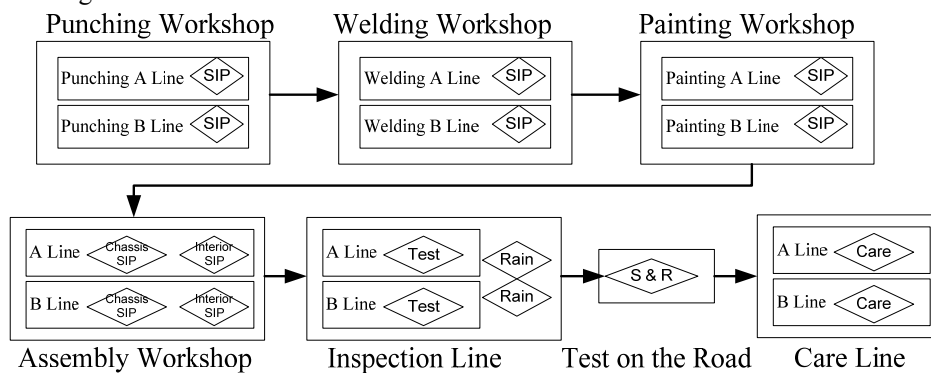


Figure 1 SIP Station in the Production Line

Table 1 Inspection Items of the SIP Station

Number of validation station	Name of validation station	Main item of inspection
V.S.#1	Press validation station	Surface quality of pressing
V.S.#2	Body validation station	Surface quality of body and other options
V.S.#3	Paint validation station	Surface quality of paint
V.S.#4	Internal decoration validation station of general assembly	Hardware of electrical appliance, harness, trim strip, matching of internal and external decoration, glass and so on
V.S.#5	General assembly chassis validation station	Hanging and fixing device, brake lines, inhaul cable, machine, harness, chassis layout, the strength of the door switch, scratch, and mechanical function
V.S.#6	General assembly validation station	Electrical system, engine compartment and clearance fit
V.S.#7	Inspection line validation station	Light, EFI system, emission, wheel alignment, rotation angle and braking force
V.S.#8	Inspection before receiving of customer	Function of electrical appliance and machine, missing parts and presentation quality

According to SIP process, SIP validation is mainly divided into eight stations. The following table shows all validation stations are checking their corresponding main item for each inspection.

5 SIP Information Flow Model

The major work of the SIP station include the inspection of the validation station, the feed forward and feedback of the quality information, the update of the information on the SIP message board, and the confirmation of repairing [8]. The inspectors of the validation station carry out the inspection according to the standardized operation sheet (SOS), recording defects, updating the SIP message board regularly, and forming the corresponding charts and reports about the quality defects according to the recorded data.

When validation station inspector finds quality problems, he will give an alarm according to SIP station, and fill in the relevant quality information in the “quality information board card” to feedback. When production shop receives the dark light signal of the validation station or “quality information board card”, the shop monitor will give feedback to the validation station to response to the problems immediately. Also the shop monitor will give respond the production line from quality validation station to check quality problem.

They should identify the vehicles or parts with quality problems and record problem breakpoint number. Then the shop monitor decide whether it can be repaired online according to the nature of problem. If it can be repaired online, they should immediately organize repairman to repair before quality validation station. If it cannot be repaired online, it should pass the quality validation station and repair offline. Inspector makes validation to the repaired vehicles or parts.

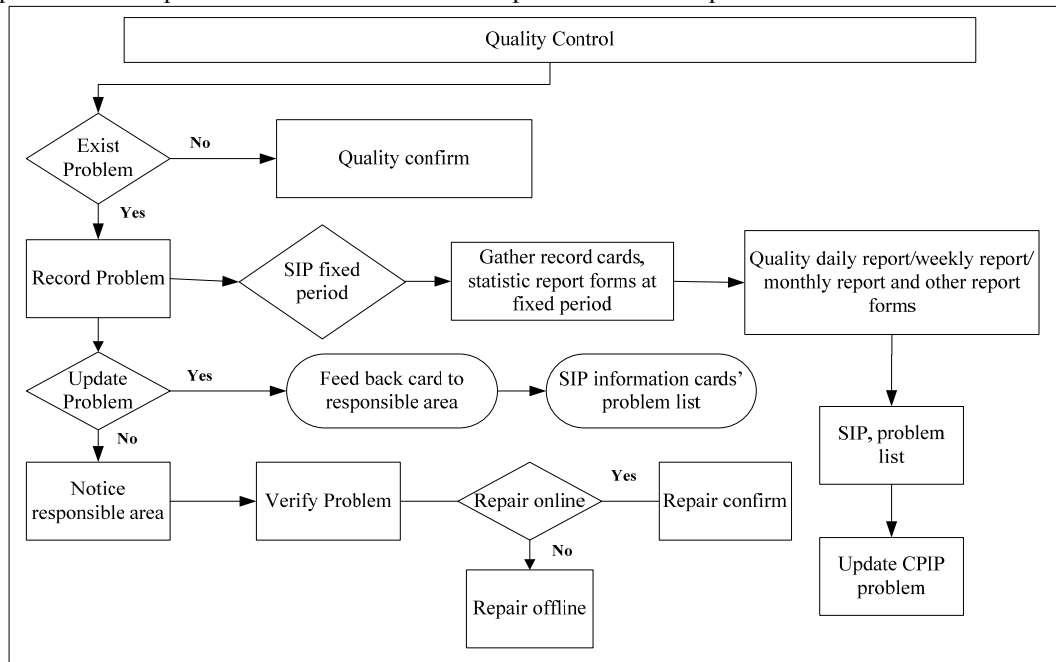


Figure 2 Standardized Inspection of SIP Station

Quality engineer analyses the data according to the inspection information recorded by the recording card, forming daily, weekly, monthly quality report, transferring information to each department. The quality daily report is divided into two parts: shop automobile type daily report and quality running daily report. Shop automobile type daily report mainly records daily quality information and analyzing the problems that affect first time quality, FTQ. Quality running daily report is summarizing and analyzing of quality information of this day, including running state and prior quality problem of FTQ. The quality weekly is divided into three parts: shop automobile type weekly report, SIP station internal weekly report and quality running weekly report. Shop automobile type weekly report is summarizing of quality problem of this week and recording the running state of FTQ and top-ten problems that affect FTQ. SIP station internal weekly report is summarizing of SIP stations quality data and communication among SIP stations. Quality running weekly report is summarizing the analyzing of quality information of this week including running state and prior quality problem of FTQ.

6 SIP Process Flow Model

SIP information flow is mainly divided into three parts: Data statistic and analysis, quality information alarm response and exchange of information of the validation station.

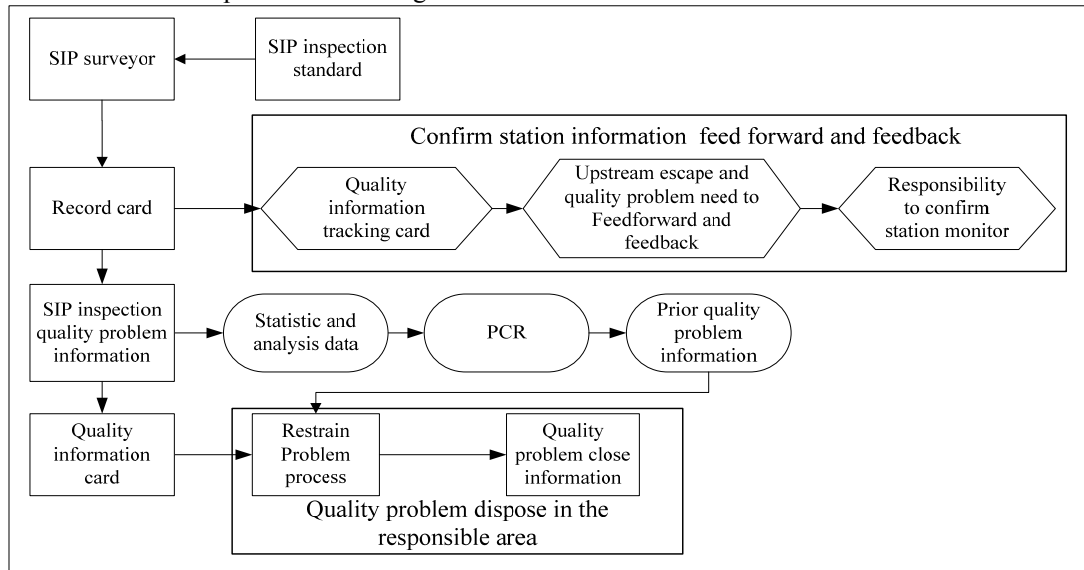


Figure 3 Process Flow in SIP Information

The surveyor gather information from SIP inspection standard station and record the problem information. The inspector from the record section analysis the problem record and send information to the confirm station to confirm quality information. SIP inspection station check some record problem according to statistic and analysis data and polymerase chain reaction PCR. Then quality engineer will send the result from that section to the quality problem dispose in the responsible area to finish checking quality information problem. The process flow of the SIP information is shown in Fig.3.

Specific to inspection work, inspectors should appropriately communicate information about the inspection process and the nature of the inspection to the various parties involved in the inspection to help them understand such things as the inspection objectives, time frames, data needs, and reporting. Inspectors should use their professional judgment and comply with their respective organization’s policies and procedures to determine the form, content, and frequency of communication. Communication should be appropriately documented in the associated inspection records.

7 Conclusions

The quality of work involve all departments, the efficiency of every post work and determines the products quality and service quality at the same time. However, it depends on the quality of people, including staff quality consciousness, responsibility and business level. The quality of information is the core of the entire company, quality management, corporate decision-making and quality improvement. Standard inspection process played a significant role in corporate decision making, information sharing and expert knowledge information platform. The standard inspection process can improve the quality of corporate governance in all aspects and product quality, accelerate the development of enterprises.

Acknowledgments

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Research on Independent Brand System Strategy of Special Vehicle*

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Abstract: The special vehicle plays an essential role in auto industry, and the independent brand of which dominates its future. This article focuses on the formation and building of independent brand system strategy of special vehicle. Firstly, it elaborates some basic concepts, then proposes two system strategy models according to the differences of brand number, brand hierarchy and brand portfolio in each brand system. Furthermore, the article analyzes the influencing factors in the process of independent brand system strategy implementation from three aspects.

Keyword: Special vehicle; Independent brand; Strategy; Influencing factor

1 Introduction

Special vehicle is one of the automobile products meeting special need in auto industry, which is equipped with special equipment and function, to undertake special transportation task or assignment. So it plays an important role in promoting the development of society and economy, as well as meeting the needs of people's living standard. Formulating independent brand strategy of special vehicle not only can make special vehicle industry stronger and bigger, but also can pull the regional economic rapid development. At present, there has formed rich theoretical achievements about brand strategy research by domestic and foreign scholars, such as single brand strategy and brand system strategy, and research has gone further to concentrate on brand equity and brand image. In summary, the research on vehicle independent brand has gradually risen by domestic scholars in recent years, but there are very few studies on special vehicle, not to mention special vehicle independent brand, which is nearly a blank.

2 Connotation of Special Vehicle Independent Brand

The concept of independent brand has two basic elements, one is independence, the other is brand. The former refers to full control and decisive power to brand from the perspective of intellectual property rights, meanwhile, the ability to make brand continuation effectively, which also means mastering the independent core technology to have the ability to decide and lead the future direction of the brand. Brand is a unique symbol or design, the difference between different brands lies in the comprehensive quality and feature of enterprise contained within the brand. So a brand is at least composed of four elements, namely graph, name, technology and commodity circulating in the market, especially for the last, represents the destination and carrier of other three.

Special vehicle independent brand is the collaborative product of such independent innovation ability, that are enterprise technology innovation, market innovation and management innovation. As the carrier of enterprise core competitiveness, special vehicle independent brand can make the enterprise gain market competitive advantage, as well as sustaining continuing growth.

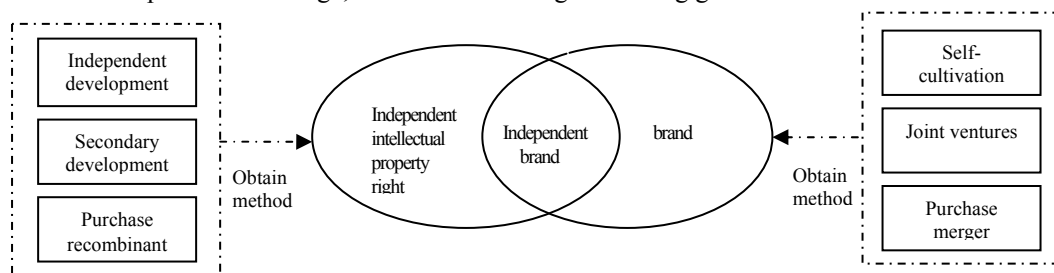


Figure 1 Independent Brand Component Model of Special Vehicle

3 Independent Brand System Strategy of Special Vehicle

From the viewpoint of system, independent brand system strategy implies that enterprise makes

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best use of the resultant force produced by common characteristics of all brands to provide classification for a variety of products, thus achieves the optimal allocation of brand resources. Different from the single brand strategy, the choice of brand system strategy focuses on the relationship structure selection, such as the role and status of each brand.

In general, there are different brand number, brand hierarchy and brand portfolio in each brand system, so with two methods to divide brand system strategy model from different perspectives.

3.1 Strategy model of product brand and enterprise brand

According to the role and function in the system, there are mainly three kinds of strategy model in product brand and enterprise brand, model particularly in the former or latter and mixed mode, respectively.

Named by enterprise name, enterprise brand can convey the corporate business philosophy, culture, value and attitude to consumers, so as to form connection between different industries and integrate brand resources. Strategy model dominated by enterprise brand refers to that the corporate brand (parent brand) occupies the absolutely leading position in the system, which can influence each sub-brand and product, acting as the flag brand. Therefore, the relationship between parent brand and sub-brand presents as leading and supporting.

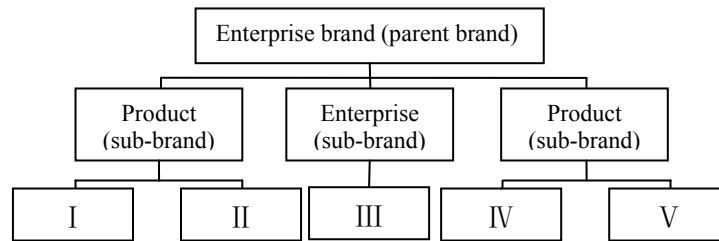


Figure 2 Figure of Strategy Model Dominated by Enterprise Brand

This model shows that enterprise brand can cover all products and services, which is mainly used in enterprise with less product variety and higher consumer homogeneity, so it's convenient for consumer cognition, and also conducive to form distinctive brand personality or strong brand influence, except for implementing strategic transformation.

In terms of product, product brand contains two meanings, one refers to the combination of product's name, term, sign, symbol, design and other fields, the other stands for a series of added value of products, including two aspects of interest point in function and psychology, such as that product can represent the utility, function, taste, form, price, convenience and service, etc, but that two have different connotations. Strategy model dominated by product brand means to give priority to product brand in the entire brand system, with complex correlation and interaction existing between different product brands.

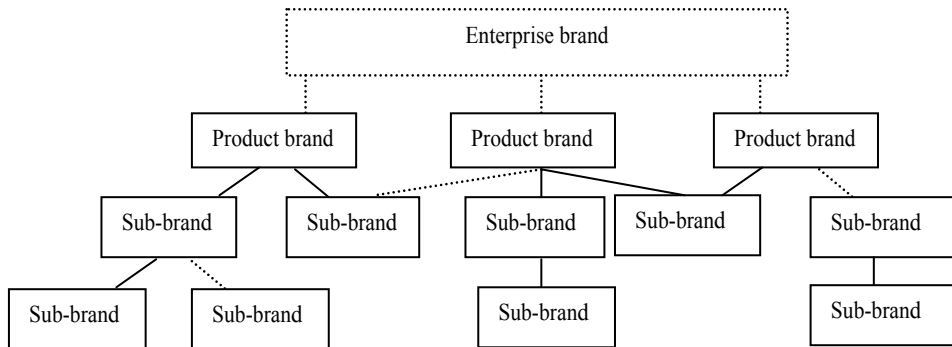


Figure 3 Figure of Strategy Model Dominated by Product Brand

The hybrid strategy pattern is mainly suitable for the more strong and complex enterprise with two major advantages. For one hand, it can give full play to the strong effect of corporate brand to make enterprise resources, corporate brand equity pass to each product brand through commanding its development and construction, which also provides protection for brand development. For the other hand, using this pattern can also seize the opportunity to expand some of the product brands rapidly to nurture the parent brand in turn, which promotes to form the benign interaction between them, and finally to realize the accumulation of intangible assets, as well as the sustained, rapid development of the

enterprise. However, the hybrid strategy requires huge fees, so must with a lot of continuable money as a guarantee.

3.2 Strategy model of core brand leading and multiple brands equal attention

According to the different proportion in the brand system, the brand system strategy model can also be divided into the core brand leading mode and multiple brands equal attention mode.

The core brand leading mode refers to that the special vehicle enterprise would focus on developing one or two brands in its brand system, with which to drive the development of other brands together. Such strategy can be used where brands have a wide difference and one or two brands stand more prominent at the same time. The choice of the core brand can either be the enterprise brand or the product brand, but both should occupy the absolute dominant position, and be far ahead of other brands in terms of brand influence or brand benefit. Moreover, it must play a significant role in the development trend and operation of the brand system.

The multiple brands equal attention mode is adapt to the special vehicle enterprise which chooses some brands with greater strength and more potential to form a pattern of multiple major brands covered and balanced development. But in the process of development, the special vehicle enterprise should pay attention to not overstating the number of brand, which may lead to the structure imbalance of brand system, as well as improper operation or management confusion.

4 Factors of Independent Brand System Strategy Implementation of Special Vehicle

It is a system engineering of long-term consideration on how to choose the suitable strategy mode for brand system of special vehicle enterprise. The enterprise should also more emphasis on the long-term development of brand system under the guarantee of current brand earnings. So there are three key factors influencing the strategic choice and implementation, the external environment, enterprise strength and brand features, respectively.

4.1 External environment

External environment conditions mainly include the economic environment, policy environment and industrial environment. The economic environment plays an important role on the brand development and brand awareness strengthening. Under different economic environments, the requirements for independent brand system strategy implementation are also different, which can ultimately boil down to the influence from social purchasing power to brand development strategy. But for special vehicle, due to its special purpose, the consumer groups are usually fixed and not primarily for individual, the impact is not significant on independent brand system strategy, such as the change of consumer income, spending or saving pattern, credit scale and so on. So when choosing the development mode, the enterprise should focus on competitor analysis, like that how many competitors exist, how the strength or resource advantage of the competitors are, what kind of brand strategy has been adopted, then to accurately positioning the market segments that can be developed or potential market that can be entered.

Government policy also stands significant position for independent brand system strategy. Especially for the special vehicle industry, it is very sensitive to the policy change, and a series of industry policy adjustment has made independent brands squealed. For example, the exit of preferential policies in purchasing vehicles in 2011, the implementation of the restrictions and the admittance of fuel consumption. At present, there is still too much restriction on private capital, so with lack of effective measures in independent research and development, as well as the independent brand construction.

Being the same as other industries, special vehicle industry would also go through four stages, namely formation, growth, maturity and decline. In different stages, consumer demand is different, as well as the competitive environment, not to mention the pattern of brand competition. Therefore, the emphasis and purpose of independent brand development strategy is also different, so with the different mode.

4.2 Enterprise strength

Enterprise strength conditions refer to the qualification enterprise owns when choosing independent brand development strategy, such as resource condition or cost effectiveness. The choosing strategy should be able to give full play to the enterprise's own resource advantage, optimize the resource allocation and reduce idle or waste resource, which should also be judged according to the actual situation of resource ability.

The management aim of enterprise is to obtain more profit and achieve better economic benefits.

The different choice of independent brand development strategy may lead to the different cost. So the special vehicle enterprise must make clear of the double degrees of brand system strategy under the target cost, which means the enterprise should consider the cost benefit ratio, and meanwhile follow the basic rule that income must be greater than cost.

In addition, the decision makers' own needs and values could also affect the choice of brand system strategy, not to mention the attitudes towards external environment or risk.

4.3 Brand features

The inherent characteristic of special vehicle independent brand mainly displays on its individuation, differentiation and distinctive culture. In the emotional benefits, individuation requires originality when designing the brand position and to win the consumer recognition. In the functional benefits, the character and function of brand must be consistent with the value and emotion of consumers.

Nowadays, in the special vehicle market, the phenomenon of product homogeneity is very serious, so the independent brand development strategy selected should be able to strengthen the externalization of the product intrinsic value, and make the differentiation characteristics of the brand clear and prominent in front of consumers to attract attention. In general, differentiation is mainly manifested in these fields of brand, such as the beauty, convenience, comfort, price, service or benefit, besides, for the special vehicle independent brand, the functions of safety, environmental protection and energy saving should also be considered seriously. In fact, an enterprise can't highlight its difference in many ways with its competitors, but it must stay ahead in a particular aspect to gain better market advantage from such difference.

The core value of the brand culture is the main part of the brand value, so the special vehicle enterprise should concern about the refining of national characteristics or distinct cultural elements to enhance the affinity of independent brand.

5 Conclusion

Special vehicle independent brand is the collaborative product of independent innovation ability, which decides the market competitiveness of enterprise. According to different perspectives, such as the position, function or proportion brand holds, the independent brand system strategy can be divided into two modes, the strategy model of product brand and enterprise brand, as well as the strategy model of core brand leading and multiple brands equal attention. At last, this article proposes that there are three key factors influencing the strategic choice and implementation, the external environment, enterprise strength and brand features, respectively.

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Study on the Influence of Science and Technology Innovation on International Service Outsourcing in Jilin Province of China*

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Abstract: This paper firstly analyzes the status of science technology innovation in Jilin Province of China. The input of science and technology innovation is increasing, the institutional guaranty is perfecting, the service system is growing, and the science and technology innovation ability in Jilin Province of China is rising while which is weak in China. Science and technology innovation can affect the ability to undertake international service outsourcing, the human resource quality, the upgrading of service outsourcing industry, the research and development ability in software, and the building of service outsourcing base. In order to accelerate the technology innovation ability of international service outsourcing in Jilin province of China, some measures should be taken to play fully the function of innovative department, to optimize the environment of science and technology innovation, and to perfect the mechanism of the science and technology innovation.

Key words: International service outsourcing; Science and technology innovation; Jilin Province of China

1 Introduction

With the development of the international service outsourcing, many scholars studied the relation of international service outsourcing and science and technology.

First, some scholars studied the effect of developing international service outsourcing on the technology progress of undertaking country. Yu Meici (2008), Zhang Wang (2010) discusses the technology spillover effects of international service outsourcing by developing a model of endogenous technical progress that increases varieties of intermediate inputs. Through the competitive equilibrium analysis, the conclusion is drawn that the technology spillover derived from outsourcing exerts positive effects on the technology growth of the undertaking country.

Second, some scholars studied the influence of developing international service outsourcing on the ability to technology innovation of the enterprises. Bartel (2001) thought the influence is negative. Bartel indicated that ITO can promote the technology transformation of the contracting-out party. However the invisible feature of service will increase the contradictions between the parties of service outsourcing and developing international service outsourcing can hinder the technology innovation of the enterprises. Cui Ping (2010) proved the influence is positive. Cui Ping used the panel data of China's IT listed companies to make an empirical analysis of the impact of undertaking service outsourcing on the technological innovation of enterprises. The result shows that the technological inputs and outputs of enterprises undertaking international outsourcing are significantly higher than those which have not undertaken.

Third, some scholars studied the influence of regional science and technology development on undertaking international service outsourcing. Miozz (2001) studied the international service from the view of technology with the method of "two-divisive doctrine", the result showed that with the development of national economic, technology progress can affect the technology intensive industry contract out their service activities. Zhu Shengyong and Li Wenxiu (2009) analyzed the influencing factors based on OECD Countries' input-output data. It shows that some factors play a positive role in service outsourcing and information technology is one of the factors.

According to studying the literates, it finds that a few scholars studied the influence of regional science and technology innovation on the development of international service outsourcing with the qualitative analysis. This paper studies the influence of science and technology innovative on the development of international service outsourcing in Jilin province of China.

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2 the Status of Science Technology Innovation in Jilin Province of China

2.1 The input of science and technology innovation is increasing

The persons engaged in R&D are the key element in the science and technology innovation. The persons in R&D department, the Full-time Equivalent of R&D personnel and the person with high educational background are increasing in Jilin province of China from 2009 to 2011(See table 1). Proportion of persons with high educational background to the whole R&D personnel is 70%, which shows the quality of the persons taking part in science and technology innovation is good.

The Intramural Expenditure for science and technology is rising in Jilin province of China from 2009 to 2011(See table 1). The rising tendency is obviously of expenditure on R&D and local government intramural expenditure, the expenditure on new products development is decreased in 2010 while increased remarkably in 2011. The plenty of Expenditure input build the economic guarantee to science and technology innovation.

Table 1 The Input of Science and Technology in Jilin Province of China

index	2009 year	2010 year	2011 year
R&D personnel (person)	56428	65380	70704
Full-time Equivalent of R&D personnel (man-years)	31457	34115	38904
Person with doctorate (person)	6725	6980	7794
Person with postgraduate degree (person)	13121	15101	16934
Person with undergraduate degree (person)	19444	21337	24892
Proportion of persons with high educational background to the whole R&D personnel (%)	69.6	66.4	70.2
Expenditure on R&D (10 000 yuan)	306229	355405	488723
Local Government Intramural Expenditure(million yuan)	18.98	19.12	21.18
Expenditure on New Products Development(10 000yuan)	331990	219809	709348

<China statistical yearbook> 2010~2011, <China statistical yearbook on science and technology 2012 >

2.2 The guarantee mechanism of science and technology innovation is perfecting

A series of laws and regulations are built in Jilin province of China such as <the decision of implement the strategy of developing science and education to promote province improvement >, <the decision on strengthening technology innovation to develop the high science and technology industry >, <the decision on deepening the reform of science and technology system>, <the regulation of promoting the development of science and technology enterprise>. The laws and regulations involve input of science and technology, intellectual property protection, the environment of science and technology innovation, which guarantee the science and technology innovation.

2.3 The service system of science and technology is rising

The service organizations are established in Jilin province of China to promote the development of science and technology innovation. The economic information centre of Jilin province of China was built in 1989, which is the first department to service the science and technology innovation. There are 12 technical markets, 38 productivity development centers and 14 technical incubators. All the service organizations reform a service system of science and technology innovation, and play an important role in the transformation of science and technology into productivity, communication of technical information and introducing technology. The service organizations have brought 1500 technical enterprises and 2000 technical items. The technical innovative center of high-tech zone in Changchun is awarded the excellent national innovative center.

2.4 The technology innovation ability is strengthening

Table 2 The Level of Technology Output in Jilin Province of China

	Transaction Value in Technical Market (10000yuan)	Number of Inventions Patents Application Granted (piece)	income of software technical service(10000yuan)
2007	174845	2855	288000
2008	196066	2983	347300
2009	197598	3275	455500
2010	188090	4343	480000
2011	262614	4920	530000

Transaction value in technical market, number of inventions patents application granted and income of software technical service is rising, which shows the technology innovation ability is strengthening in Jilin province of China (See table 2).

3 The Influence of Science and Technology Innovation on International Service Outsourcing in Jilin Province of China

3.1 The influence on the ability to undertake international service outsourcing

Service outsourcing industry is technology - intensive industry, especially the development of ITO and KPO demand more input of science and technology. Only those enterprises with high-technology can engage in the international service outsourcing. Science and technology innovation can promote the development of high-technology and strength the ability to undertake the international service outsourcing.

With the development of science and technology, the international service outsourcing undertaken is increasing in Jilin province of China. In 2011, the amount of contractual offshoring service outsourcing is 35696 thousand dollars, which increased 42.4% than 2010; the amount of implement is 22398 thousand dollars, which increased 38.3% than 2010. In 2012, the amount of offshoring service outsourcing more than which in 2011. In 2012, there are 59 enterprises to undertake the international service outsourcing in Jilin province of China.

3.2 The influence on human resource quality

International service outsourcing needs human resources with high quality. The technical talents with service technology, software technology and other technology related the industry is the key element in international service outsourcing, and the administrators can communicate effectively with the clients which compounded basic technology of service outsourcing, ability to forecasting industry development and ability to manage modern enterprises. The science and technology innovation is done by the human resource, and the process of science and technology innovation is also the process of increasing human resource technical ability. The result of science and technology innovation is grasped firstly by the human resource.

Science and technology innovation increases the quality of human resource in Jilin province of China. The patent and the technical thesis can evaluate the human resource quality. Table 2 shows that the patent in Jilin province of China is increasing year by year. Besides, 994 book and 27672 technical papers were published in 2009. The quantity of book publish in 2009 is 1.6 times which in 2000 and the quantity of papers publish in 2009 is 2.4 times which in 2000.

3.3 The influence on upgrading service outsourcing industry

International service outsourcing consists of information technology outsourcing (ITO), business process outsourcing (BPO) and knowledge process outsourcing (KPO). The degree of technology-intensive in BPO is higher than which in ITO and the degree of technology-intensive in KPO is higher than which in BPO. The science and technology innovation can improve the science and technology level of enterprise, so the enterprises with the ability to science and technology innovation can undertake not only ITO but also BPO and KPO.

With the science and technology innovation, the amount of BPO and KPO is increased gradually in Jilin province of China. The proportion of BPO to all the service outsourcing in Jilin province of China is 11% and the proportion of KPO is 7% in 2011. The proportion of BPO to all the service outsourcing in Jilin province of China is 12.5% and the proportion of KPO is 7.5% in 2012. The data show that service outsourcing industry in Jilin province of China is upgrading gradually.

3.4 The influence on research and development ability in software

There are 877 software enterprises and lots of scientific research institutions in Jilin province of China. All the scientific research departments pay more attention to science and technology innovation and increase the research and development ability in software. Jilin province of China developed and produced 800 software products, in which there are 511 products owning independent intellectual properties right. The technical level of some products is advanced in China. About 20 items such as the software managing population of Changchun Hongda enterprise, the software managing manufacturing enterprises of Qiming information technology co., LTD, the information security software of JIT Cinas, the management software of Jilin golden hawk enterprise, are awarded the good software in China, and the market share is better than other software.

3.5 The influence on building of service outsourcing base

Science and technology innovation is the important method of gaining persistent competitiveness for the enterprises of service outsourcing. The enterprises should operate on other enterprises so that they can use the overflowed technology and strengthen the ability to innovate. Industrial agglomeration becomes the important condition for science and technology innovation. More and more enterprises of service outsourcing settle down industrial park, which accelerate the development of service outsourcing base.

Changchun Software Park, Jilin Software Park and Sino – ROK Software Park in Yanji are the chief service outsourcing base in Jilin province of China. Changchun Software Park is biggest service outsourcing base in Jilin province of China. The products about Network security and information security such as biometric identification, electronic certification and distance education are developed principally in Changchun Software Park. Embedded software and application software are developed principally in Jilin Software Park. Jilin Software Park has established strategic partnership with some enterprises coming Japan, America and Europe. Sino – ROK Software Park in Yanji undertakes the software outsourcing and information outsourcing coming Japan and ROK. The amount of service outsourcing industry, number of enterprises and employees in service outsourcing industry increased. (See table 3)

Table 3 The Development of Service Outsourcing Industry in Changchun Software Park, Jilin Software Park and Sino – ROK Software Park in Yanji

index	Changchun city	Jilin city	Yanbian region
Executive amount of service outsourcing (100 million yuan)	12.9	0.37	0.36
Executive amount of offshoring service outsourcing (10 thousand dollar)	1756.8	79.0	404.0
Number of enterprise undertaking actually service outsourcing (item)	24	3	17
Person engaged in service outsourcing (person)	7483	265	1260

4 The Suggestion of Improving the Ability to Acience and Technology Innovation

4.1 The function of innovative department should be played fully

The science and technology innovative departments consist of enterprises, research organizations and universities. The enterprises should be the most principle innovative department, the research organizations and universities should take the paramilitary duties, and government should service for the science and technology innovation. The competitive of research organizations and universities in Jilin province of China is at the middle level in China. The enterprises undertaking international service outsourcing is lagged, the number and scale of the enterprise are small, and there is only one enterprise in Jilin province of China of the 100 software enterprise listed among China. The talent and expenditure input in science and technology innovation is small. The enterprises of service outsourcing should be supported by capital and policy. Anyway, the enterprises, research organizations and universities should pay more attention to their research and enhance their ability to science and technology innovation.

4.2 The environment of science and technology innovation should be optimized

The innovation is affected directly or indirectly by the environment of innovation. The information infrastructure such as internet and telecommunication network should be strengthened and which can support a credit information technical panel for science and technology innovation. Plenty of talent and capital should be input to service outsourcing industry, research instruments should be equipped, the communication and cooperation with different regional technical department, high-tech enterprise should be strengthened, which can build the technical environment for innovation. The software industry, the industrial chain which consists of telecommunication industry and Service industry should be developed and the Alliance of service outsourcing industry should be boosted, which can establish the industrial environment for innovation. Besides, government should manage good market environment for science and technology innovation.

4.3 The mechanism of the science and technology innovation should be perfected.

The technology innovative input mechanism should be formed which is comprised with governments, enterprises, financial institutions and members of the public. The capital should be raise by many channels, and human capital can be not only cultured at home but also introduced at abroad.

The transformation platform of technology achievement should be established and the transformation mechanism should be development with the influence of market mechanism. The stimulation mechanism should be development which consists of money and job award; the research organizations, universities and the research persons should be encourage transforming their research theories into products. The government should promote the cooperation of enterprise, research organizations and universities support the innovative enterprises to transform their research achievement to products with capital, credibility, and guarantee.

5 Conclusion

Science and technology innovation can affect the development of international service outsourcing by the way of affecting the ability to undertake international service outsourcing, the human resource quality, the upgrading of service outsourcing industry, the research and development ability in software, the building of service outsourcing base. It is essential for Jilin province of China to play fully the function of innovative department, to optimize the environment of science and technology innovation, and to perfect the mechanism of the science and technology innovation so that accelerate the science and technology innovation of international service outsourcing in Jilin province of China.

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Research on the Endogenetic Impetus of Strategic Emerging Industrial Cluster Development

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Abstract: The strategic emerging industrial cluster is an advanced industrial cluster. Its proximity is not separate from industrial cluster. On the contrary, it is rooted in the internal structure and interactions of the industrial cluster. In this paper, the proximity perspective is used, especially the perspective of how the geographical proximity affects the knowledge flow of the cluster, collective learning and innovation, thus promoting the development of the cluster. The endogenetic impetus mechanism of strategic emerging industrial cluster development endogenetic impetus is analyzed.

Key words: Strategic Emerging Industry; Industrial Cluster; Development Impetus

1 Introduction

Strategic emerging industry refers to the emerging industry that has the strategic significance on technological innovation, optimization and upgrading of industrial structure and the coordinated development of national economic and social stability. These industries has the characteristics of intensive innovation elements such as knowledge and technology, high investment risk with long period, internationalization development, and fierce international competition. Therefore, the formation and development of strategic emerging industrial cluster has its endogenetic impetus and mechanism. Its endogenetic impetus has the market self-organizational characteristics, which have direct and fundamental impact on the development and evolution of clusters. As the strategic emerging industrial cluster is an advanced industrial cluster, the industrial cluster impetus itself is the development impetus, especially in the area of specialized diversion of labor, transaction cost, external economies and economies of scale, etc. The proximity of strategic emerging industrial cluster is not separate from industrial cluster. On the contrary, it is rooted in the internal structure and interactions of the participants within the industrial cluster. The following is the research on how the geographical proximity affects the knowledge flow of the cluster, collective learning and innovation, thus promoting the development of the cluster with proximity perspective.

2 Meaning and Characteristics of Proximity

Proximity, also can be described as accessibility, refers to the same or similar characteristics of “group” among different subject in the same network. By summing up the relevant regional economic geography literature, proximity can be divided into three types: industrial proximity, social proximity and geographical proximity.

Among these three different types, geographical proximity concept is relatively simple, which means the proximity in space among the innovation subjects in regional economic. That will make sure of the smooth interaction between the innovation subjects despite the barrier of distance. According to Joseph Alois Schumpeter, innovation is not an isolated space, and it is not equally distributed in time and space, but tends to be cluster. Besides, innovation is not equally distributed in the entire economic system, but tends to be accumulated in some department. After Joseph Alois Schumpeter, lots of scholars proved that innovation activity, like other production activities, has a strong geographic aggregation characteristic.

The connotation of social proximity is relatively abundant, and it is easier to generate ambiguous. Social proximity is closely related to the concept of social embeddedness. Granovetter pointed out that behavior and instruction are closely linked. People’s economic behavior and social behavior are deeply embedded into the institutional environment and social culture. Social proximity mainly reflects the impact the economic behavior of innovation subjects have on the entire network structure and the interaction among individuals. Namely, social proximity can be divided into cultural proximity, institutional proximity and organizational proximity.

As to industrial proximity, it means that the subjects use the same or similar process, means of production to produce the identical production, which leads to horizontal competition. At the same time, the enterprises are at different stages of industrial chain, which leads to vertical cooperation.

Proximity can be divided into five types^[1], the meaning and characteristics of each type are shown in Table 1.

Table 1 Meaning and Characteristics of Each Type of Proximity

type of proximity		Main dimensions	Too little proximity	Too much proximity	Possible solution
Geographical proximity		distance	No spatial externality	Lack of geographical openness	Combine self-sowing with external relation
Social proximity	organization	control	opportunism	bureaucracy	Loose contact network
	cultural	trust (based on social relations)	opportunism	Lack of economic rationality	Combine embedness and market relation
	institution	trust (based on mutual institution)	opportunism	Locking and inertia	Check and balance of institutional system
Industrial proximity		Knowledge gap	misunderstanding	No source of innovation	Mutual knowledge base based on diversity and complimentary

3 Inherent Logic Between Geographical Proximity and Industrial Cluster

In the knowledge economy era, knowledge has replaced capital as the resource with the most strategic value and development potential. Knowledge is obtained by using innovation and is mastered by learning. Therefore, innovation has become the most important driving force in economic development, learning the most important approach. The development core of industrial cluster is whether it has lasting innovation capability within the cluster in this knowledge economy era. The innovation capability within the cluster has a close relation to the mutual learning of the participants as well as the flow of knowledge among all the subjects. In addition, geographical proximity has provided convenience for the participants to learn and exchange. Therefore, in the process of industrial cluster innovation, geographical proximity has a significant role. Neoinstitutional economics mentioned the concept of transaction cost, which has a significant meaning in explain the relation between cluster development and geographical proximity. Coase, the presenter of transaction cost theory, believed that enterprises gathering in a certain area have the geographical proximity, which provide convenience for exchanges and reduce information asymmetric and opportunism in transaction. In addition, it reduces the time and cost in seeking market information, as well as the transaction cost of two trading parties^[2].

In summary, we can see that there are inherent logic between geographical proximity and industrial cluster, as shown in Figure 1.

		enterprise	
		trustworthy	not trustworthy
customer	buy	100,100	50,150
	do not buy	0,0	0,0

Figure 1 Inherent Logic Between Geographical Proximity and Industrial Cluster

4 Mechanism of Geographical Proximity in Industrial Cluster

Geographical proximity, social proximity and industrial proximity are inseparable and interconnected. Generally speaking, the relational network will not work well in interaction and exchange with only one proximity. For example, knowledge network is an integration of several different proximity, and show different features. In practice, the knowledge network of mutual cooperation can be formed with only geographical proximity and social proximity, but no industrial proximity in a certain area. However, the network is relatively loose. If there is only geographical proximity and industrial proximity, but no social proximity, the network will have a shortage of interaction and innovation. If there are only industrial proximity and social proximity, but no geographical proximity (for example, international scientists association, etc), this kind of organizational

network has a strong leading value and professional characteristics. It is another form of interaction network. Unlike the three kinds of network above, strategic emerging industrial cluster contains geographical proximity, social proximity and industrial proximity at the same time. Its proximity is not separate from industrial cluster. On the contrary, it is rooted in the internal structure and behavior of the industrial cluster. Therefore, strategic emerging industrial cluster has more efficient knowledge exchange and learning network. Figure 2 shows how geographical proximity, social proximity and industrial proximity are combined to promote the new network of strategic emerging industrial cluster and how the dynamic competitive advantage is obtained from them.

At the same time, it must be noted that when the proximity exceeds a certain limit, it may bring some risks to industrial cluster, such as vulnerability, locking and fossilization, and then lead to the invalidation of impetus mechanism in the industrial cluster [3]. In addition, from the perspective of knowledge, excessive proximity may lead to assimilation of the subjects in the industrial cluster, while too little proximity will lead to difficulty exchange of knowledge. Knowledge, too new (not easy to take in or digest) or too old, is meaningless for innovation. So, in practice, we should not only attach importance to the integration with local culture in developing strategic emerging industrial cluster and keep local embeddedness, but also enhance compatibility and maintain openness in the cluster.

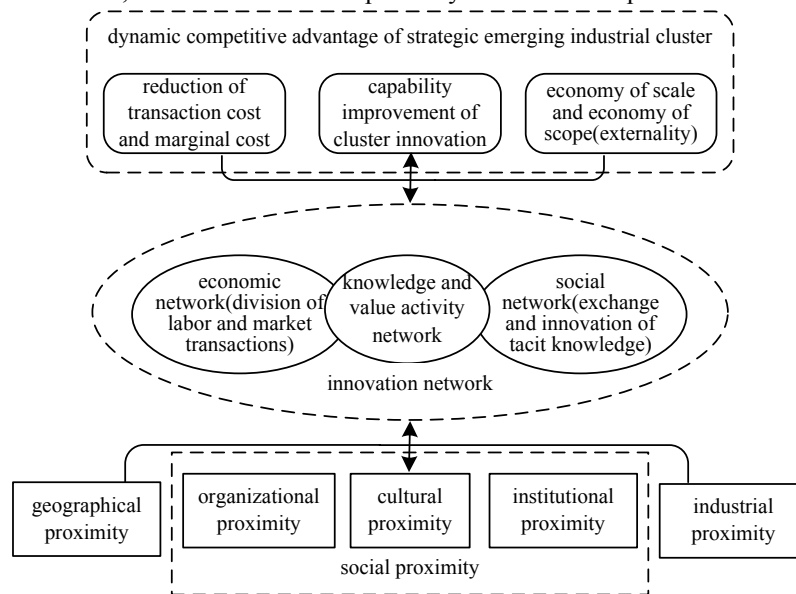


Figure 2 Industrial Cluster Innovation Advantage Constructed by the Combination of Proximity and Network Interaction

5 conclusion

Proximity refers to the same or similar characteristics of “group” among different subject in the same network. The formation and development of strategic emerging industrial cluster are accompanied by three formation of proximity: geographical proximity, social proximity and industrial proximity. Its proximity is not separate from industrial cluster. On the contrary, it is rooted in the internal structure and interactions of the industrial cluster. Therefore, strategic emerging industrial cluster has more efficient knowledge exchange and learning network. Geographical proximity, social proximity and industrial proximity are combined to be the internal impetus of new network of strategic emerging industrial cluster.

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Low Carbon Technology Innovation of Chinese Petrochemical Industry: Challenges, Strategy and Approaches*

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Abstract: In the context of global climate change and low carbon economy, Chinese petrochemical industry is under increasingly great pressure of CO₂ emission reduction and social responsibilities, and meanwhile, facing severe challenges including oil shortage, poor oil quality, and product standard upgrade. The paper argues that currently it is practical for the industry to focus on improving energy efficiency and clean energy structure, and integrated innovation should be the proper strategy choice for Chinese petrochemical industry. Some implementation approaches are discussed as followed: integrating current refining technology and low carbon technology, integrating innovative process and innovation organizations, and establishing strategic alliance of low carbon technology innovation. Besides, Clean Development Mechanism is suggested to be highlighted for international collaboration.

Key words: Petrochemical Industry; Low Carbon Technology; Technology Innovation; Integrated Innovation; Strategy Alliance

1 Introduction

Climate Change, especially global warming, has become one of the most significant environment and development challenges to human society in 21st century. IPCC (2007) argues that most of the global warming is the consequence of human activities with a probability of 90%, in particular from the greenhouse gases emissions due to the use of fossil fuels^[1]. Petrochemical industry refers to the industry of oil refining and the chemical enterprises with materials of oil and gas. As one of energy intensive industries, the productive process of petrochemical industry needs to consume lots of fossil energy. Combustion emission is the largest CO₂ emission source, and followed by process drain. There are some indexes that have significant impacts on CO₂ emissions, including the scale of petrochemical corporate, quality of crude oil, standard of refined oil products, depth of processing, and the level of equipment and management. Since the pressure of emission reduction on developed countries from Kyoto Protocol, international oil corporations, including BP, Shell, and Exxon Mobil, all pay great attention to CO₂ emission reduction, aiming to maintain their environmental protection responsibility and establish their green images by developing low-carbon technologies, and finally grasp the initiative of low carbon energy technology development in the future. Generally speaking, the development of low carbon technology mainly focus on four fields: improving energy and oil processing efficiency; exploiting renewable energy; developing CO₂ capture and storage technology (CCS); developing CO₂ isolation and utilization technology^[2-3].

Since current China is in the process of industrialization led by heavy chemical industry, the petrochemical industry plays key roles in supplying fundamental energy and chemical materials, and meanwhile, acts as both of major energy customer and CO₂ emission resource. In the context of global actions to deal with climate change, Chinese government has claimed the target of CO₂ emission reduction in economic and social development plans, of which the petrochemical industry has to undertake great pressure and responsibilities to reduce greenhouse gas emission and provide low-carbon energy on premise of ensuring national energy supply. Since technology innovation is proved as an effective method to alleviate and adapt climate change^[4], the paper selects the issue of low carbon technology innovation and discuss the strategy choices for Chinese petrochemical industry to deal with the dual pressure of CO₂ emission reduction and sustainable development. On the basis of analysis on the challenges and opportunities, the paper argues that Chinese petrochemical industry must be based on the national conditions, aim to integrate energy conservation, emission reduction and industries renovation through technology innovation, and finally coordinate the development of society, environment and industry.

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2 Challenges to Chinese Petrochemical Industry

2.1 Pressure of CO₂ emission reduction from governments and public

With rapid growth of economic aggregate, accompanying influences of low energy efficiency and constraints of energy structure, China's total amount of greenhouse gas emission increases rapidly, and Chinese government shoulders double pressure from both the deterioration of domestic ecological environment and the international standard of emission reduction. In 2009, China has promised that the CO₂ emission of per-unit GDP will fall by 40-45% in 2020 than 2005. Petroleum & Chemical Industry "Twelfth Five-Year Plan" Development Guide also claimed that the expenditure of energy and the gross of CO₂ emission for every 10 thousand RMB worth of industrial value added should drop by 15% in 2015 than "Eleventh Five-Year Plan". So it is the only way for petrochemical industry to transform the economic development mode and take the road of sustainable development by cutting down CO₂ emission and providing low-carbon energy.

2.2 Increasing foreign-trade dependence of crude oil

Comparing with petroleum refinery distillation capacity of 540 million tons per year and ethylene production capacity of 15.365 million tons per year in 2011, the gap of crude oil output is tremendous steady on about 200 million tons per year [5]. In 2012, China's crude oil imports reached up to 270 million tons, accounting for 56.4%, more than 50% of the security cordon. Domestic oil demand in 2020 is expected to 600 million tons and the foreign-trade dependence is going up to 68%, which is close to a high-risk line of 70%. Short supply and continuous high price of crude oil directly affect the stable operation and the sustainable development of the petroleum refining industry in China, and also constitute serious and urgent threats to national security. As a pressing issue of the petrochemical industry, it is instant to improve energy efficiency, which means to turn limited resources into energy and petrochemicals needed for economic development.

2.3 Inferior and Heavy Properties of Crude Oil

Petroleum, a non-renewable fossil energy, is harder to explore and develop around the world among which the output of accessible low-sulfur and light crude oil decreases constantly, while the proportion of sulfur-bearing and heavy crude increases by years [5]. Consequently, of scanty domestic petroleum resources, the scale of new exploitable hypotonic and extremely-viscous reserve is increasing, which leads to greater processing difficulty. To follow the trend, the refinery process and technology of petrochemical industry is required to be improved, and the deeper processing of raw materials and stronger adaptive capacity of equipments are also needed. However, with the growing complexity, severity, costing and energy consumption of oil refining, the intensity and gross of carbon emission will be inevitable to increase as a sequence.

2.4 Clean products for environmental protection

Because of enormous pressure of environment protection around the whole world, it's instant to reduce exhaust gas emission to prevent air pollution by upgrading qualities of products, including fuel oil. As a result of the frequent haze across China in recent years, with great tension from the government and the public, Environmental Protection Department regulated the environmental index and the clean ability of vehicle fuel oil more rigorously. That is to say, domestic gasoline and diesel standards keep going on, which will bring much more cost pressure to the petrochemical industry for its quality upgrading. It is worth noting that future development tendency will follow the Low Carbon Fuel Standard established by the US and Europe, concerning low carbon of clean fuel.

3 Strategic Analysis of Low Carbon Technology Innovation

3.1 Strategic framework of technology innovation

When Chinese petrochemical industry makes strategies of low carbon technology innovation, it must take all factors into consideration, including challenges from international and domestic economic society, key points and thoughts of national development and reform, and its own strategies and sustainable development, so as to offer energy security to maintain China's stable and fast economic growth. Meanwhile, Chinese petrochemical industry should pay close attention to major breakthroughs of industrial key generic technology and the disruptive innovation which bring deeply influence on the industry. Neither independent innovation nor simulating innovation matches the maturity, technology level and targets of the present Chinese petrochemical industry.

According to the change degree of product and process, the Research & Development Projects of any industry or enterprise can be divided into four types ^[6]: derivative projects, platform projects, breakthrough projects and research and advanced development projects, as shown Fig 1. Different types

of R&D project needs different strategy and investment. However, in long run, the industry must evaluate and develop current core technology, and plan radical innovation and foresight innovation for its sustainable development. Therefore, the paper suggests Chinese petrochemical industry to develop low carbon technology with an integrated and systemic view.

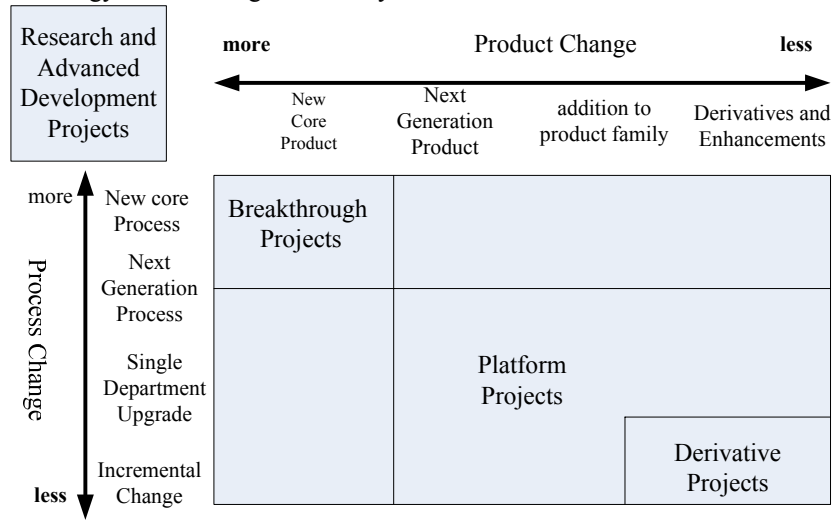


Figure 1 A Theoretical Framework of R&D Projects

3.2 Integrated innovation strategy of chinese petrochemical industry

As Tidd (2005) argues: If our mental models are limited, then our approach to managing is also likely to be limited [7]. Due to globalization and integrated trends of Science and technology, the former linear model, technology push or market pull, has not adapted to the changing context. So new models of innovation process, like coupled innovation, interactive innovation, and system & network innovation, have been introduced and applied in the past years [8]. This paper adopts integrated innovation to explain the strategy choice for Chinese petrochemical industry to develop low carbon technology.

The concept of integrated innovation is introduced by Macro Iansiti (1998) who developed former research of Freeman, Dosi, Nelson, and Rothwell [9]. Integrated innovation could be not only illustrated with a framework of technology integration, knowledge integration and organization integration, but also considered as a complex system concerning technology, knowledge, strategy and organization levels. Choosing and implementing the strategy of integrated innovation will help the petrochemical industry to achieve the match and integration of strategy, technology, knowledge, organization and process, deal with the competition of technology and market in the uncertain condition, strengthen the core competence of enterprises, consolidate and improve the sustainable competitive advantage of enterprises.

CO₂ emission reduction of the petrochemical industry is a global systems engineering which needs foreign advanced experiences for reference and overall consideration about technical feasibility, economic effectiveness and social responsibilities, and involves various aspects, such as producing, technology, technique, equipment, management, marketing, and so on. In order to choose a proper low-carbon technology development direction, one should compare emission reducing potential and advancement, and comprehensively analyze indexes of technology potential and economic maturity. In addition, it is equally important to control China's emissions of greenhouse gases and with an eye to provide sufficient green low-carbon source for the country.

4 Implementation Approaches of Integrated Innovation Strategy

4.1 Integrating current refining technology and low carbon technology

With the acceleration of industrialization and urbanization, China asks for more sufficient and cleaner energy and chemical materials. It is expected that the current energy structure dominated by fossil fuels won't take a fundamental change in following two decades, and the capacity of oil refining and ethylene production will increase steadily as well. That means in the context of the sustainable and stable growth of the national economy, CO₂ emission reduction of petrochemical industry does not mean to compress the scale of production, and developing low carbon technology can't exclude mainstream

refining technology. Low-carbon technology innovation should be based on current refining technology rather than one-sided emphasis on developing so-called pure low carbon technology. The idea insisting on the green and low-carbon principles of promoting Chinese refining industry is in consonant with China's national conditions [6]. Nowadays Chinese petrochemical industry should focus on the following: utilization technology for resource, upgrading technology of refined oil quality, environment-friendly refining technology, energy saving technology of refining process, and three wastes processing technology, and adaptive ability of poor crude process. Based on effective process innovation and product innovation, the petrochemical enterprises reduce the consumption of energy resources and materials in manufacturing process, adjust the structure of refined products, produce clean fuels with high standards and realize a minimum of unit-product carbon emission.

4.2 Integrating innovative process and innovation organizations

At present, the process of technology innovation shows with characteristics of integration, flexibility, network and parallel information processing, which requires transform former linear mode into parallel mode. Such a change emphasizes on communication and cooperation among the different departments of research, design, production, suppliers and customers. With regard to disruptive innovation, significant breakthrough innovation as well as industrial key generic technology oriented by low carbon, it's not far from enough to only depend on inner R&D of enterprise or cooperation between the upstream and downstream firms. In addition to the participation of enterprises, universities, research institutions, some other actors like government departments, financial organizations and sci-tech intermediaries, play a synergistic role through resource sharing and complementary advantages in the chain of technology innovation. As integrated innovation has characteristics of actor's diversification and networking, accompanying with the integration of knowledge and talent, the industry can have powerful technology accumulation and supporting condition in a relatively short period, reduce the barrier and cost of innovation, improve the efficiency of innovation and shorten the cycle from R&D to industrialization. In fact, integrated innovation has transcended pure technology innovation, and paid more attention on the integration of technology, strategy, organizational structure, and culture, which seeks to integrate knowledge and capability of enterprises for synergy innovation.

4.3 Establishing strategic alliance of low carbon technology innovation

Due to the development of low-carbon economy and the roles of petrochemical industry in CO₂ emission reduction, it is imperative to establish strategic alliances for low carbon technology innovation, in which petrochemical enterprises act as the main body of technology innovation and governments act as the initiator and main enabler of strategic alliance. Governments select partners including industrial leaders, important enterprises in the industrial chains, universities and research institutes with core technology, to set up the strategic alliance.

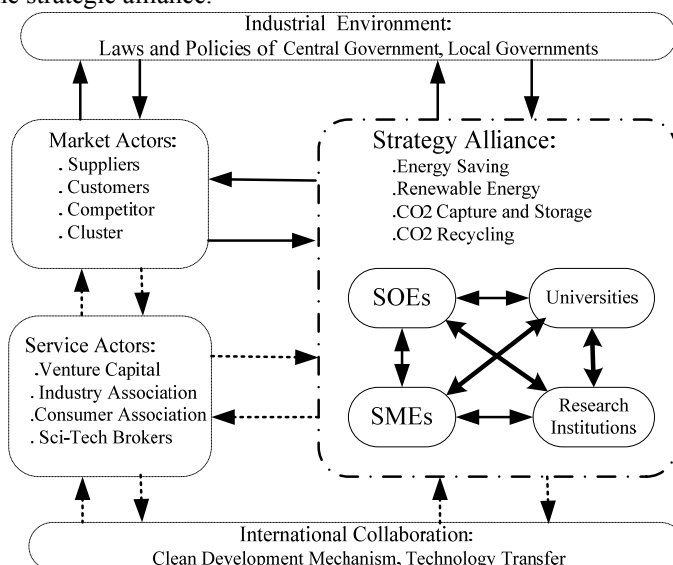


Figure 2 Strategic Alliance for Low Carbon Technology of Petrochemical Industry

The alliance seeks to explore a new cooperative mechanism based on low carbon development

strategy, focus on fundamental, strategic and prospective research and solve key and generic technologies concerning industrial sustainable development. Because of historical reasons, Chinese petrochemical industry shows multi-market patterns and takes strict measures to protect core technology from each other, so the government should act as the coordinator and guider to promote technology transfer. The important roles of strategy alliance are to enhance the competitiveness and key technology in the international market based on mastering accurately the trends of industry. Represented by the second-generation bio-fuels, a set of technologies in growing stage are appropriate for alliances to focus on, however, some technologies in the introductory stage, such as CCS, carbon chemistry engineering, could be foresight studies as strategic technology reserves for the future. Since the petrochemical industry is comparatively mature, so it is necessary to pay high attention to new energy field in case the disruptive innovation brings destructive effect on the present petrochemical industry.

5 Conclusions

Chinese government put forward innovation-driven strategy and highlights the path of independent innovation with Chinese characteristics, which aims at synergy innovation among original innovation, integrated innovation as well as import, digestion, absorption and re-innovation. To achieve the goals of low-carbon development, Chinese petrochemical industry must play coordinated roles of technology and system innovation to ensure the safety of energy, deal with climate change and promote economic development, and meanwhile, promote the whole social economy to transform into a high efficiency, low-energy and low-carbon mode. Some preferential policies to major technology reconstruction, such as energy conservation, CO₂ emission reduction, tax incentives and loan policies to CO₂ resource utilization, should greatly promote low carbon technology innovation. Meanwhile, the government funding should support forward-looking research with the help of universities and research institutes. By the ways of adjusting and upgrading industrial structure, business structure and product mix, it is expected to promote industrial concentration and resource utilization which is helpful to reduce CO₂ emission and improve international competition.

It is worth mentioning that Clean Development Mechanism (CDM), an innovative international cooperative mechanism for climate change between developed and developing countries, is proved as a win-win mechanism that can reduce the cost of emission reduction for developed countries and obtains advanced technology and additional funds for developing countries by launching project cooperation [10]. Chinese petrochemical industry should pay more attention to and make use of CDM so as to obtain advanced technologies of energy-saving, cogeneration and new energy through close cooperation with foreign oil corporations.

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Functions of Design Management on Upgrading Industrial Design in China

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Abstract: Design management, as one of the functional strategies, must serve the over-all strategy of the entire enterprise and it's a relatively new research field. Since late 1990s, researchers have laid great emphasis on design management. With large quantity of effective experiences gained in operating process, some theoretical systems have been initially formed. As a cross product of two disciplines, design management possesses extremely important practical significance in enterprise operating strategy, particularly in art industry. Industrial design in China starts relatively late, and there's an obvious gap between China and industrial design powerhouses, especially in innovation. This paper analyzes the current situation of China's industrial design, and mainly discusses the significance of design management in upgrading China's industrial design.

Key words: Design Management; China's Industrial Design; Design Levels; Cultural Creation

1 Introduction

As to the definition of design management, there are different understandings of design management from different perspectives. To sum up, a general understanding of design management can be summarized as follows: design management is a multidimensional management program that leads the overall cultural image of an enterprise. Design management is the realization of development strategies and implementation plans, and is a high unified carrier of the visual image and technology. It attaches development and design as the leader, properly adjusts the activities and organizations of the enterprises to create a more concrete manifestation belonging to its own, so as to gradually form the image of the enterprise technology and culture. Therefore, the design management is: "to carry out systematic and organized research and development management activities according to the needs of users. It is the management of a series of design strategies and activities that are carried out to effectively activate the designers' creative thinking, to converge the market's and the consumer's ideas in the new products, to affect and change people's lives in a more rational and more scientific way, and to maximize the profits of the enterprise" Design management is a method that makes design less complex. As one of the functional strategies, it must serve the over-all strategy of the entire enterprise. In China, the industrial design industry is relatively better developed in Beijing, Yangtze River Delta region with Shanghai being its representative and the Pearl River Delta region with Shenzhen being its representative. In recent years, the Chinese mainland enterprises have invested millions of dollars in product design, however, due to the economic, cultural, scientific and technological factors and the quality of employees, many enterprises lack scientific ideas of design management and they also haven't found any suitable and effective ways to improve enterprise structure, the allocation of the enterprise resources, the comprehensive strength and efficiency of the enterprise by utilizing design management.

This paper analyzes the major problems facing the industrial design in China and also puts forward a design idea that combines design management with industrial design, spontaneous design with rational design ideas, which is a fairly effective way for industrial design in China to achieve rapid advancement.

2 Analyses on Current Situation of Chinese Industrial Design

At present, the industrial design in our country generally, boasts a good momentum of development; some large enterprises have attached importance to industrial design and have made certain achievements. However, there still exist many problems in the field of product design, which mainly lie in the lack of design research yet fail to receive enough attention from most enterprises. At the same time, the enterprises' and consumers' understanding of the industrial design merely reside in beautifying the appearance. This kind of wrong understanding leads to the unessential position of industrial design in product development & design, and the lack of effective promotion and application of the existing results. Due to the small investment, the lack of design and response ability in developing new products and upgrading the old ones, and the training of design personnel couldn't catch up with development, the Chinese enterprises haven't digested the introduced advanced technology and products in the point

of design. Many domestic enterprises do not realize the importance of innovative design of products, and especially the industrial design is poorly understood by mainland enterprises, at the same time, they also do not have the enough understanding in the product brand; therefore they suffer a great loss. In the international market, huge profits belong to the independent brand enterprise. As the labor-intensive manufacturing, processing sectors, the technical content is low; the profit space is small, and easy to be replaced by peers, so they are in the bottom of the value chain curve. The value chain curve, namely the smile curve, is shown in Figure 1:

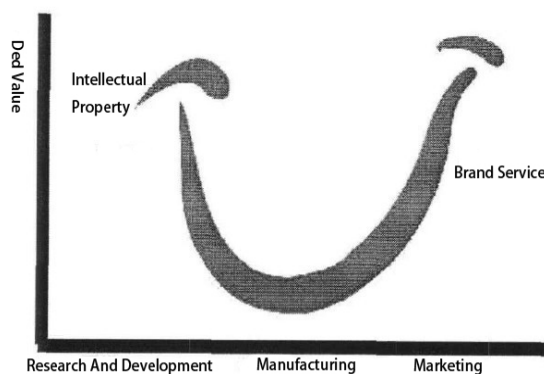


Figure 1

Simple and vulgar designs label products made in China as being poor in quality and low in price; too much imitation and introduction, and the determination to save trouble make Chinese enterprises lose the patience to cultivate the ability in product design innovation, therefore they cannot form their own brand awareness.

The industrial design of our country is still in the stage of a production-oriented industrial design; imitation and plagiarism are also still common problems. Theoretically, market research is the premise of industrial design; it can be obtained by qualitative analysis and quantitative analysis. But in actual operation, it's not easy to grasp the consumers' real expectations. Especially after joining the World Trade Organization, our enterprises have to face such problem as the patent infringement issues brought by plagiarism. In addition, our enterprises know little about the basic knowledge of intellectual property protection; and they don't pay attention to claims for the intellectual property rights, resulting in a large number of losses of intellectual property rights.

3 Functions of Design Management in Industrial Design

3.1 Key points in design management

In today's information and agile era, design management is more challenging and risky than ever before. It is a kind of thinking skill. The existing strategy center has been extended to a commercial tactical level beyond the boundaries of digital and technology. Under today's circumstance of products and technology, the corporate image and operational efficiency are quite significant to the enterprises' survival. Design management can maintain a continuous development of the enterprises and effectively improve the results of commercial activities. A company with a very popular image will win the trust of its supporters and groups. Thus you can see the key points of design management are: ① Design management is a normal, basic and specific assessment and application aiming at the institutions and business operations of business communities at all levels of the society; ② The aim of design management is to create a clear, unique and cohesive community image that can intensively display a company that is with continuous development prospects and enormous potential to create wealth, and is continuously advancing and developing; ③ To establish a community image and consolidate this image primarily based on its products, information and the attractiveness of its environmental media, and the image should especially be associated with its product design; ④ Make a rational use of resources in all aspects of the community, fully mobilize all the favorable factors of external organizations to accomplish any task of the company, and implement these intuitive actions to the end; ⑤ A logical, creative and flexible management plan has led to the continuous development of the design, the development of creative products, and economic feasibility; ⑥ The creation of a community's image is based on its culture, and it should subject to management and evaluation of the wide public; ⑦ Fully coordinate communication and interaction within the company as well as between companies and social

groups, to help companies to deal with the ever-changing realities in the market, and encourage companies to seek future success; ⑧ Design management is a new thing. It is constantly updating its tasks and requirements, it is investing in intangible assets that are valuable, meaningful, immeasurable for any company; ⑨ Design management advocates for the integration of design and management, and the expansion of the design to the whole community; ⑩ In the current high-tech conditions, the core of design management is to establish a virtual organization.

3.2 Functions of design management in industrial design

In terms of the current situation of Chinese industrial design, design management could play an important and practical role in design strategy, design process and design enforcement.

The purpose of design management is to identify and figure out which method could be adapted by design to contribute to the industry. Therefore, grasping the design opportunity is the first step to achieve that goal. As part of the product, the design is not purely a form of art, the fundamental goal of design is to be successful in the market and win profit for the enterprises. In recent years, there's a growing demand for clearly defined design hierarchy and using it as a prerequisite for industrial design.

Products are unlikely to meet the needs of all levels, nor for all people. The main task of design managers is to help enterprises to seek the balance between the design quality and cost. Different levels of consumers and enterprises pursue different goals. In the era of material scarcity, with lower living standards, consumers conducted sensible consumption behavior, and they preferred to cheap and durable products. In most areas of our country, consumers judge products only by considering whether they are "good" or "bad". Products which only meet the basic using value and also have low prices are easier for consumers to accept. Such a market is what we called the low-end market, by sacrificing some product elements to exchange low cost, thus providing a lower price. With the development of economy and the rising of living standards, the performance-to-price ratio becomes more complex and consumers have more requirements in products. Then consumers hope products can reflect their personality, social status and aesthetic taste, to meet their own psychological "pleasure".

Design does not exist independently, in terms of design strategy management, using the clearly defined design hierarchy will be conducive for industrial designers to improve the design aim and sense of hierarchy. In addition, with clearer target, it also will help to break through the bottleneck of industrial design innovation.

Design is a strict, cycle process that is full of questioning and innovation. The design process consists of a series of methods, with these methods we can solve the design project and design issues. The design process, derived from a series of trials and tests is made to solve the problems and it's applied by the designer or design team to customers' projects, thus could be constantly revised.

Cultural creation has a great importance on industrial design. It is self-evident. Looking for creation from the vast history of deep inspiration and the traditional culture is the main way for Chinese industrial design to embark on a road of cultural creation.

The idea and purpose are under the influence of national culture, and are also connected with industrial development level of each country and people's consumption consciousness. In order to design the product that has a certain international competitiveness and will be popular in the market, conducting the national culture innovation is an excellent method. With the deepening of economic globalization and integration, there's a growing awareness of people that a design with an integration of national culture is more competitive the global market. "Regression" and the integration of national culture and characteristics of times have become a trend in Chinese industrial design. The traditional elements have been blended into more and more product designs, such as the "Chinese knot", "Red China" and the auspicious clouds pattern, these symbols have strong ethnic characteristics and have been widely used in design industry, all of these unique Chinese styles have found favor with the designing world. This kind of design with strong ethnic style and cultural features is warmly welcomed in the market.

During design process, the designers often lay great emphasis on cultural creation; however, they always lack perfect management in design process and implementation. Design process and management implementation could effectively promote the design elements essential to be reflected in the final design work in the design, so as to ensure the quality of work.

3.3 Product design management within network technology

Driven by high and new technology, the application of network technology in design management is more outstanding. Under unified control of the product design and management center, various factors in CAID are interrelated through the network to form a complex and orderly organic entirety, which is a typical pattern in concurrent design. It is under such a condition of group network that the independence

of each department in the traditional design was able to be broken completely, and the whole design and manufacturing system can stay in an orderly condition with unified control and collaborative work. Only through collaborated work of every department, can the enterprises adapt to customers' changing demands and respond quickly to the market so that to develop the marketable products as soon as possible.

Under such background, the "virtual product development" (VPD) came into being. VPD is based on the integrated products and data management. The benefit of this integration is that all staff in the process of product development can quickly re-use and restore the required information. The aim of VPD is to replace as much physical prototype testing as possible, and to reduce the wasted time of using physical prototype testing. The more the engineers get in computers, the better, and they can design more products with a faster speed and higher quality. The essential process of product design and development is to monitor and predict the functionality, performance, workability and other possible problems of products through computer simulation models, in order to improve product forecasting and decision-making level, and make the product development work out of the narrow world relying on experience into a new stage of all-round forecasting. And through the world network environment - Internet, various manufacturers can quickly carry out technical cooperation, share each other's core resources, and quickly design and produce products with high quality and low cost to meet the market's demand, and to turn agile manufacturing into reality.

4 Conclusion

In the present competition situation, design management is not only a kind of integration and promotion of design resources, more importantly, as a method of management, it should raise decision-making level, and it has very important significance in the art industry. In industrial design, through rigorous and normative management, design management can enhance the designer's pertinence and sense of hierarchy in the design process, promoting the reflection of essential elements in the design works. Therefore, the rational use of design management has the extremely important practical significance in upgrading the Chinese industrial design.

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A Study on the Growth of Emerging Economies and Their National Income Distribution

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Abstract: The last decade has presented a new global economic scenario lead by emerging markets. BRICS countries (comprised by Brazil, Russia, India, China and South Africa) have been at the forefront in this phenomenon. During these years, the real Gross Domestic Product (GDP) growth of the world (annual percent change - A% c) averages 3,83. It is worth mentioning that the above referenced countries reached 6,01 (157,02% more); and Advanced Economies - not yet recovered since the last financial crisis - reached 1,6 (47,78%). Meanwhile, different measuring models have found that in the world, just the top 20% of the population controls over 70% of the global revenue. These economies have been growing as well. The importance of this investigation is answering the questions: Are they reversing this lack of equality trend? And, Would be relevant to add equity in the development agenda?. This paper offers an analysis of these points and studies them as a strategy for sustainability and continuous growth.

Key words: BRICS countries growth; National income distribution; Equity in the development agenda.

1 Introduction

BRICS Countries are leading the growth of the economy in the world, and have done so for over 10 years. The International Monetary Fund (IMF) projected that from 2013 to 2017 it will maintain its growth at least 26% above World Growth GDP. Note: GDP, will be the measure utilized in this paper when referring to growing economies. This information comes from the IMF data base and calculations made by the author.

Income distribution refers to how a nation’s total GDP is distributed among its population (Sullivan and Sheffrin, 2003). This distribution is typically unequal, and becomes an issue which has been avoided for many years. In 2004, this trend changed when the International Labor Organization (ILO) published: “A Fair Globalization.” After this occurred, other major development-related institutions followed suit and began posting about inequality as well. Currently, there is a unanimous concern in international institutions about that issue and it has become clear that the issue of inequality must be incorporated in discussions about development.

This paper analyzes: (i) Distribution of income or consumption per country, (ii) Gini Index and, (iii) Understanding the background of these countries, this research also incorporates information regarding poverty per country. All the data comes from the World Bank and the calculations made by the author. This paper also discusses the negative consequences of rising inequality and defines the importance of adding equity in the development agenda, as a strategy for sustainability and long-term growth.

2 Growth in BRICS Countries

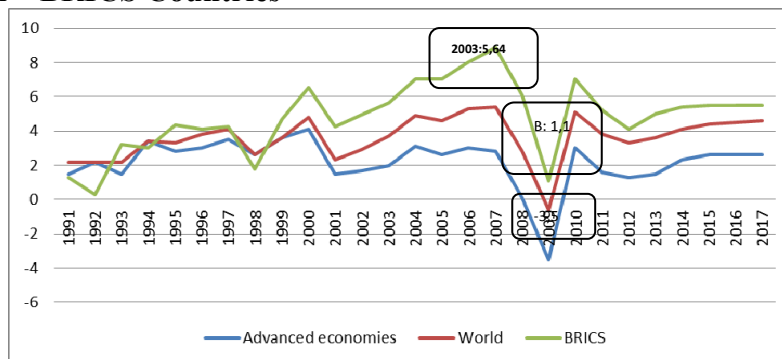


Figure 1 Real GDP Growth (Annual percent change) 1991 to 2017

The Figure 1, shows the argument that as introduces the research and salient facts may be

mentioned; (i) 2003 and 2004, emerging economies (BRICS) began a significant consolidated period of growth (and were already doing so), during these two years, their GDP increased from 5,64 to 7,04 (ii) 2008 (September), the outbreak of the global crisis obviously affects everyone. BRICS fell in 2009 to 1,1 (fall but remain in positive), the world economy: -0,6 and Developing Economies: -3,5 (iii) After the global crisis, very slow recovery in developed economies and promising trend showing the BRICS economies.

This graph (figure 1), also evidenced the situation and positioning: BRICS, Advanced Economies and World, from 1991 (since all these countries have data) to 2017, from 2013 to 2017 are projections.

Considering information about the last 10 years (2003- 2012), the position and growth average for each BRICS country (including the world as well) is: **China: 10,45%, India: 7,76%, Russia: 4,73%, world: 3,83%, Brazil: 3,67% and South Africa: 3,46%**. All of them have correlated well with the “world” result, except China, with a strong first place position, followed by India (See Figure 2).

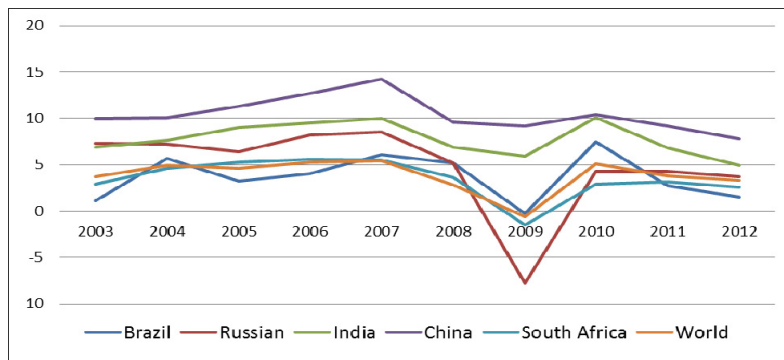


Figure 2 Real GDP Growth BRICS Countries (Annual Percent Change) 2003- 2012

However, fast growth in economies with a background of instability might not be sustainable. From a statistical point of view, when deciding whether measurements agree with a theoretical prediction, the standard deviation of those measurements is of crucial importance: if the mean of the measurements is too far away from the prediction, then the theory being tested probably needs to be revised. (DeVore, 2005).

The following comparison was also done for these economies. (See Figure 3):

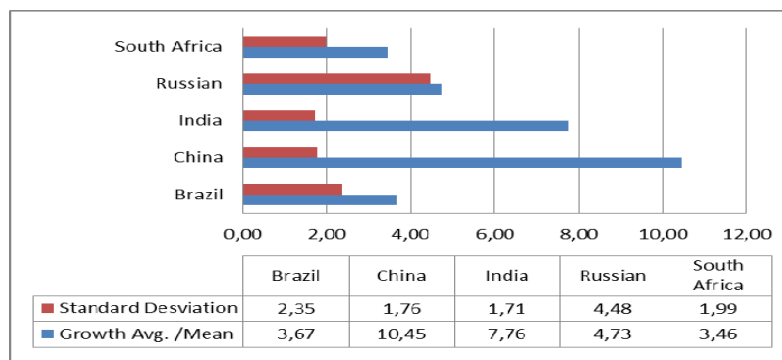


Figure 3 Market Instability (Mean Vs. Standard Deviation) 2003- 2012

From these results it can be determined which country seems to have higher or lower levels of uncertainty. From higher to lower, the order is the following China and India (far away from the rest), then, South Africa, Brazil, and Russia. Almost the same positioning reached in its growth.

The new global economic scenario has changed phenomenally in the last decades. Securing a sustained growth in the coming years will be crucial in reducing the level of uncertainty for these countries; therefore, it becomes necessary to implement adequate strategies.

3 National Income Distribution

How is income distributed worldwide? (Ortiz and Cummins, 2011). We inhabit a planet in which the top 20% of the population controls over 70% of global revenue. What about BRICS countries?

The following is an analysis for each country: (i) distribution of income, reflected in the percentage of shares of income or consumption accruing to portions of the population and ranked by levels (deciles in this paper): highest (more income); lowest (less or no income). (ii) The Gini Index-Lorenz Curve, which represents the distribution of income within a community, plotted with a Lorenz curve, where “0” means perfect equality, and “100” implies perfect inequality (World Bank, 2013). (iii) Poverty; considering the percentage of the population living on less than \$2,00 (which covers the \$1,25 a day at 2005 international prices).

The figure 4 make more completed the analysis, showing graphically the main variables per country during: 1994 -2002, 2003 – 2012 (last decade), and the average. Also, as a visual reminder contrasted with its GDP growth average analyzed before (2003-2012). The data includes all available years, from 1994 to the last available year (each country has different years of information availability).

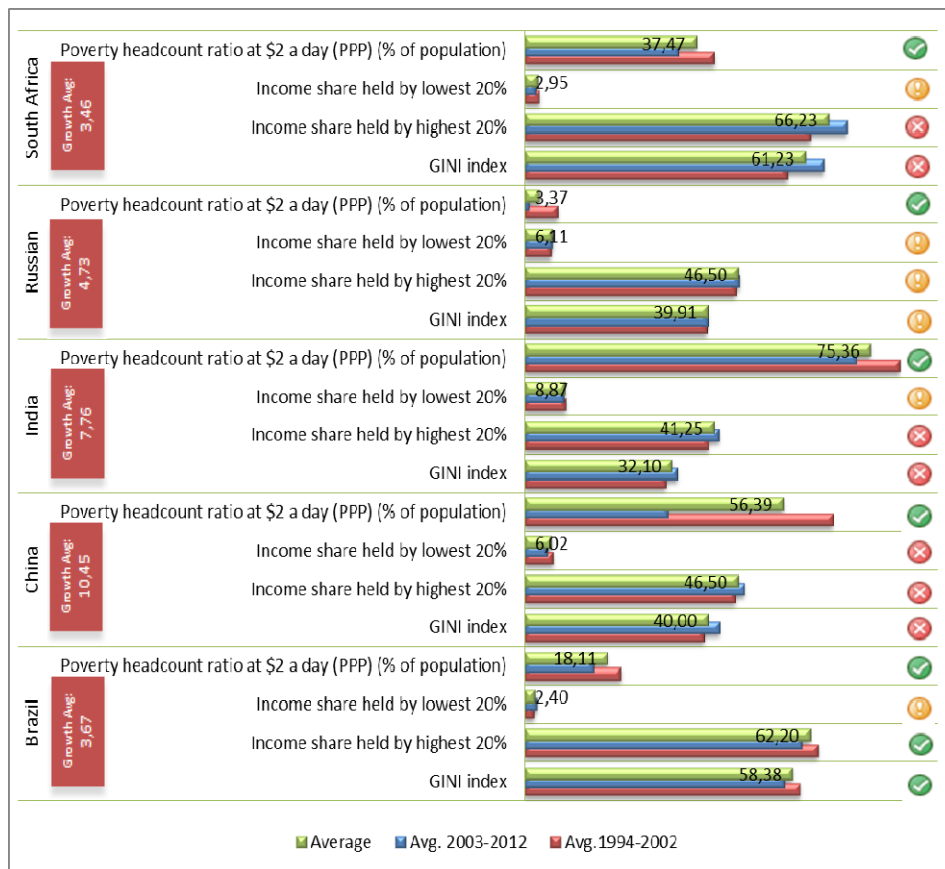


Figure 4 Comparison Between BRICS: Growth / Income Distribution / Gini / Poverty (1994- 2012 or Years Available)

3.1 Brazil: The only South American member of the Group, with a population of 196,7 million in 2011 (last year published). There has been some improvement in the incomes distribution, as well, growth of the economy. Considering data from 1990 to 2009; the 20% highest of the population (people with more incomes) controlled: Averages 62,24% of incomes while 20% lowest just 2,38%. The highest deciles (10-20%) have been going down and the lowest (20%) have been going slightly up. More people are joining the middle class. Concerning poverty, it has consistently improved, however moderately; nevertheless, by 2009 they have 10.8% of its population living in poverty. That means a total of 21,2 millions of people. The Gini Index has descended to 6,35 in the same period of time. This country shows the best results in terms of proportion of improvement.

3.2 China: The Asian giant has recently given so much to talk about in terms of growth, with a

population of 1.344,1 million. Contrary to economic growth, not so well results exposed, with data from 1990 – 2005 (last available), the 20% Highest of the population control: Avg. 45%, while 20% lowest just 6,58%. Overall, it looks like the lowest 10%-20% of the population is poorer, and the highest 10%-20% just descended somewhat. The Gini index jumped by 10,5 in the same period. Regarding poverty (one additional year of data - 2009), it is clear that there has been a descent (2,6%), in this country it is equal to aprox. 34,8 millions of people. However, by the last year available it shows 27,2% of its population living in poverty. That means 365,6 millions of people (almost two Brazil).

3.3 India: Another Asian populated giant. It shows a huge growth and a population of 1.241,5 millions of people. Concerning income distribution: data of: 1994 and 2005 (years available); the proportion is: 20% Highest: Avg. 41,25% and 20% lowest: just 8,8%. There are no significant changes during the time, except that the highest 10-20% of the population (wealthy people) has been receiving more income. The Gini index jumped to 2,56. Poverty levels have improved (based on one more year of data -2010). However, by the year 2010 it had an amazing 68,72% of its population living in poverty. That means 853,2 millions of people (more than China, which has more population).

3.4 Russia: The largest country in the world, with a population of 143 million. Its income distribution, from 1993 to 2009: The highest 20% control Avg. 47,07% of incomes, while 20% lowest 5,96%. In this economy, each decile is closer to each other. The Gini Index descended: 8,27 points. Poverty has decreased. By 2009 the result for “\$1,25 a day” is: 0% and “\$2 a day” is: 0,1%. That means 142,9 thousand people. They show the best result in terms of “absolute numbers” in the BRICS countries.

3.5 South Africa: The newest member of the BRICS group and a country representative of Africa. It had a population of 50,6 million in 2011. Considering data from 1993 to 2009 (last year available), the gap between the highest levels (10-20%) and the rest of the population (48,67 points) is disturbing. Here the proportion is: 20% Highest: 65,85% and 20% Lowest: 2,95%. In terms of poverty, it can be said that it has decreased but not significantly. During sixteen (16) years: 9,7 points. That means that by 2009, approximately 15,8 million of its people (31,3%) still live in poverty.

(Ortiz and Cummins, 2011), while it is true that there is some evidence of progress, it is too slow.

We estimate that it would take more than 800 years for the bottom billion to achieve ten percent of global income. Every economy must double its efforts in order to build an integral development agenda in order to improve in the area of social politics, environment, and climate change.

4 Importance of Adding Equity in the Development Agenda

Inequality also matters to economic growth. In order to ensure that sustainable growth continues, and also, in order to allow other developing countries to join better economy situations, a similar employment-intensive push in the agenda becomes necessary, as well as an international setting favorable to such agenda. Understanding the negative consequences of rising inequality becomes crucial to the progress of the economy of the nations.

4.1 Lack of equality inhibits growth, In the 1950s, Simon Kuznets argued that income inequality is necessary for the growth of the economy. Supporters of this position advise investing in growth as a first priority because they believe that the benefits will “trickle down” to the poor. However, (Bourguignon, 2004), (Birdsall, 2005), among others, suggests the contrary. (Ortiz and Cummins, 2011), using 131 as sample of countries from 1990 to 2008, it was found that countries with increased levels of inequality experienced slower annual growth per capita GDP ($\rho = -0.20$). Moreover, the strong negative correlation between high inequality and high growth remains virtually unchanged when restricting the sample to developing countries only. (94 countries) ($\rho = -0.19$)

4.2 Inequality generates social and health problems, (Wilkinson and Pickett, 2010) examine the relationship between income inequality and eleven unique health and social problems. They developed the International Index of Health and Social Problems (IHSP). The composite index covers 23 countries and includes the following indicators: number of homicides, imprisonment, infant mortality, life expectancy, math and literacy scores, mental illness, obesity, social mobility, births by teenagers, and trust. They find a strong relationship between high levels of inequality and greater health and social problems ($\rho = 0.54$).

4.3 Inequality produces political instability, the sources of political conflict vary from country to country, some causes included: class conflicts, perception of inequality between ethnic, religious or others. (Alesina and Perotti, 1996), among others, argue that inequality can lead to less political stability, and this in turn can lead to sub-optimal investment levels. They present an extensive battery of robustness tests on a cross-section of 70 countries, for the period 1960 – 1985, a two- equation system in

which the endogenous variables are: investment in physical capital and a measure of political instability. Their results in sample of 70 countries are quite solid.

Adding equity to the Development Agenda is beneficial and imperative right now, not only because it is correct seeking balance or because is a worthy cause, but also because equity is a guarantee and an innovative strategy for growth and sustainability.

5 Conclusion

It is clear that the BRICS countries are at the forefront of the GDP growth worldwide. As a group, considering the last 10 years, the GDP average growth of the BRICS countries is 6,0% and the world's is 3,83%. Meanwhile, for all of them, the highest concentration of income is controlled by a few people. The highest 20% of the population controlled 52,3% of the income and the lowest 20% controlled just 5,3%. The Gini Index Average is 46, and 41,9% of the population is living in poverty, that is means: 1.255,9 millions of people (approximately 18% of the population of the world).

Finding the right balance between equity and growth is required. Mainstreaming equity in the development agenda, striving to achieve the equity/growth balance requires a major overhaul of current decision making. Economy-related choices at both international and national levels have often been made without proper consideration for their distributional impact. If there is a negative social impact, it could be mitigated, but we must be aware that equality and social progress cannot be achieved solely by following this approach.

The Implantation of public policies that focused on generating employment and household income, ensuring access to land and assets, as well as infrastructure and services, and enhancing human capital and labour productivity are need as a guarantee and an innovative strategy for growth and sustainability.

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Countermeasures of the Industrial Energy Consumption Based on the Industrial Economic Increase in Wuhan of China*

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Abstract: During the 12th Five Year Plan, energy saving plays an important role in the sustainable development of the industrial economy in Wuhan. The paper further explores the correlation between the industrial energy consumption and the economic growth in Wuhan by analyzing in detail the actual situation and features of the industrial energy consumption of Wuhan. Then, the paper puts forward some suggestions on the energy consumption in promoting the sustainable development of the industry in Wuhan. Finally, the paper draws a conclusion that the renewable energy development and the energy saving decide whether the industrial economy increase can be sustainable or not.

Key words: Industry in Wuhan; Energy consumption; Suggestions; Correlation analysis

1 Introduction

Since the 11th Five Year Plan, the industry in Wuhan has grown rapidly. With the industrial transformation and upgrading in Wuhan, energy has become the bottleneck to curb the development of the industrial economy and the pressure of energy-saving and industrial emission-reduction been intensified. For the sake of further accelerating the development of the industrial economy in Wuhan in the new era, it's a worthy issue to deeply explore the industrial energy consumption.

2 Actual Situation and Features of the Industrial Energy Consumption in Wuhan

2.1 Industrial energy consumption rises year by year in total, but drops in unit output value

According to the statistic data in Table 1, the total energy consumption in Wuhan from 2000 to 2011 is respectively 2485.33, 2265.24, 2356.15, 2615.67, 3274.48, 3255.39, 3828.17, 3884.03, 3914.27, 3741.91, 4071.71 and 4396.63 tons of standard coal. Except 2009, the total energy consumption gradually rises in the other years. The energy consumption per ten-thousand-Yuan industrial output value drops from 2000 to 2011 except 2002 and 2004.

Table 1 Over-scale Industrial Energy Consumption in Wuhan from 2000 to 2011

Year	Over-scale industrial energy consumption (converted to standard coal) (ten-thousand tons)	Energy consumption per ten-thousand-yuan industrial output(converting to standard coal)
2000	2485.33	1.43
2001	2265.24	1.15
2002	2356.15	1.35
2003	2615.67	0.82
2004	3274.48	0.94
2005	3255.39	0.81
2006	3828.17	0.79
2007	3884.03	0.63
2008	3914.27	0.45
2009	3741.91	0.34
2010	4071.71	0.29
2011	4396.63	0.27

Note: Data in 2010 and 2011 from Wuhan Statistic Yearly Book 2012

* The paper is supported both by the MOE Project of Key Research Institute of Humanities and Social Science in University Wuhan and by the Research Centre on the Development of the Manufacturing Industry of the Wuhan City Circle, China.

Other data from Wuhan Statistic Yearly Book 2010 and in 2004, data are from the economic census and the electric converting coefficient in 2005 was changed into 1.229 from 4.04.

2.2 Industrial energy consumption in unit output value added in each district of Wuhan drops, but that of Qingshan and Xinzhou districts remains in a rather high level

In 2011, except Qingshan and Xinzhou districts, the industrial energy consumption in unit output value added in each district of Wuhan was stabilized below 1 ton standard coal per ten thousand yuan, but that of these two respectively got to 3.76 and 3.34 ton standard coal per ten thousand yuan, which far surpassed that of the others. The drop degree of the industrial energy consumption in unit output value added in Xinzhou was -8.92% while that in Qingshan -5.11%(see Table 2, Figure 1).

Table 2 Comparison of the Energy Consumption in all the Districts of Wuhan in 2011

Districts	Industrial energy consumption in unit output value added (ton standard coal per ten thousand yuan)	Fluctuation of the industrial energy consumption in unit output value added ($\pm\%$)
Jiang'an	0.39	-12.94
Jianghan	0.12	-4.45
Qiaokou	0.54	-19.02
Hanyang	0.04	-11.69
Wuchang	0.44	11.67
Qingshan	3.76	-5.11
Hongshan	0.15	-13.45
Dongxihu	0.24	-21.08
Hannan	0.89	20.23
Caidian	0.15	-6.67
Jiangxia	0.32	-17.98
Huangpi	0.51	-15.87
Xinzhou	3.34	-8.92
Donghu Hi-tech. Development District	0.12	-11.54
Wuhan Economy-Technology Development District	0.15	-12.35

2.3 Electricity consumption of above-designated-size industry evidently drops and is gradually stabilized during the 11th Five Year Plan, compared with that in the 10th Five Year Plan, but a little rises in the 12th Five Year Plan

In the 11th Five-Year-Plan period, the electricity consumption of the above-designated-size industry has dropped much in comparison with that in the 10th Five-Year-Plan period (see Table 3). The drops occurred respectively from 403.96, 442.30, 325.54, 395.33 and 710.32 standard coal/ten-thousand tons converted in 2000, 2001, 2002, 2003 and 2004 to 223.26, 178.24, 215.37, 221.32 and 229.67 standard coal/ten-thousand tons converted in 2005, 2006, 2007, 2008 and 2009. However, at the beginning of the 12th Five-Year-Plan, the electricity consumption is up a little, compared with that of the 11th Five-Year-Plan.

In the 11th Five-Year-Plan period, the coal consumption of the above-designated-size industry has risen in comparison with that in the 10th Five-Year-Plan period (see Figure 1). The ups occurred respectively from 926.39, 863.67, 950.27, 1084.49 and 1435.12 standard coal/ten-thousand tons converted in 2000, 2001, 2002, 2003 and 2004 to 1742.06, 1891.64, 1863.85, 1793.92 and 1672.25 standard coal/ten-thousand tons converted in 2005, 2006, 2007, 2008 and 2009. However, at the beginning of the 12th Five-Year-Plan, the coal consumption is up a little, compared with that at the end of the 11th Five-Year-Plan.

Table 3 Comparison Between the Electricity Consumption and the Coal Consumption of the Above-Designated-Size Industry

Year	Coal (converted to standard coal/ten-thousand tons)	Electricity (converted to standard coal/ten-thousand tons)
2000	926.39	403.96
2001	863.67	442.30
2002	950.27	325.54
2003	1084.49	395.33
2004	1435.12	710.32
2005	1742.06	223.26
2006	1891.64	178.24
2007	1863.85	215.37
2008	1793.92	221.32
2009	1672.25	229.67
2010	1768.01	259.98
2011	1027.95	296.52

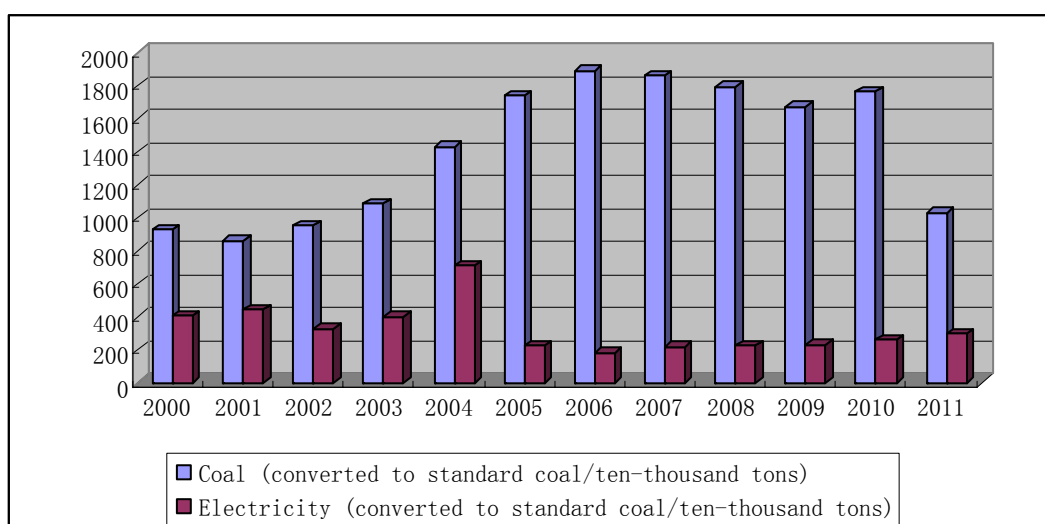


Figure 1 Comparison Between the Electricity Consumption and the Coal Consumption of the Above-Designated-Size Industry

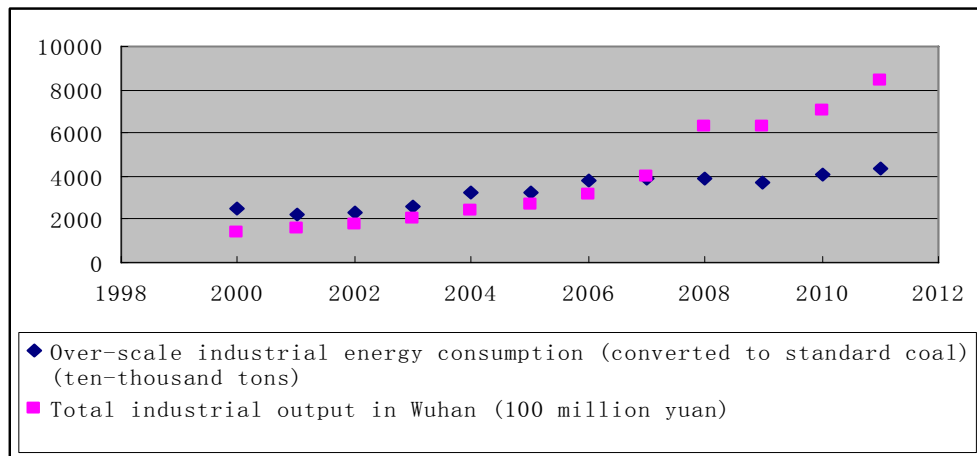
3 Analysis of the Industrial Energy Consumption in Wuhan

3.1 Positive correlation does not necessarily exist between the industrial economic increase and the industrial energy consumption

Seen from Figure 2, before 2006, the increase rate of the energy consumption of above-designated-size industry surpassed that of the total industrial output in Wuhan. From 2007 to 2011, the increase rate of the total industrial output surpassed that of the energy consumption of above-designated-size industry in Wuhan. Especially since recent three years, the increase rate of the total industrial output has been far beyond that of the energy consumption of above-designated-size industry in Wuhan (see Table 4). This phenomenon shows us that although the increase of the industrial economy needs the support of the energy, the energy consumption volume is able to be controlled and the correlation between the industrial economic increase and the industrial energy consumption is not always positive.

Table 4 Energy Consumption and Total Industrial Output in Wuhan

Year	Over-scale industrial energy consumption (converted to standard coal) (ten-thousand tons)	Total industrial output in Wuhan (100 million yuan)
2000	2485.33	1422.37
2001	2265.24	1611.76
2002	2356.15	1769.92
2003	2615.67	1994.49
2004	3274.48	2402.34
2005	3255.39	2674.41
2006	3828.17	3162.06
2007	3884.03	4010.30
2008	3914.27	6251.79
2009	3741.91	6317.94
2010	4071.71	7004.96
2011	4396.63	8461.21

**Figure 2 Comparison Between the Energy Consumption and the Total Industrial Output of the Above-Designated-Size Industry in Wuhan**

3.2 Too much reliance on the traditional energy by the industrial economic increase in Wuhan does no good to the expansion of new varieties of energy consumption

The energy consumption in Wuhan still mainly relies on coal, electricity, oil and gas. In 2011, of the energy consumption, coal occupied 1027.95 standard coal/ten-thousand tons converted with a proportion of 23.38%, coke was 668.84 standard coal/ten-thousand tons converted with a proportion of 15.21%, crude oil accounted for 720.11 standard coal/ten-thousand tons converted with a proportion of 16.38%, electricity was 296.52 standard coal/ten-thousand tons converted with a proportion of 6.74% and gas occupied 197.32 standard coal/ten-thousand tons converted with a proportion of 4.85%. The sum of their energy consumption accounted for 61.71% of the total, which says that too much traditional energy consumption existed. With the further economic development and without the substitute available, the reliance on the traditional energy will be deepened and this will do no good to developing the new energy and expanding its new varieties.

3.3 The energy consumption of all the districts in Wuhan goes downward, but a few of them still leave much room to drop

In 2011, the industrial energy consumption in unit output value added of Qingshan and Xinzhou districts was respectively 3.76 and 3.34 ton standard coal per ten thousand yuan. The drop degree of the industrial energy consumption in unit output value added in Xinzhou was -8.92% while that in Qingshan -5.11%. All these tell us that much room in these two districts is to be narrowed.

4 Countermeasures of the Industrial Energy Consumption in Wuhan

4.1 Saving energy by relying on the progress of science and technology

Energy consumption can be reduced by increasing the scientific and technological content and improving crafts. Take it for example that Wuhan Steel and Iron Group has greatly raised its level in using the crude fuel for the blast furnace and reduced the coke ratio in iron-making by making use of energy-saving technology like sintering waste heat power generation and the thick layer, etc.

Energy can be utilized comprehensively by technological innovation. Wuhan Steel and Iron Group has realized the optimization of the fuel structure and the cascade utilization of energy and made the energy consumption per ton reach the advanced level at home by recycling the waste gas and heat in the blast furnace, ovens and converters and so on.

4.2 Saving energy by relying on optimizing the industrial structure

The actual situation of the layout of the industry in Wuhan is that the secondary industry occupies a very important place in the industrial structure. But the secondary industry consumes too much energy, which makes the energy supply in great pressure. The optimization of the industrial structure can relieve the tension of the energy consumption. The main countermeasures are to develop in priority the industries which can play an important leading role in the economic increase and those with a low-carbon economy such as high equipment industry, electronic information industry and bio-medicine industry, etc. Also, these enterprises with overcapacity, high energy consumption and high emission should be eliminated continuously. In the 11th Five-Year-Plan period, 65 enterprises which were diagnosed to be supervised in stress as high energy consumption ones had been reduced to 53 by shutting off, stopping, merger or transfer, etc. These measures have played an active role in raising the efficiency of the energy utilization and in the energy saving.

4.3 Making a full use of the recyclable energy by innovating and adopting the hi-tech

Seeing that the industrial economy in Wuhan has been developing fast and that the energy varieties available are limited, it is necessary to further strengthen the exploitation of the new energy so as to realize comprehensively the diversification of the energy consumption. The details are presented as follows:

1) Fully utilize the solar energy and the wind energy. In 2007, 6 demonstration bases for the solar energy were set up and they can make the solar energy technology serve the road lamp power. Take it for example that the road lamps installed in such streets as Hankou Yanjiang, Hankou Jiangtan in Wuhan can generate electricity both by using the solar and the wind energy and realize the zero expenditure and the zero emission.

2) Fully utilize the bio-energy. For example, the gasohol developed by Wuhan Dibo Petrochemical Company is a kind of fuel of environmental protection used for automobiles. It is a mixed energy from the fuel ethanol that is made from grain and various plant fiber and the regular gasoline in certain proportion. It can effectively improve the performance and quality of oil, reduce the emission of the pollutants like carbon monoxide and hydrocarbons.

3) Generate electricity by recycling wastes. According to some statistics, the daily production of the wastes in Wuhan is 600 tons and the yearly one nearly gets to 220 thousand tons and increases per year by 8%. The Environmental Science Institutes in Wuhan says that the content of the organics in the wastes in 13 years has increased by 3.89 times, which makes the wastes in Wuhan more fit for incineration. In recent years, Wuhan has been engaged in developing the projects of generating power by recycling the wastes and several power stations of incinerating the wastes like Jiangxia Fenghuangshan, Caidian Qianzishan and Guodingshan, etc have been set up. The Guodingshan Power Station has a total capacity of 40 thousand kilowatt and can recycle 1500 tons of the wastes every day with a yearly electricity generation of 220 million degree that is equivalent to the daily electricity used by Hubei Province and that can reduce over 80% of the wastes.

5 Conclusions

From the above research, we may draw the following conclusion: the fast development of the industrial economy can't be separated from the support of the energy. Due to the limitation of the traditional energy, we must save the energy and develop the renewable one to substitute the traditional energy by innovating science and technology, optimizing the industrial structure, fully utilizing the solar energy, the wind energy, the bio-energy and generating electricity by recycling wastes so as to make the industrial economy increase sustainable.

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The Building of Excellent Vehicle Brands: Research on Vehicle Brand-quality Chain and Its Operation Mechanism *

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Abstract: The building of vehicle excellent quality and brand is actually the process in which building excellent brand is taken as the goal, and vehicle quality chain comes into being through the systematic planning and integrated control and scientific management of every links throughout the formation of vehicle excellent quality, including the quality of planning, design quality, procurement quality, manufacturing quality, logistics quality, information quality and other intermediary qualities and even customer perceived quality. The mechanism of creating excellent vehicle brand is just the operation mechanism of the vehicle brand-quality chain. From the perspective of building excellent vehicle brand, this paper raised the concept of Vehicle brand-quality chain and explored the characteristics of vehicle brand-quality chain operational mechanism.

Key word: Vehicle; Excellent brand; Quality and brand Chain; Operation mechanism

1 Introduction

21st Century is the century of the brand and quality. For the national pillar industry of the vehicle industry, core competitiveness stems from the advanced technical level, the enterprise reputation based on brand, and the reliability and stability of the credibility of specific product quality. In recent years, with the blowout of China's vehicle market, and self-owned brand vehicle also occupy a certain share among the fierce competition. However, compared with the opportunities brought by China's huge market scale, its developing speed is't ideal. Of course, there are many complex reasons. Concretely speaking, China's independent vehicle industry have paid too much attention to immediate interests. There is no system planning or long-term construction to technology innovation, excellent quality, hundred-year brand and famous brand. From the perspective of creating China's excellent brand of vehicle industry, with the study of vehicle quality chain and its operation mechanism, this article is to discuss the creation of excellent brand of vehicle.

2 The Connotation of Excellent Automotive Brand and Excellent Quality

2.1 The connotation of excellent automotive brand

Excellent vehicle brand refers to the comprehensive embodiment, which is based on well-known vehicle trademark, including product quality technical level, service level, corporate image and reputation of automobile enterprise. Creation of excellent vehicle brand lies in excellent vehicle quality.

2.2 The connotation of excellent vehicle quality

Excellent vehicle quality is relative to the usual standard of automotive quality which is just the minimum standard that must be met by all automotive enterprises. However, excellent vehicle quality, which is based on the usual standard of automotive quality, demands to carry out continuous quality improvement actively, and constantly surpass and get breakthroughs in quality. That is to say the excellent vehicle quality is a set of internal management system in enterprise, and much stricter than normal quality standard. ^[1]

The capacity of enterprise to offer long-term and zero-defect product and service to meet customer demands stably and reliably is the external representation of excellent vehicle quality, which also need give customers "surprise" sometimes exceeding their expectations, and achieve customer's satisfaction and increase their fervidity, thus building excellent brand.

2.3 Interactive triangle between excellent vehicle technology, excellent quality and excellent brand

As shown in Figure 1, creation of excellent brand aims at creating transcendent brand, and takes it as a guide to build excellent vehicle quality on the basis of excellent technology. Technical excellence need that enterprises increase technical inputs to accumulate automotive technology, and that enterprises

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introduce advanced technology to digest and absorb and realize innovation, and that enterprises integrate resource to form independent innovation achievements. Excellent vehicle quality lies in a system planning of quality and integrated control. With quality disposing, fast response, perfection and propulsion of quality system, enterprises could actualize continual improvement of vehicle quality.

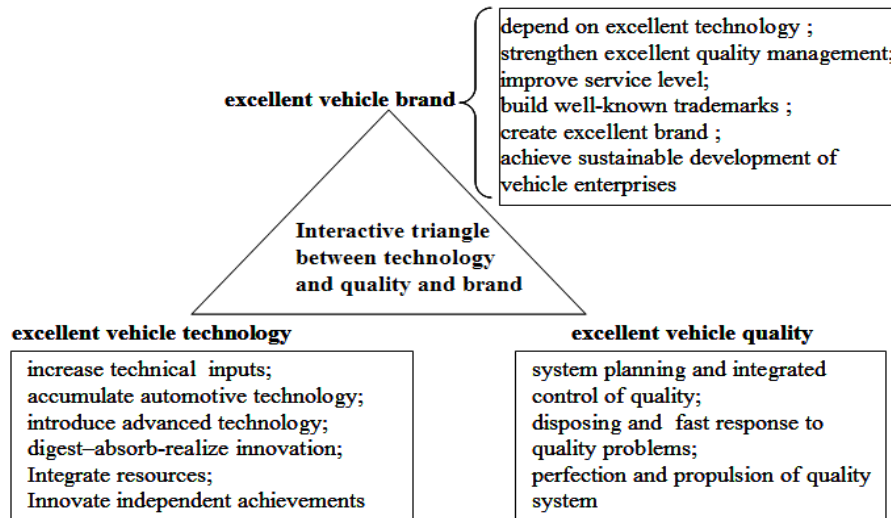


Figure 1 Interactive Triangle Between Excellent Vehicle Technology, Quality and Brand

3 Process of Creating Excellent Vehicle Brand—Vehicle Quality Chain

3.1 Bringing forward of the concept of quality chain

It was under the background of social production specialization, personalized customer demand and furious market environment that vehicle quality chain engendered. At the same time, quality chain also stems from the change of competition mode, which from free competition to cooperative competition, from the competition among individual enterprise into the competition among enterprise groups, from competition for corporate interests to competition for social responsibility. The earliest concept of quality chain was proposed by Columbia University of Canada (UBC) scholars.^[2]

3.2 The concept of vehicle brand and quality chain

Vehicle Brand and Quality Chain (“VBQC” hereinafter) refers under the background of open economic environment and global manufacturing system, the process of automobile industry manufacturing chain entity forming excellent vehicle quality. It is a quality chain taking automobile factory as main body, customer satisfaction as the core, creation of excellent vehicle brand as the goal through the control of products quality as well as collaboration with other quality chain subject. It is a fusion of scientific and compositive function chain which combines vehicle value chain and vehicle service chain and vehicle information chain.^[3]

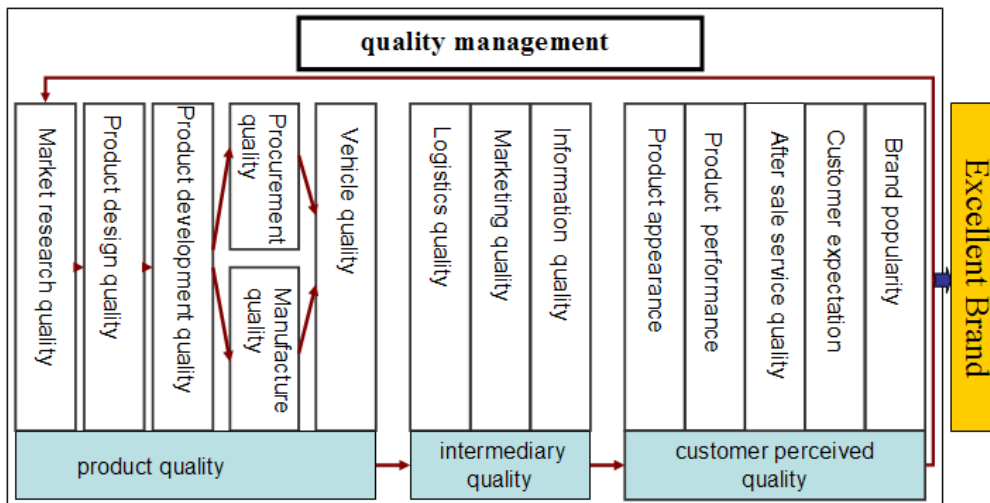


Figure 2 “VBQC”——From the Perspective of Formatting Vehicle Quality

The concept of “VBQC” could be concretely understood from two aspects. Firstly viewed from the perspective of formation of vehicle quality, “VBQC” consists of all business processes and working links related to vehicle quality. Vehicle quality starts from quality of market research, and then with quality of programming, development, procurement and manufacture, at last formatting vehicle quality. Vehicle quality evolves into customer perceived quality via intermediary quality, with management quality running throughout this period, as shown in Figure 2.

Secondly, from the perspective of vehicle product constituent, all node enterprises like automobile factory, suppliers, OEM, distributors and other external partners as a unified whole form a quality chain across enterprises boundaries. All node enterprises on the quality chain operate around the core of automotive product quality closely to control and coordinate quality, therefore formatting quality chain as shown in figure 3.

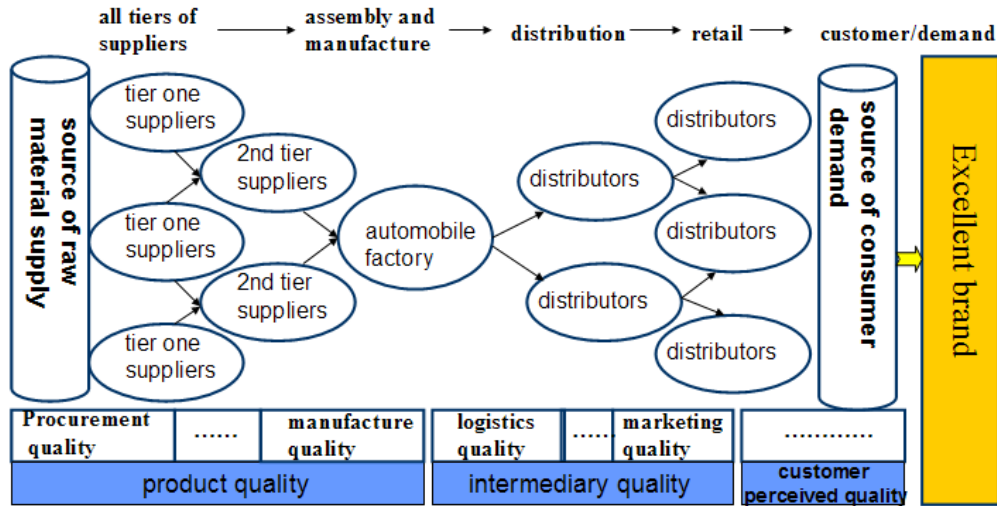


Figure 3 “VBQC”——From the Perspective of Constituting Vehicle products

3.3 Characteristics of “VBQC”

(1) Many main bodies. In the process of automotive products programming, design, production, sales to aftersale, there will be many different related main bodies such as automobile factory, suppliers of auto parts and raw materials, OEM, logistics providers, franchiser, service providers and so on. So the quality is coordinated and guaranteed mutually by all parties involved in the collaboration. Once any party provides quality which could not meet the requirements, the final quality of automobile products will be affected.

(2) Distributed characteristic. On one hand, characteristic of regional distributed of “VBQC” refers that because of the related node bodies especially suppliers, franchiser, service providers distributing in different regions, there is a somewhat differential spatial constraints between automobile factory with them.

(3) Transitivity. Quality problems in automobile factory, suppliers, logistics providers, franchiser, service providers will not only affects the quality of its own, but also will be transferred to the vehicle generally, even to the end customer. In the process of automobile quality formation and implementation, there is "Domino" effect obviously.

(4) Augment. Augment characteristic of “VBQC” means that losses caused by quality problem will continue to enlarge from upstream to downstream process, as shown in figure 4. Early-period quality is the foundation and guarantee of manufacturing quality of downstream manufacturing enterprises. Toyota’s recall events for problems of “Tramplng” and "Brake" is a profound lesson.

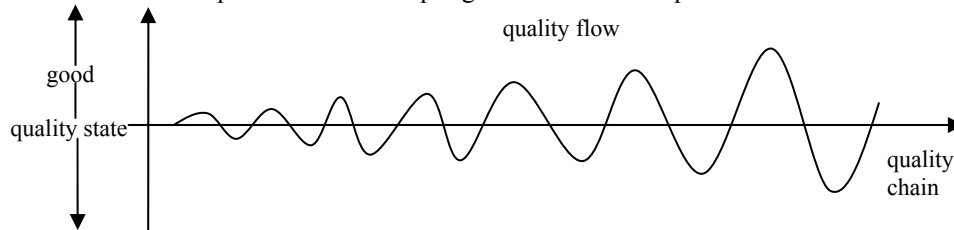


Figure 4 Augment and Transitivity of “VBQC”

4 Creating Mechanism of Vehicle Excellence Brand—Operation Mechanism of Vehicle Outstanding Quality Chain

4.1 The operation mechanism model of “VBQC”

The process of creating vehicle excellent brand is actually the vehicle outstanding quality chain management process of the strict control and management in every aspect of the vehicle quality formation, which takes creating excellent operation brand as the ultimate goal. [4]Creating mechanism of excellent vehicle brand is actually the operation mechanism of “VBQC”. Vehicle outstanding quality chain often takes automobile factory as the core enterprise and its operation mechanism is shown in figure 5. Vehicle product quality is the vector and core of vehicle quality. Vehicle product quality is composed of the quality of planning, design, procurement and manufacturing and delivered to the client through the intermediary quality forming the customer perceived quality. If the actual quality can be in the upper limit of the standard or even beyond standard quality of the long-term, it will receive good customer perceived quality, forming excellent quality, casting customer enthusiasm, thus creating excellent brand .Of course, the implementation of superior quality and excellent brand also requires the quality of management throughout the process to provide protection and support; conversely, if the actual quality is below the standard quality, the risk of product quality problems may exist. Once the risk quality exceeds a certain range, the risk will be converted to deterministic defect and cause the defect quality.

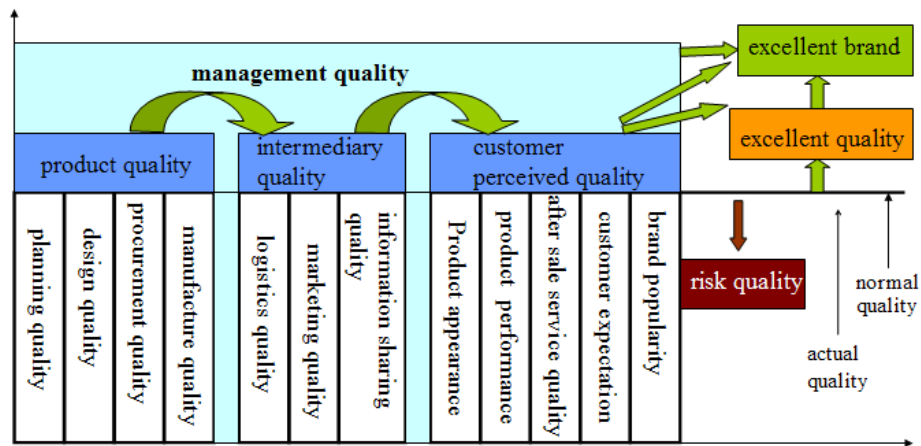


Figure 4 Creation Mechanism of Vehicle Excellent Brand—the Operation Mechanism of “VBQC”

4.2 Management and collaboration of “VBQC”

Vehicle Outstanding Quality Chain Management (“VOQCM” hereinafter) is taking the vehicle manufacturers as the core business, integrating the entire life cycle of the vehicle products from planning and design, manufacturing to sales and service into the main responsibility for quality of vehicle outstanding quality chain, driven by the common quality objectives ,through the specification and control of the subject behavior and the sharing of quality information and the full collaboration between organizational elements to ultimately achieve the whole process of integrated control and management of superior brand. “VOQCM” is the management of the specific implementation in the enterprise of the operating mechanism model of “VBQC”, to achieve superior quality through the various elements quality in the planning, implementation, control and measurement improvement to achieve the stable actual quality which is beyond the standard quality.

“VOQCM” aims at collaborative management of vehicle quality between the relevant parties, namely taking full participation as means, common interests as base, mechanisms for sharing of information resources, integrated use of technology and management and other means as pattern to achieve integration of information, processes, resources and other elements from node enterprises which is to create a open, sharing and cooperative working model. Finally, both production and business will be synchronous between enterprises, as well as strategy and objectives, so that substance and energy could be exchanged smoothly between organization and environment. In short, “VOQCM” builds a quick, smooth, controlled and optimized quality chain among the supplier, manufacturer, franchiser and end user through the control and sharing of automobile quality information. It targets customer satisfaction and excellent brand creation in order to enhance the core competitiveness of enterprises and the whole supply chain. [5]

The collaborative “VOQCM” requires: ① to base on the theory of system theory, coordination theory and integration theory, simultaneously effectively combined with the theory of quality management; ② to achieve effective integration of information flow, workflow, logistics, value flow and cost flow through quality flow; ③ to always adhere to the core of customer satisfaction, the pursuit of excellence in quality, the goal to create excellent brand, the main line of resources integration and quality control, the means of sharing information technology; ④ to realize continuous improvement of vehicle quality through the full participation and continual improvement.

5 Conclusions

Creating excellent brand is a rough task for China’s vehicle industry. It is essential to establish excellent vehicle quality which is also the strong backing and core connotation. Complete systematic analyses of “VBQC” are momentous to form excellent vehicle quality. It is necessary to research the operation mechanism of “VBQC” on the basis of mentioned analyses in order to achieve integrated control and collaborative management of automobile quality so that satisfy or even exceed customs’ expectation and build brand.

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Research on Identification of Core Competence of Disruptive Technological Innovation Network Partners

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Abstract: Disruptive technological innovation is a new research field which is different from the traditional technological innovation and has become the main power to push the continuous economic development worldwide, especially in the developed countries. It has been a significant theoretical and practical issue since in 1997. During the process of disruptive technological innovation, partner selection is an important problem and the identification of core competence of network partners is directly related to its effectiveness and success. Considering the fuzziness involved in the identification of core competence of disruptive technological innovation network partners, this paper proposes to identify the partners' core competence by using fuzzy cluster method and constructs model of core competence of network partners, which aims to provide scientific basis and method for enterprises' successful disruptive technological innovation.

Key words: Disruptive technological; Innovation network; Network partners; Core competence; Identification

1 Introduction

The concept of disruptive technological innovation has become a popular topic in both academic circles and mainstream press since its introduction in 1997 by Clay Christensen in *The Innovator's Dilemma* (Christensen, 1997). According to Christensen, a disruptive technological innovation initially appeals only to fringe customers, but eventually improves the dominant technological that had been long used by mainstream customers (Christensen, 1997; Tellis, 2006). One of Christensen's main contributions was the discovery that new entrant firms tend to have more success with the emergence of disruptive technological innovation than incumbents (Christensen, 1997; Henderson, 1993). The reasoning for this claim is that incumbents tend to invest more in incremental innovations that build off of their previous products while new entrants were more likely to invest in disruptive innovations. Henderson (1993) found that incumbents may be saddled by their assets. Furthermore, incumbents have likely already developed effective routines for handling their customers. Conversely, new firms are not constrained by prior competencies and are more able to take advantage of technological opportunities (Tushman & Anderson, 1986). For example, new entrants appear to be advantageous as they are generally more flexible in resource allocation.

With the rapid development of technological and the accelerated globalization process, disruptive technological innovation has become the main driving force for sustainable economic development of a country, which can make countries, regions or enterprises lagging in technological have a chance to compete with those who advanced technological in the same starting line, even surpass them. With the advent of the era of knowledge economy and the rapid development of information technological revolution, the importance of the innovation network is increasingly apparent, and will become the organization form and strategic choice that enterprises will take in technological innovation activities. The most basic reason to construction of technological innovation network is that the finiteness of the enterprise innovation ability and the resources scarcity. It is impossible that any enterprise is equipped with technological innovation ability in all the required fields. Enterprises which carry out disruptive technological innovation is no exception. As Christensen points out, needed resources of disruptive technological innovation activity should gain from consumers needed disruptive technological and investors willing to invest, rather than merely from the original organization. Therefore, the identification of core competence of disruptive technological innovation network partners is a major project. When distinguishing our partners' core capability of enterprise, we can't judge accurately if a partnership enterprise have one kind of core competence or do not have another core competency, but can only judge if a partner companies has some kind of core competence to some extent. It is easy to make out that the problem of fuzzy properties is obvious, while the fuzzy clustering analysis can solve the problem of the unclear boundaries.

2 Problem Description

Generally speaking, the integration object of enterprise innovation network can be divided into three categories: resources, knowledge and technological. Because of this, we can base on the perspective of resources, combine with the related network theory, and construct the disruptive technological innovation network which is made up of the lead users, suppliers, universities, other stakeholders, venture capital firms and so on. Assumes that each partner has a core competence. Therefore, we need to identify core competence of all disruptive technological innovation partners.

Through the way of online bidding, the enterprises implementing disruptive technological innovation have determined (including itself) n identified enterprises X_1, X_2, \dots, X_n , and arranged decision committee to investigate the identified enterprises from the index m . Firstly, according to the index data provided by the identified enterprises and their experiences, decision makers make a comment on the identified enterprises $X_k(k=1, 2, \dots, n)$ from characteristic indexes m . It is written as:

$$X_k = (x_{k1}, x_{k2}, \dots, x_{km}) \quad k=1, 2, \dots, n.$$

Among them, the x_{kj} ($k=1, 2, \dots, n; j=1, 2, \dots, m$) is the symbol for the characteristic evaluation value of the identified enterprise X_k about number j . So, for the characteristic evaluation value of the identified enterprise n , the characteristic matrix is denoted as:

$$X_{n \times m} = (x_{kj})_{n \times m} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1m} \\ x_{21} & x_{22} & \dots & x_{2m} \\ \dots & \dots & \dots & \dots \\ x_{n1} & x_{n2} & \dots & x_{nm} \end{bmatrix}$$

At the same time, we assume that members of the network partners of disruptive technological innovation has broken down into partners s , each partner has a core competence correspondingly V_1, V_2, \dots, V_s , each core competence V_i ($i=1, 2, \dots, s$) corresponds to a cluster center, i.e

$$V = \{V_1, V_2, \dots, V_s\},$$

According to past experience, Decision makers make a comment on each cluster center from the index m , denoted by:

$$V_i = (v_{i1}, v_{i2}, \dots, v_{im}) \quad i=1, 2, \dots, s.$$

Among them, the v_{ij} ($i=1, 2, \dots, s; j=1, 2, \dots, m$) mean that decision makers make a evaluation to core competence V_i about characteristic indexes j . As a result, characteristic matrix of each cluster center is written as :

$$V_{s \times m} = (v_{ij})_{s \times m} = \begin{bmatrix} v_{11} & v_{12} & \dots & v_{1m} \\ v_{21} & v_{22} & \dots & v_{2m} \\ \dots & \dots & \dots & \dots \\ v_{s1} & v_{s2} & \dots & v_{sm} \end{bmatrix}$$

Determined the evaluation value of characteristic index of each identified enterprise and core competence correspondingly, decision makers need to synthesize these information to determine the core competence identified enterprise. There is s kind of core competence, which corresponds to the s membership degree, denoted by:

$$U = \{U_1, U_2, \dots, U_s\},$$

U_i ($i=1, 2, \dots, s$) means vector which are made up of membership degree of core competence no. i of all identified enterprises, denoted by:

$$U_i = (u_{i1}, u_{i2}, \dots, u_{in}).$$

Among them, $u_{ik} \in [0, 1]$ ($i=1, 2, \dots, s; k=1, 2, \dots, n$) means that the membership degree of core competence no. i of identified enterprise X_k . In this way, we can obtain membership degree matrix of core competence s of identified enterprise n , is written as :

$$U_{s \times n} = (u_{ik})_{s \times n} = \begin{bmatrix} u_{11} & u_{12} & \cdots & u_{1n} \\ u_{21} & u_{22} & \cdots & u_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ u_{s1} & u_{s2} & \cdots & u_{sn} \end{bmatrix}$$

3 Algorithm Description

Based on the description of the problem, we can learn about the value of characteristic matrix of unidentified enterprises, $X_{n \times m}$, the value of characteristic matrix of cluster center, $V_{s \times m}$, and the constitute condition of membership matrix, $U_{s \times n}$. Next, we are going to make a detailed description about the specific algorithm.

First of all, initializing the value of characteristic matrix of cluster center $V_{s \times m}^0$ and the membership matrix $U_{s \times m}^0$

As we know, fuzzy clustering algorithm is an iterative process. Therefore, we should confirm the initializing the value of characteristic matrix of cluster center $V_{s \times m}^0$ and the membership matrix $U_{s \times m}^0$. According to the description of the issue above, the initialized $V_{s \times m}^0$ and $U_{s \times m}^0$ separately are:

$$V_{s \times m}^0 = (v_{ij})_{s \times m}^0 = \begin{bmatrix} v_{11}^0 & v_{12}^0 & \cdots & v_{1m}^0 \\ v_{21}^0 & v_{22}^0 & \cdots & v_{2m}^0 \\ \cdots & \cdots & \cdots & \cdots \\ v_{s1}^0 & v_{s2}^0 & \cdots & v_{sm}^0 \end{bmatrix}$$

$$U_{s \times n}^0 = (u_{ik})_{s \times n}^0 = \begin{bmatrix} u_{11}^0 & u_{12}^0 & \cdots & u_{1n}^0 \\ u_{21}^0 & u_{22}^0 & \cdots & u_{2n}^0 \\ \cdots & \cdots & \cdots & \cdots \\ u_{s1}^0 & u_{s2}^0 & \cdots & u_{sn}^0 \end{bmatrix}$$

Among them, $V_{s \times m}^0$ is the characteristic matrix, which components of the initial judge of core competence s from index m by decision makers; as for $U_{s \times m}^0$, it is the initial membership estimation made by the decision makers towards unidentified enterprises n attached to core competence s. They will be iterated by certain regulations in the following steps.

Step 2, iterate the membership matrix attached to core competence V_i of the unidentified enterprises X_k .

To iterate the membership matrix attached to core competence V_i of the unidentified enterprises X_k , that is to say confirming the figure of u_{ik} ($i=1, 2, \dots, s; k=1, 2, \dots, n$) in the matrix. Here, the relative distance between unidentified enterprises X_k and core competence V_i represent the membership attached to core competence V_i of the unidentified enterprises X_k .

$$u_{ik} = \frac{1}{\sum_{j=1}^s \left(\frac{|X_k - V_i|}{|X_k - V_j|} \right)^{\frac{1}{r-1}}} \tag{1}$$

From the formula(1), It is not hard to see that the closer between the unidentified enterprises X_k and the clustering center V_{ij} , the more the membership u_{ik} attached to core competence V_i of the enterprises. That is to say, it is very clearly show that the enterprise has core competence V_i . R is any positive integer

in the formula(1), in general, $r=2$.

Step 3, iterative the value of characteristic matrix of cluster center, $V_{s \times m}$

To iterate the value of characteristic matrix of cluster center, $V_{s \times m}$, that is to say confirming the figure of v_{ij} in the matrix. According to step 2, we can get the figure of u_{ik} . Therefore, we can solve characteristic value v_{ij} of cluster center i about j .

$$v_{ij} = \frac{\sum_{k=1}^n (u_{ik})^r x_{kj}}{\sum_{k=1}^n (u_{ik})^r} \quad \begin{array}{l} i = 1, 2, \dots, s; \\ j = 1, 2, \dots, m. \end{array} \quad (2)$$

R is any positive integer in the formula (2), in general, $r=2$.

4 Conclusion

With the rapid development of technological innovation, the general trend of the enterprises' innovation is transforming from an incremental pattern to a disruptive pattern. In today's society, disruptive technological innovation has become the main driving force for sustainable economic development of a country, especially of the developed countries. During the process of disruptive technological innovation, the identification of core competence of network partners is directly related to its effectiveness and success. Generally speaking, the identification of core competence of network partners is a process of combining qualitative and quantitative analysis. At present, using quantitative analysis method is a mainstream method when we are reseaching the identification of core competence of network partners. In this paper, based on the former work done by the author, the practicality of fuzzy cluster analysis method has been further studied. Core competence of disruptive technological innovation network partners are identified by fuzzy cluster analysis method.

The author applied the fuzzy cluster analysis method to the identification of core competence of disruptive technological innovation network partners, and considered the characteristic of the fuzzy involved in the identification of core competence of enterprise partners. Using this fuzzy cluster method to identify the partners' core competence, is much more close to life, fits our learning way as well as makes the judge result more objectives and dependable. Using this method, to some extent, can enhance enterprises' success rate for implementing disruptive technological innovation.

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Product Architecture Embedded in Mobile Internet: An Exploratory Study*

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Abstract: There are a lot of Mobile Internet products arising with the development of Mobile Internet. Product architecture has an important effect on product's development process. This paper takes WeChat as an example to study the product architecture embedded in Mobile Internet. Combining with the different characteristics of Mobile Internet product, we build a logic framework for product development which classified the development into three phases: analysis, product design and adjustment. After contrastive analysis, we make a conclusion that product architecture embedded in Mobile Internet should focus on the combination of flexibility with various functions. Modular architecture and "Prepare for the future" product architecture decision are more effective.

Key words: Component; Mobile Internet; Product architecture; Contrastive analysis

1 Introduction

With the rapid development of Mobile Internet, the number of Mobile Internet products grows gradually. Kik is a very important part of Mobile Internet products. Under the rapid development and fierce competition, many companies pay sustainable attention on how to make competitive mobile internet products through effective product architecture at strategic level.

Product architecture is a process of mapping product functions onto physical components and the interaction among these components through specified interfaces (Ulrich, 1995; Sanchez, 1996).

Product development process can be viewed as consisting of three phases: analysis, product design, and adjustment.

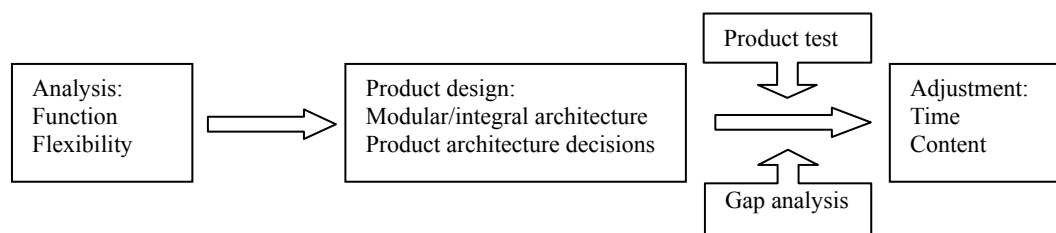


Figure 1 Product Development Process

The analysis phase concerns the identification of function and flexibility requirements as well as the mapping from functional elements to physical components. The function and flexibility requirements are based on technology situation analysis, customers' needs, and competition environment and so on.

The product design phase includes two main parts: selection of the product architecture type and choice of product architecture decision way. There two types of product architecture: modular architecture and integral architecture. Modular architecture includes a one-to-one mapping from functional elements in the function structure to the physical components of the product, and specifies de-coupled interfaces between components. Integral architecture includes a complex (non one-to-one) mapping from functional elements to physical components and/or coupled interfaces between components (Ulrich, 1995). There are four categories of product architecture decision: "Include in all", "Exclude", "Prepare" and "Do nothing". "Include in all" means to include the features in all units of the product but disabled once the market requires the feature. The firm can launch it very fast and gain a good market share. "Prepare for the future" is to build a preparation form into the product. If the market requires it, the time to market will be short. "Exclude in all" exclude a particular feature deliberately, however, the consequences can be so drastic that it is impossible to redesign the product and include the feature in the future. "Do nothing" means do not prepare for the possible feature but without excluding the possibilities for offering the feature (Marc Wouters, Mark Workum and Paul Hissel, 2011).

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The adjustment which is based on product test and gap analysis includes the change during a product's lifecycle and the change across generations of the product (Ulrich, 1995). The adjustment also concerns the change of components or/and interfaces. Henderson and Clark (1990) classified innovation into four categories: incremental innovation, modular innovation, architectural innovation and radical innovation. They classified them as two dimensions. The horizontal dimension captures an innovation's impact on components, while the vertical captures dimension its impact on the linkages between components.

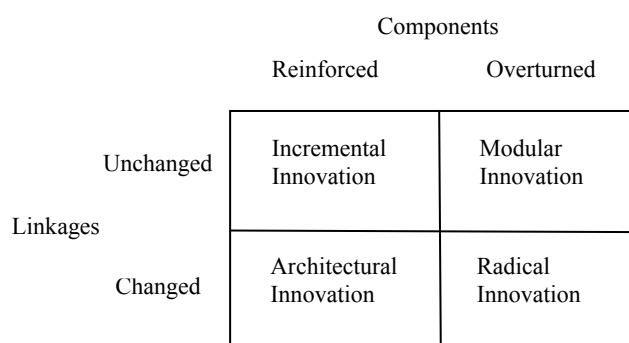


Figure 2 A Framework for Defining Innovation

On the whole, product architecture is of strategic importance for firms (Fixson, 2005, 2007; Gil, 2007). It plays an important role in a product's development process and helps corporate design and update products.

2 Mobile Internet Applied in Social Communication

2.1 The status of mobile internet industrial development

From a global perspective, with the rapid development of Mobile Internet, the network continues to upgrade. The penetration rates of Mobile Internet in Japan and Korea are higher than those in other countries.

Japan's Mobile Internet development is one of the fastest. Its development depends on the co-ordination with the industrial chain, especially with the mobile communication operators and the financial industry, which is of significance on China's Mobile Internet development (Hao Enduo, 2010).

In the process of analyzing the domestic Mobile Internet development, operation mode, specialty applications, and respond to market competition, scholars point out that the main problems in the development include bandwidth, terminals, platforms, applications, industry chain and so on (Lu He, 2009).

2.2 The status of mobile Internet based social communication products and services

Table 1 Comparison among Kik Products

Products	Advantage	Disadvantage	Time	Company
Michat	Launch in the head Technical support Humanized function	Grassroots No user base	December,2010	Xiaomi Tech
WeChat	Huge QQ user base	Coordination between making friends and keep privacy	January,2011	Tencent
Youni	Reliability of Short message model and protection of users' privacy	No recommendation No combination with game player Limited users source	April,2011	SDTH
Kouxin	Technical support comprehensive function unique group share function	No motivation for user to use 360 ID, which lead to small user number	August,2011	360
Woyoo	First to initiate among three operators Have cell phone user base	Unstable function Message delay imperfect User experience	August,2011	China Unicom
Fechat	Free internet fee among Feiliao users	Mobile user only	September,2011	China Mobile
Yichat	Regardless of operator E-surfing user base Completely free	Late release time Seize the market chance	October,2011	China Telecom

On October 2010, Kik message had been launched. Although Kik is very easy to use, it is own the function of both efficiency and effectiveness. Products like Kik have many features such as simple, timely and cheap, Kik users do not need face to face, they can fully aware that whether the information reach the other party and whether there has feedback (Sheng Jia, 2011). Products like Kik also began to appear in China, such as WeChat launched by Tencent, Michat launched by Xiaomi Tech, Youni launched by SDTH and so on. Table 1 is a comparison among various types of Kik products.

3 Case Analysis and Suggestions

WeChat, as one of the successful Mobile Internet products, is worth studying. Taking WeChat as an example, this paper aims at realizing the strategic significance through analyzing the product architecture of WeChat.

3.1 Profile of WeChat

WeChat, created on January 21st, 2011, is cell phone chatting software via the Internet. There are many functions, such as sending sounds, video, picture, words as well as supporting group chat among people. Users can keep in touch in rich forms through WeChat. WeChat is completely free of charge, which means any function will not be charged. The Internet flow fees generated in the process of WeChat is paid by network operator. By late March in 2012, WeChat users have broken 100 million users in 433 days. On September 17th, 2012, users have broken 200 million in less than 6 months. By January 24th, 2013, users are amount to 300 million in less than 5 months. The trend is on the way.

“WeChat Speed” is becoming an industrial topic under the age of Mobile Internet. WeChat is not originally created by Tencent, but the primary form of a foreign company, named Kik. The similar softwares also have MiTalk, MoMo and so on. Among these softwares, MiTalk is earlier than WeChat on line, but at a slower development speed. WeChat versions, from 1.0 to 4.5, always surprise users at every version updating. With regard to WeChat’s success, the innovative function and perfect user experience are the trump card except Tencent’s powerful social relation chain.

In terms of functions, WeChat can send voice messages, pictures and media information, which only spends Internet flow without paying any fees. “Look around” and “Shake” are two hotspots in WeChat. The growing number of new users at a high speed establishes absolute statue in mobile App market. WeChat also introduces LBS social function and another two functions related to geographic location, namely “Seek for friends around you” and “Drift bottle”, which enlarge the applied range of WeChat from friends to strangers, as well as maximize the mobile features of phone. In 4.2 versions, WeChat adds another two functions named “Video chat” and “Web WeChat”. In 4.3 versions, WeChat introduces a function called “Shake to send pictures”. For WeChat users, they often have one or two memorable points of WeChat in every version. WeChat’s frequent upgrading shows its special innovation.

3.2 Analysis and suggestions

The success of WeChat lies in its outstanding product as software, combing market need with technological factor in the process of its product architecture. Table 2 is WeChat’s iphone version.

The chart shows that since WeChat is online, its functions are improving with the updating version and users experience continues to enhance. In other words, WeChat’s progress is realized by the changes across generations of the products. Each version is a generation of WeChat, which means new functions have been added into new version or original functions will be perfected in new versions.

On another side, the basic idea of WeChat’s product architecture is the transformation from ordinary Mobile Internet chat software to a basic platform. This platform enhances the flexibility and effectiveness with combining various functions and technology. Through this platform, companies can open up users’ resources and relation chain. Entrepreneurs focus on how to provide goods or service for users, not how to manage or sale the product. A series of problem, such as the stability of server, the abundance of bandwidth, the speed of operational capability, the security of users’ privacy, can also be solved through this platform.

In detail, WeChat’s product architecture finds out the most valuable factors and pay attention to them. First, the Mobile Internet brings two things differing from PC. There are location information and real-time online. However, Mobile Internet product also cannot switch among many functions smoothly just likes PC. Thus, WeChat have to think about how to construct a product which has better user experience with the environment change. Second, an important feature of Mobile Internet product which WeChat should know is the fact that one App can only do one thing. For WeChat, communication is the basic function, so how to make this function and related functions work well is a key part for WeChat’s

product architecture. At last, in terms of product architecture, an ideal product is to satisfy the major demand of user within one page, like Facebook, Twitter. The study shows that most users intend to focus their things within two pages. Therefore, WeChat need to consider how to organize product to realize its value in two pages after user open WeChat (Shu Xun, 2013).

Table 2 WeChat's Iphone Version

Version	Time	Function
1.0 for iPhone(beta version)	01/21/2011	
1.1 for iPhone(beta version)	03/10/2011	Interflow with Tencent microblog private letter
1.2 for iPhone(beta version)	03/21/2011	Support Group chat
2.0 for iPhone	05/10/2011	Add Talkback function
2.5 for iPhone	08/03/2011	Support video and Look Around
3.0 for iPhone	10/01/2011	Support the function called Drift bottle and Shake. Support Traditional Chinese language interface Support users from Hong Kong, Macao, Taiwan, USA and Japan to bind cell phone number
3.1 for iPhone	10/27/2011	Support English interface display
3.5 for iPhone	12/20/2011	Support text message register among over 100 countries
4.0 for iPhone	04/19/2012	Add photo album function
4.2 for iPhone	07/19/2012	Add video chat plug-in board Add web version for WeChat
4.3 for iPhone	09/05/2012	Add a new function called send picture by shaking Add voice search WeChat number can unbind QQ number and cell phone number
4.3.2 for iPhone	10/30/2012	Overall Compatibility for iPhone 5

4 Contrastive Analyses

Product architecture plays an important role in many industries such as automotive industry, machinery industry, electronics and the software products (Gu Yuanxun, 2012). For WeChat, functions such as “Voice chat”, “Look around”, “Shake” can be regarded as components. The linkages among those components are interfaces. The process of WeChat’s development can be divided into analysis, product design and adjustment phase.

4.1 Analysis

The first step for product development is to analysis the technical environments, customer requirements, state of market competition, etc. After the analysis, companies found out desired functions, especially core functions, as well as flexibility requirements, and then mapped those functions onto components. For WeChat, the basic function is communication; this function has been mapped onto components such as Voice Chat, Emoticons and Group Chat. WeChat is a social communication App based on Mobile Internet which has the typical characteristics of Mobile Internet products, it must meet users’ personality demand and take the rapid development of such applications into account, so the flexibility requirement is high.

4.2 Product design

During the product designing phase, corporate should choose the product architecture approach and decision way. Modular architecture can enhance flexibility and improve customer’s satisfaction, while integral architecture may exhibit higher performance. In fact, most products, including WeChat, will embody hybrid modular-integral architectures (Ulrich, 1995). WeChat’s basic function about communication is integral architected, functions such as “Shake”, “Look Around” are separately designed as a plug-in for users to install.

According to the patient table case study (Marc Wouters, Mark Workum and Paul Hissel, 2011), the product architecture decision of “Exclude” is always effective, while “Prepare” is hardly favorable. But for Mobile Internet products, “Prepare” would be the best solution which saves launch time and redesign costs. WeChat is continuously updating, each version of the updating can be seen as the redesign based on the original version. Managers will decide whether to launch the new functions after they analyze the markets and outweigh the costs.

4.3 Adjustment

The product's adjustment and upgrade is the key to success. WeChat's iPhone version shows that the main change of WeChat is adding new functions by version update. But the change is not only to add a new plug-in, but also to combine with other industries. In May 2012, WeChat launched the "scanning" function and try O2O marketing mode through two-dimensional code. In addition, WeChat incorporates with banks, hotels and so on to provide many applications such as check road conditions, check credit cards, booking hotels, booking takeaway, tickets, etc. These extensive functions of WeChat both attract more users and enhance user stickiness. The adjustment and upgrade requires WeChat to build a basic platform which support the new components to be added in and the interface to be changed.

5 Conclusions

Product architecture has an important effect on product's development process. This paper builds a logic framework for product development and lists key points of each phrase.

When product architecture is embedded in Mobile Internet, new features emerge. It needs increasing focuses on the combination of flexibility with various functions. The function has been enhanced and expanded by the addition of plug-ins. So modular architecture will be more useful when each plug-in is regard as a module. Mobile Internets products change quickly and they are more common across different generations. The product architecture decision "Prepare" is more effective because it is always quicker.

There are several limitations and future research opportunities. This paper makes an overall framework for product development but lacks some research in depth. Future research could focus more effectively on how the Mobile Internet product will be able to incorporate new functions and various industries.

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Technology Diffusion of Cloud Computing

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Abstract: This paper (1) presents background and technical framework of cloud computing; (2) introduces innovations, technology diffusion and reasons that intensifies diffusion; (3) represents the technology diffusion enablers in relation cloud computing; (4) defines opportunities; (5) address challenges and finally sets out (6) conclusions.

Key words: Cloud Computing; Technology Diffusion; Innovations

1 Introduction

Cloud computing has become one of the most discussed topics in today’s IT organizations. Rather than having massive server farms, companies look for cost savings, cost avoidance and effectiveness by utilizing services based on cloud computing. Especially SaaS (software as a service) solutions have increased greatly and they are in many companies replacing the traditional on premises application environments.

When analyzing how technologies are being adapted, technology diffusion is one of the key elements. From technology diffusion perspective cloud computing is well adopted on the market but not yet a dominant design. Various technical and especially privacy related challenges need to be still addressed. Additionally, there are lots of legacy systems and legacy installations which may stay live still for several years. The cloud services become tempting often when selecting a new solution or when the support for the existing hardware or software elapses.

2 Background and Technical Framework

2.1 Development towards cloud computing

Roots of cloud computing are back in 1960s when computer sharing was discussed for the first times. Discussion intensified again when dotcom bubble was burst in early 2000 and investments got scarce. On mean to reduce costs was to reconsider sharing computing capacity as servers had overcapacity. Systems were prepared for usage peaks which seldom occurred. Hence leasing extra capacity out became tempting. Amazon’s Web Services (AWS) start up in 2002 is considered the beginning of cloud services.^[1]

2.2 What is cloud computing?

Reese sets out three criteria which defines if a particular service is a cloud service:^[2]

- (1)The service can be accessed via a web browser or web services API.
- (2)No capital expenditure is required to get started.
- (3)You pay only for what you use as you use it.

In cloud computing the software and hardware resources are delivered as a service over a network, typically the Internet. The name comes from the use of cloud-shaped symbol as an abstraction.

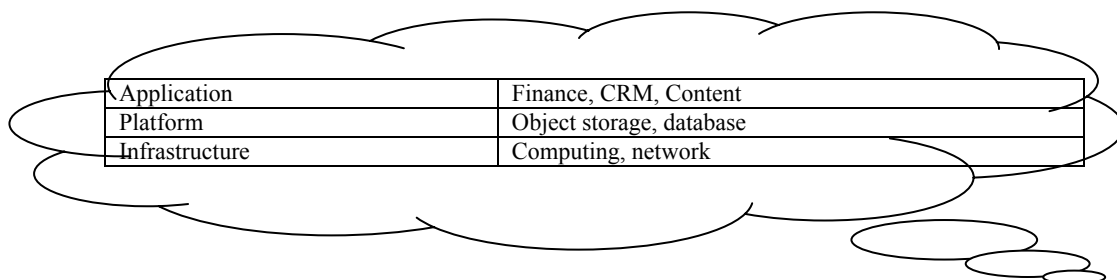


Figure 1 Cloud Computing

Figure 1 shows the layers of cloud computing. Software has an important role as the application layer provides the biggest value to the end user. The business logic resides on the application layer.

2.3 Service provisioning

Cloud services can be defined into three categories in relation to service provisioning:^[1]

Platform as a Service (PaaS) means the service provider has virtual servers from which the customer gets services as needed. In this model the customer can build his own applications by using predefined APIs. The computing comes from the cloud. An example of a PaaS is Google's development environment which enables development for applications to be run on Google's AppEngine service.

In Infrastructure as a Service (IaaS) the service hosts a virtual server base and gives predefined amount of computing power to customers. The customer installs his own operating systems and applications into these predefined segments. Well known IaaS service is Amazon Web Services.

Software as Service (SaaS) means the customer uses only the application, everything else from computing to the data storages is managed by the service provider. There are lots of SaaS providers. One of the most known is Salesforce.com who provides several cloud based solutions for CRM (customer relationship management) usage. SaaS is the biggest growing area in cloud computing era as it enables quick application deployment without one time deployment costs coming along with server and connectivity equipment purchases which would be required for stand-alone in-house systems.

2.4 Accessibility

Another way to classify the cloud services can be done by the accessibility: ^[1]

Public cloud means that the capacity is set out freely to anyone and it is not dedicated to any customer. The payment model is subscription based on time or on capacity. Private cloud is a company specific cloud which utilizes its own LAN. It does not require an internet connection outside. The operating and maintenance costs are carried out by the customer who also maintains the operating environment.

Public and private clouds can be connected to a hybrid cloud. Hybrid cloud means that company's private cloud is connected to a public cloud via internet connection.

3 Technology Innovations

Innovations can be segmented on radical innovations and on incremental innovations. ^[3] Cloud computing is considered to be an incremental innovation which utilizes the existing technology elements in a new way. The cloud implementation itself may include radical innovations but to end customer the services looks mostly the same.

The rate of technology performance and the rate at which the technology is adopted in the marketplace have been shown to conform to an s-shape curve. These curves are related as improvements in technology may foster faster adoption and greater adoption fosters further investments in performance improvement. ^[3]

Technology diffusion means technology adaptation in the marketplace. ^[3] Technology diffusion can be also presented by an s-shape curve which plots cumulative number of adopters against time. In the beginning the adoption pace is slow but as the technology becomes known in the marketplace, it accelerates. Finally the pace saturates as the rate of new adopters decline. S-curves in technology diffusion are in part a function of s-curves of technology improvement: when technologies are further developed, they become more secure and useful to users, facilitating their adoption. ^[3] As learning curve and scale advantages accrue to the new technology, the price of finished goods reduce which again attracts new users. ^[3]

Even if new technologies may be much better compared to the new ones, they often fail to attract the users and can be deployed only to a niche market. One major reason behind may be the complexity of the knowledge underlying new technologies, and the lack of complementary resources that make those technologies useful. Many potential users may not adapt new technology until the technology is available to them. ^[3] Cloud computing in its best is not visible to the end users but it affects application developers and IT organizations heavily. Making technology available to them is crucial.

Technology diffuses through international trade and international R&D ventures by multinational corporations. Developments in software technology and sharing of R&D investments have fostered this process. The future trend is to increase knowledge diffusion of technology. The competition for new processes and products has been intensified lately due to trade globalization and markets expansion. ^[4] Cloud computing itself can act as a knowledge diffuser; it eases the knowledge and knowledge sharing globally in a cost effective manner.

A change in the technology indicates a change in the production or in relation to the costs. In general technology includes all the knowledge and innovations needed to the production and distribution process. ^[4]

Technology generates multiple changes that affect the long term growth of an economy. In the

upward shift it improves the productivity of inputs like labor or capital following by reduced unit costs. Cost reduction helps to improve the profits and decreases the costs. ^[4]

Additionally, technologies help to expand the scale of production and enables further globalization and market expansion.

Innovation efficiency changes technology at the various points of value chain, thus challenging the companies to compete in new innovative ways. Successful companies transform their technologies to create new strategic assets which bring them more cash flows and new projects. This enables further investments and growth. ^[4]

Especially the latter is something cloud computing certainly helps; it enables companies better to focus their operations to competing edge rather than using capital and resources on ongoing services which in principle keep the current activities on the existing level.

4 Technology Diffusion Enablers

Adaption to the market requires the product or the service needs to be commercially attractive. In addition to commercial requirements proper technology diffusion requires the technological and functional needs to be fulfilled. Technology enablers make the commercial deployments possible.

4.1 Functional enablers ^[5]

There are four cornerstones which are to be fulfilled in order to reach adequate quality of service level:

(1)Efficiency: Execution and coordination of services are optimized in terms of data traffic and latency. Data traffic carries a big cost element with it, and therefore reducing that carrying cost is a long term goal. Latency can affect a lot in customer satisfaction and therefore needs to be watched carefully.

(2)Scalability: Cloud platforms can be connected by massive amount of people. Ability to work during burst hours is crucial.

(3)Robustness: The systems are to be designed for high availability with effective use of failover and graceful failover.

(4)Security: Proper security provisions must exist for both the applications and the data to protect service providers as well as consumers for intentional misconducts or malicious actions.

4.2 Commercial enablers

IT projects or services whose mission not to go beyond helping the business “stay with the race” or on “run” mode must reduce total cost of ownership (TCO). Projects on “grow” which improve existing products and services must increase return on investment (ROI). That is to help the business make more money. “Transform” projects which enable new things or even change the game are giving the business a competitive edge. These phases are described in figure 2 which plots also an s-shape curve. ^[6]

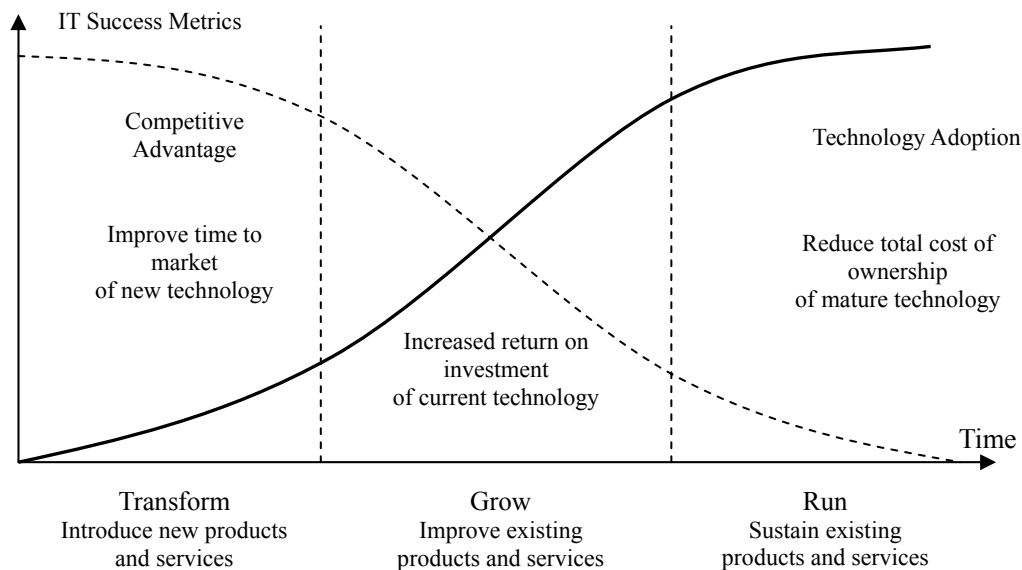


Figure 2 IT Success Metrics ^[6]

Cloud computing can reduce the IT's involvement in "run" projects and offer possibility to shift to "grow" and "transform" projects. This enables IT to move from cost center or provider of services to a value-adding partner for the business. This is considered a big advantage cloud computing can offer. [6]

In addition to requirements for company IT cost efficiency, the cloud services themselves often meet commercial requirements such as: [1]

(1) In general cloud services are reasonably priced. The absolute costs of cloud services are low.

(2) By using cloud services, the company can switch fixed costs into variable costs (or operating costs). The agreements with the cloud service providers are time limited and the company will not have any upcoming costs beyond the agreement term. Services, such as cloud services, are not usually depreciated. In addition, additional capacity can be easily acquired without any set up fees.

(3) Cloud services enable the company to reduce the costs with its own efforts. The invoicing gets lower if the usage is lower, e.g. on monthly basis.

Another cost reduction or cost avoidance comes from maintenance perspective: the company does not need to worry about hardware maintenance or upgrades of the firmware or software but they are rather included e.g. in the monthly fee. If the IT environment is managed by the company itself, the environments get outdated and require bug fixes, upgrades, and configurations and related testing regularly. Finally the hardware and also software gets obsolete due to operating system upgrades or because of elapsing maintenance from hardware or software supplier. This forces the company to make new upfront investments to the IT systems which are often crucial to the businesses.

5 Opportunities

Cloud computing brings great opportunities in relation to cost reduction of ongoing running costs and enables quick application and service deployment. Utilizing common computing platform is environmentally friendly but brings a business challenges to companies who traditionally have collected their revenues from server sales and from technology licensing. This applies to companies such as HP, Oracle (Sun Microsystems) and IBM. Oracle, in turn is having Big Data concept which stores and manage big amounts of data in dedicated servers effectively. Traditional IT vendors have also shift their focus on the cloud's application layer by providing SaaS services to customers who traditionally have purchased standalone database or application licenses. Utilizing similar services as SaaS will ease the learning curve and fasten the technology diffusion. The end user does not recognize any change if the performance and other technical requirements are properly fulfilled.

Cloud based services can also act as an infrastructure to various services for mobile devices. Web surfing has expanded to emails, Facebook and Twitter. All of those are cloud applications. [1]

In emerging markets lots of people would need to access ATMs and other online services. Cloud computing is a tool to enable that with inexpensive investments. As economies grow, more IT based solutions come desirable. The cloud can serve small and midsize businesses that cannot afford building massive data centers. [6]

New growth theory refers to recent modeling of economic growth which explains the rate of sustained growth of per capita income in the long run. The growth process has been affected by three dynamic forces. Firstly, technology and innovations are seen as the engine of sustained growth. Profit-seeking entrepreneurs who forward-look the state of the world make direct and intentional investments that foster technological progress. Second important factor is the dynamic externalities due to international diffusion of knowledge base and the rapid development of information technology. Knowledge spillover effect may be the most significant factor explaining the great differences in marginal productivity of capital between a less developed and a fast or developed economy when taking into account the human capital. Thirdly, trade openness and its impact on sectorial growth of output are crucial for the growth. It has been emphasized that the diffusion of spillover research technology implies the strong connection that is foreseeable between rapid productivity growth and trade or openness. [4]

Cloud services is one element is the broad range of information technology but an important enabler in respect to providing computing capacity and easy application deployments globally. Even if security is foreseen one weakness of cloud computing, an existing cloud instance would have security provisions readily available which reduces the vulnerability of a service.

6 Challenges

Cloud computing brings various challenges for the system and application developers, system administrators and service providers. Virtualization brings challenges for maintenance operations as

multiple virtual machines need to be managed effectively so that the service level can be kept on an adequate level.^[7]

Security, privacy and trust are major concerns when considering and using clouds. Important data and critical operations may be subject to cloud hosting. Hence trust to cloud providers is crucial. In addition, legal and regulatory issues need to be taken into account. Applications and data can reside anywhere in the world. Physical location of data centers and clusters determines the set of laws that are applicable in relation to data management. Some cryptography techniques may not be allowed in certain countries. Banks and insurance companies need to put extra effort to protect the confidential data of their customers.^[7]

Security and privacy issues may slow down the deployment of cloud services and therefore slow down the pace of technology diffusion.

Compatibility may also slow down the deployment of cloud services. Applications that are desirable for SaaS are such that are similar in various companies. For example managing sales funnel is done similarly in many companies and is potential candidate to be used as SaaS. Applications for supply chain management differ from company to company and therefore are not so suitable for SaaS. Similarly the applications for human resource management are fragmented and as such are not the first candidates for SaaS.^[1]

7 Conclusions

Technology diffusion of cloud services have started reasonably quickly. Dotcom burst in early 2000 intensified the use of computing power effectively. Cloud computing cannot be said yet to be domain design but it is gradually reaching that status. Cloud vendors are experiencing growth rate of 90 % per annum.^[8] Especially new services are vastly build on top of cloud computing. The global recession has intensified the efficiency needs in relation to IT projects, to productivity and in relation to the running costs. New innovations in IT are required in order for the businesses to maintain their competitiveness. Cloud computing enables the expansion of IT operations to emerging markets, hence lowering the labor costs. On the other hand geographic expansion enables growth in new geographical areas. Environmental issues certainly speak on behalf of cloud computing as there is need for less hardware appliances.

Data security and privacy issues have been discussed widely in public during the last few months. The importance of them is not diminishing but rather growing as normal citizens start to be more aware of potential underlying threats in respect to their personal and private data. Cloud computing companies and those who utilize cloud computing must address these concerns with great carefulness. Privacy issues are subject to up to privacy legislation which again is moving slowly due to national bodies and is governed by national and international legislations.

Still a sign of the importance of cloud computing is from 2008: when big real estate financiers Fannie Mae and Freddie Mac were withdrawn from the Standard and Poors 500 stock index in September, the other was replaced by Salesforce.com which is a successful CRM supplier fully relying on cloud computing. Salesforce.com has become a core holding item of many technology focused stock funds.^[1]

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A Study of Concept Structure of PMBOK Based on Graph Theory*

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Abstract: One especial characteristic of the PMBOK fourth edition is that the data flow between processes is defined with the definition of individual processes. Based on relations of input and the output during an adjacent management process, we can visualize the network structure of 42 project management processes analytically.

The author showed that we could estimate the density of the process flow from the network structure based on the relations during the process of the first proximity.

However, this network structure based on relations of first proximity is not including the indirect relationship among management processes. Therefore, it is necessary to extract a cross-sectional data flowchart on knowledge areas by expanding analysis range of the management pass in consideration of a highly advanced proximity element (process).

Based on this cross-sectional data flowchart, it is able to visualize a complicated management processing flow. As a result, it is found that there were complementary relations between the flow by way and by no way of the project integration management knowledge area. This suggests that network analysis technique is effective as method to visualize the flow of the management process of project.

In this paper, I would like to report the example of visualization of the management processing flow of some project management knowledge areas.

Key Words: PMBOK; Project Management Process; Graph Theory; Network Analysis

1 Introduction

One characteristic of PMBOK [1] is that data flowcharts corresponding to the each management process are described. This data flow chart of the each process is renovated in PMBOK 5th edition [1]. The data flowchart corresponding to the five process groups (a setup, a plan, practice, monitoring and control and end) was macroscopically described before the second edition [2]. In the third edition [3], it was changed to the data flowchart for every the project management (PM) knowledge area and it came to easy to look the flow of the management in each knowledge area.

There are two characteristics of the data flowchart. One is what is described by a viewpoint of the delivery of input and the output of the process concerned. The second is that the mutual relations between process of the knowledge area and process of the outside of the knowledge area are described. This characteristic was succeeded to in the PMBOK fifth edition, and brushing up was planned more.

In the previous paper, it has reported that it is able to visualize the flow of the PM process so far by describing the data flow between all processes based on the graph theory [5].

In this study, I visualize a management process of the PMBOK fifth edition and consider the positioning of the project stakeholder management knowledge area added newly.

2 Visualization of the Management Process

We can visualize the implicit structure such as an organization or the procedure by graph theory explicitly. Network graph is one of visual view graphs by graph theory, and formed only with nodes and lines. The node of the network corresponds an active point of action (e.g., the people in the organization) that information or an object goes by way of. If or action is connected with a node between nodes, I draw a line. I call a diagram provided in this way a network graph. When action is accepted between a node and nodes, it is able to link the node to the node in a line. A diagram provided in this way is called as a network graph. It is possible to express various structures by thus network methodology.

In this research, the node shows the management process of PMBOK, and the link shows the relationship between management processes. Adjacency matrix describes the relationship among the nodes which forms network. The component will be '1' when there is relationship between two nodes, or '0' when there is no relationship. An undirected graph is a graph describing the network in which the nodes are connected by undirected arcs.

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2.1 Management process of the PMBOK 4th edition

From the data flowchart of 42 processes, it is able to get the adjacent line corresponding to the mutual relations between management processes described in PMBOK. It could be visualized the concept structure of the management process of PMBOK by analyzing this adjacent matrix.

In the data flowchart in the PMBOK 4th edition, “*a project document*”, “*the environmental factor of the body*”, “*the process assets of the organization*”, and “*the process assets of the organization*” are treated in almost all processes. For the network analysis, a number and the mutual relations of the node to describe structure become important. Therefore I compare the concept structure when the above-mentioned external elements are considered as a node of the networks with the concept structure based on only 42 processes.

The adjacent matrix demanded from 42 data charts is shown in Figure 1. And a viewgraph of network obtained from the adjacent matrix is shown in figure 2. The viewgraph of network is displayed in the circle mode which placed a node on the circumference. The link between nodes corresponds to the element “1” of the adjacent matrix.

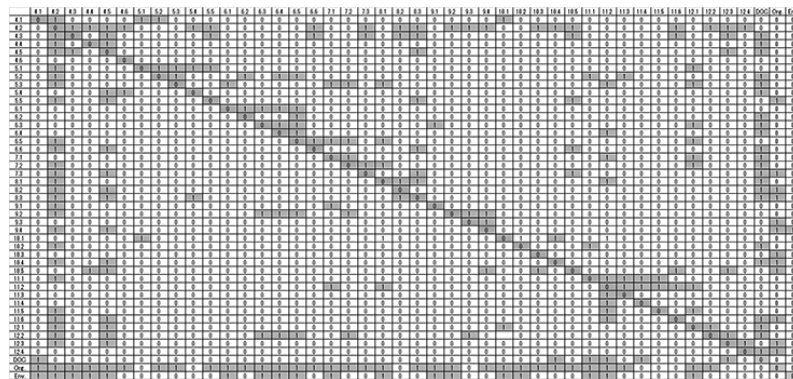


Figure 1

(a) Adjacency matrix for mutual relations among 42 processes of PMBOK4th edition

(b) Adjacency matrix for 42 processes and “*Project documents*”, “*Enterprise environmental factors*”, and “*Organizational process assets*”

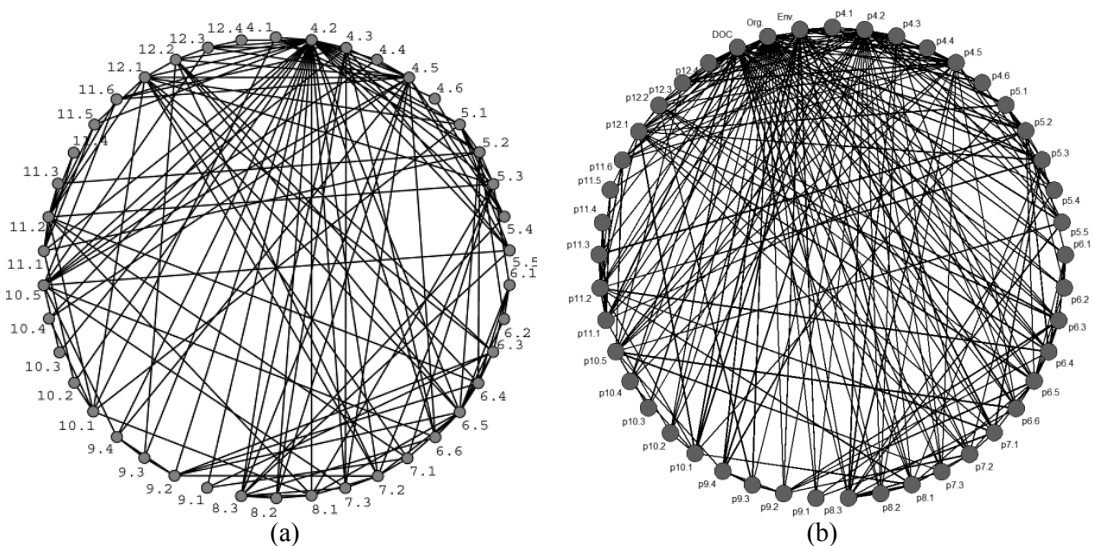


Figure 2

(a) Network graph provided from the adjacent matrix shown in figure 1(a)

(b) Network graph provided from the adjacent matrix shown in figure 1(b)

Figure 2(a) is network graph which described from the adjacent matrix by the 42 process without external elements. This network graph is corresponding to the data flow only for the knowledge area. Figure 2(b) is a network graph when I considered “*a project document*”, “*the environmental factor of the body*” and “*the process assets of the organization*” as a node.

2.2 Management process of the PMBOK fifth edition

Figure 3 is the adjacent matrix based on the data flowchart of the PMBOK 5th edition. In the data flowchart of the PMBOK fifth edition, “Sponsor”, a “Customer”, and “Sellers” were added as new elements of external to processes.

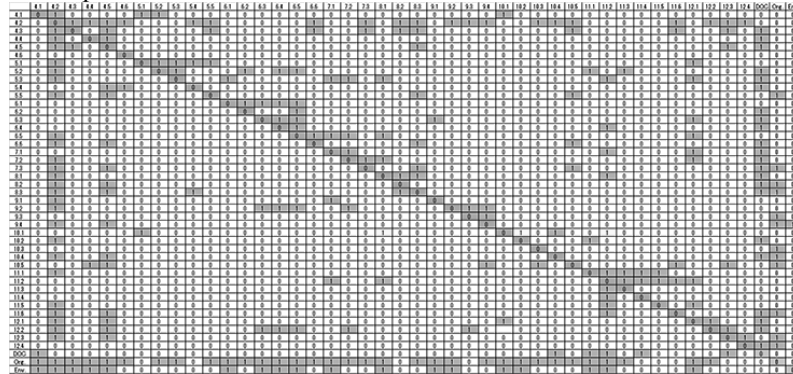


Figure 3

- (a) Adjacency matrix for mutual relations among 47 processes of PMBOK 5th edition
- (b) Adjacency matrix for 47 processes and “*Project documents*”, “*Enterprise environmental factors*”, “*Organizational process assets*”, “*Sponsor*”, and “*Customer*”, “*Sellers*”

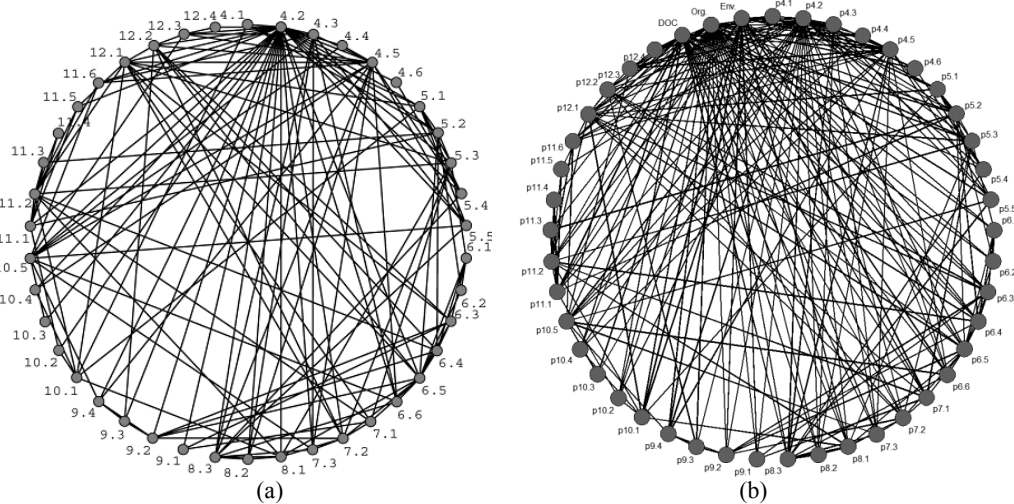


Figure 4

- (a) Network graph provided from the adjacent matrix shown in figure 3(a)
- (b) Network graph provided from the adjacent matrix shown in figure 3(b)

Figure 4(a) is network graph of 47 processes without external elements. Figure 4(b) is the network graph (expanded network) corresponding to the matrix including “*a project document*”, “*the environmental factor*”, “*the process assets of the organization*”, “*a sponsor*”, “*a customer*” and “*a seller*” in addition to 47 processes.

3 Data Flow Diagram for Stakeholder Management

The most important characteristic feature of the PMBOK 5th edition is that a stakeholder management knowledge area was added. The management processes for stakeholders were incorporated in the communication management knowledge area in the PMBOK 4th edition. The PMBOK 5th edition isolated these and described those as independent chapters.

The above-mentioned Small world network indication is insufficient while it is able to realize visualization of the concept structure of PMBOK to describe the management flow in the individual knowledge area. Therefore, the data flow diagram of the stakeholder management knowledge area is described in order to estimate the range where the stakeholder management had an influence on the management process. The data flow diagram for communication management knowledge area of PMBOK 4th edition is shown in figure 5. The data flow diagrams of the communication and

stakeholders management knowledge areas of the PMBOK 5th edition are shown in figure 6 and 7.

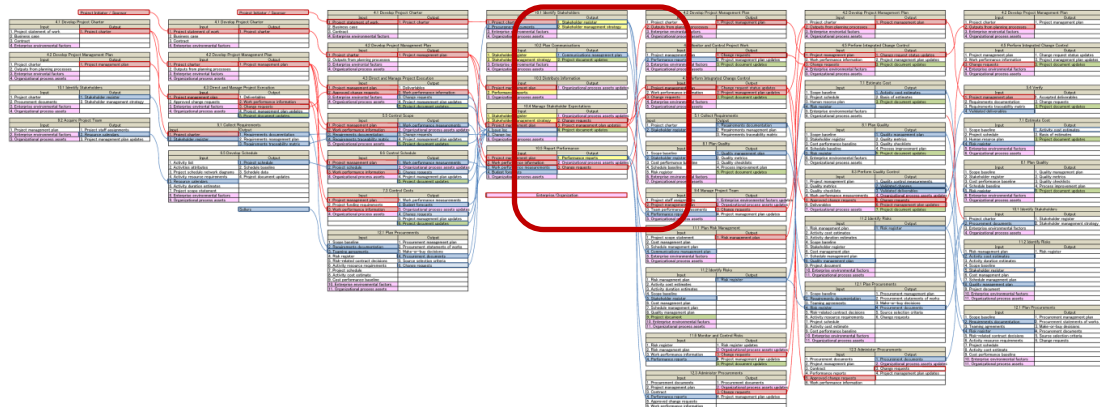


Figure 5 Detail data flow diagram of Communication Management Area of PMBOK 4th considered until the third proximity. Square is indicating the set of inputs & outputs of Communication Management processes in PMBOK 4th.



Figure 6 Detail data flow diagram of Communication Management Area of PMBOK 5th considered until the third proximity. Square is indicating the set of inputs & outputs of Communication Management processes in PMBOK 5th.

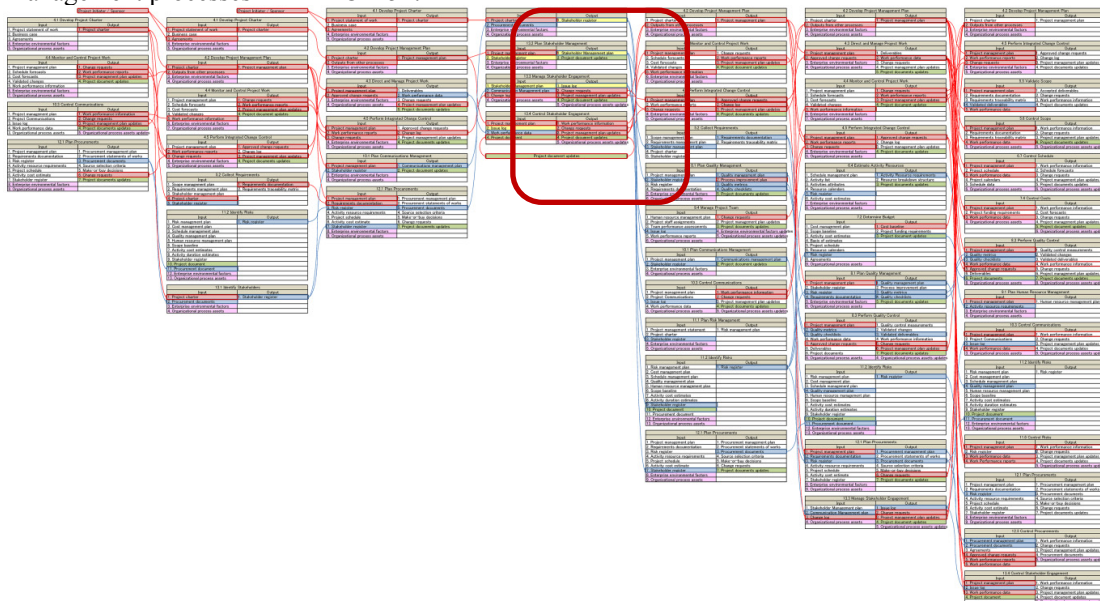


Figure 7 Detail data flow diagram of Stakeholder Management Area of PMBOK 5th considered until the third proximity. Square is indicating the set of inputs & outputs of Stakeholder Management

processes in PMBOK 5th.

4 Discussion

It is observed that network density of the expanded network graph which is including “*a project document*”, “*the environmental factor*” and “*the process assets of the organization*” shown in figure 2 (b) increases in comparison with figure 2(a). This means that three elements of “*a project document*”, “*the environmental factor*” and “*the process assets of the organization*” make the relations of 42 management processes stronger. In the comparison between figure 4(a) and figure 4(b), it is found a similar relation. Furthermore, it is considered that the density of the network graph of PMBOK 5th becomes higher rather than the one of PMBOK 4th edition.

The above-mentioned results indicate that, the network density of the PMBOK 5th edition becomes minute according to adding “*Sponsor*”, “*Customer*” and “*Sellers*” as new outside factor of the process and improvement of the management network by creation of project stakeholder management knowledge area as a new chapter.

5 Conclusion

Based on flow chart of the PMBOK fourth edition and the fifth edition, I visualized the concept structural analysis of each management process. As a result, I showed that the network structure of the process became minutes by supporting external elements having increased and a stakeholder management knowledge area having been established in the PMBOK fifth edition.

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Firm's Key Success Factors in Power Electronics Segment Based on the Dynamic Capabilities and Flexible Business Concept

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Abstract: Numerous events have taken place during recent years, of which many have had a huge impact on the way of doing business. Some of these events have even caused an economic crisis in world. This caused an un-certain and challenging business environment and has battered many managements that are running businesses all over the world. This paper supports the view that dynamic capabilities can be used successfully in a fast changing business environment for improving firm's efficiency.

This research is constructive approach including also several interviews and case studies. Key findings of the study are the elements of key success factors: entrepreneurship strategy, R&D performance, operational excellence and innovativeness. This research is focused on to power electronics business field which is study's limitation. This research helps directors and managers to think more widely and make better decision for success of the company. This research results bring additional value of the previous studies regarding dynamic capabilities and flexible business concepts.

Key words: Dynamic Capabilities; Entrepreneurship Strategy; Operational Excellence; Innovation; Agility.

1 Introduction

Due to tightening competition, firms need to be more agile and resilient in their business sector. The need of this agility is to make them more fit for the prevailing competition for the market. The competition requires firms that are agile, and resilient. However, this resilience should be in line with their resources, capabilities, and readiness of the firm; they should reconsider and reconfigure their dynamic capabilities. This reconsideration and reconfiguration should also be agile and resilient in order to cope up with the dynamic market.

In addition, the preparation for this process requires competent management and leadership. The management and leadership are responsible for guiding, planning, controlling and monitoring the whole process. It needs to be able to sense and respond to the market it targets and the market as a whole. It should also be innovative, as well as empower its subordinate to be creative and encourages them to make new innovative proposals. This should be done in a flexible but agile manner. The decision-making in the organization should be decentralized to speed up the implementation of the new ideas.

Furthermore, this management and leadership should be transformational in order to create an interaction between leaders and their subordinates^[1].

Conversely, Garvin argues that, a learning organization gets more skilled at creating, acquiring, and transferring knowledge which in turn helps it to adapt to new knowledge, interaction behaviour and insights^[2]. This interaction and communication allows for peer learning, teamwork building, collaboration, and creative thinking. This creativeness becomes innovative knowledge and technology that helps in problem solving; i.e. overall performance of the organization^[3]. There is also evidence that, training and development has been associated with increasing market share and growth^[4]. Such knowledge could be extended further to global operations or large-scale operations.

The study in this paper suggests a model that can be used by organisations to be successful in a turbulent market environment. This model combines the theory of science and methodology. The models' methods and its paradigm have an influence on the research problem and it is implemented in this research. The contribution achieved from the research, could suggest that, organisational management should have a competent entrepreneurial strategy that is unique.

2 Thoretical Dramework and Research Design

The model theory comprises of different literature from numerous authors. One of the key literature theories comes from Robert^[5]. Although this model could be implemented in firms, the results from the case study should not be generalized, but to expand and generalize other theories. However the design of

the case study covers units of analysis, suggestion logic linking data to the propositions, criteria for interpreting the findings and answering the three study questions;

Qn1. How is strategy architecture developing?

Qn2. How to implement necessary changes in dynamic capabilities?

Qn3. What are the key success factors for high technology (power) electronics companies with global operations?

The model is designed to meet the construct validity, internal validity, external validity, and reliability checks due to the reliability of the informants that were used for collecting data.

The model uses a constructive research approach, which is normally used in the discovery process, where, there are many possibilities that are still open, in the sense of ontological choices. The model extends on the already existing knowledge to piece and fix the possibly missing links.

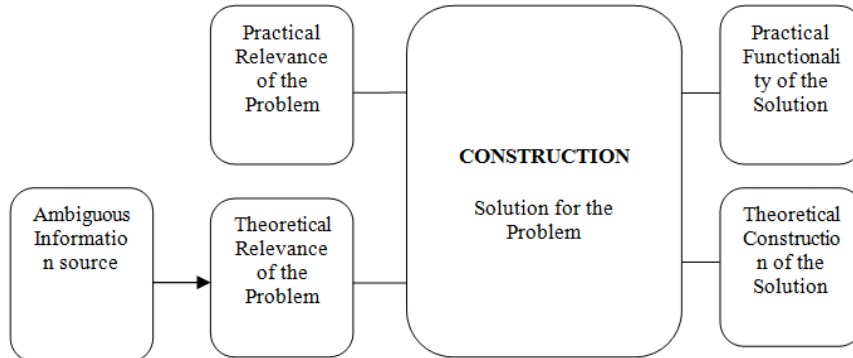


Figure 1 Model Theoretical Diagram Adapted from Constructive Research Approach in Business Science

The central research question of this paper is as follows: Can you create enterprise architecture framework for the firms which have global business and are operating in a turbulence business environment to handle dynamic capabilities and agility in an effective way. The main question has been divided to the three sub questions by using ontology terminology:

(1) What are the main classes (and subclasses elements) that a company should take into account to be successful in a turbulence global business environment?

(2) What are the most important slots?

(3) What are the slots that are most important?

2.1 Literature review

2.1.1 The theoretical construction of the model

The theoretical construction of the model is based on the concepts of dynamic capabilities (flexibility and responsiveness) to achieve agility in an organization in order to improve organization performance [6].

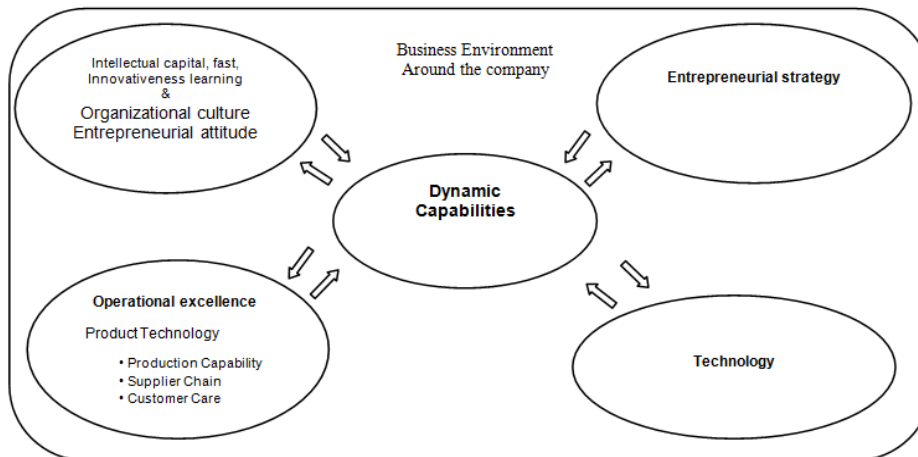


Figure 2 Theoretical Construction of the Model

The figure above (Fig 2) illustrates the flexibility and responsiveness of the model that is used in

the research. The theoretical construction is supported by dynamic capability framework that is also comprises of three major elements: organizational structure, organizational performance, and competitive intensity^[7]. Despite the fact that organizational and firm performance is influenced by strategy structure performance, only little empirical research has been conducted to link it to the firm's dynamic capabilities.

2.1.2 Entrepreneurial strategy

In entrepreneurial strategy, there should not be a gap between business management and technology but they should rather be intertwined^[8]. The two business and technology strategies are viewpoints dualistic viewpoints to a mutual strategy. Strategy, in a business, organizes the firms' resources to position its self to win and no two-organizations' thought of strategising the same way. This has its root from many angle of the firms' processes, strategy, resource and positioning; just to mention a few.

It should be noted that the creation and implementation strategic management of technology has its challenges. It is ideal to for firms to think while linking business and technology developments as a common strategic discussion. Hakkarainen & Talonen suggested that strategic thinking should be in three levels; Strategic Level for strategic positioning and generation (developments), Tactical Level for continuous planning and adaptation (short-term) and Operational Level for Implementation (long-term). They also observed that at strategic challenges required a better understanding of the internal and external business environment changes analyse potential and then consequently make decision on strategic business options for the future^[9].

2.1.3 Innovation

There is an impact of innovation on innovation process and product innovation. Technological change in many cases triggers innovation which in turn acts as a driver in firms' competition as well as economic process development. Management need to be concerned about how far institutions and organisational forms promote innovations due to its' influence in industrial organisation, market and supply chain, economic policy. Furthermore, in many cases, innovation is used by many companies as a competitive strategy as well as market leadership. Although this is the case it should be noted that, many firms that engage in such strategy should be will prepared technologically as well as financial; Resource and Knowledge based View (R/KBV). Overlooking this fact has led many firms to bankruptcy.

2.1.4 Decentralized decision making organization model

In today's competition and un-certain markets, globalisation has been on an increase for many organisations. These decentralised units can be seen as "teams" of the organisations, and need to be standardised with complete competitive advantages and access to competencies most especially in Research and Development (R&D). However, these come with challenges such as collaboration, integration, and networking, to mention a few, that require a dynamic strategic management that is efficient and will supervision these strategies^[10]. All this supervision requires effective decision making in these distributed project teams. Bourgault, & Nathalie suggested that dynamic strategic management approach is how firms us their planning technique to reach their goals, as variables' change with time. In addition, it should be a growing planning process, flexible internal and external factors, manageable and sharable in order to show individuals their targets^[11].

A study made by Rubenstein on the problem of decision-making, in phases like analysis and statement of alternatives, best choice from the alternatives, communication and implementation of the decision as well as checking to see whether the decision was implemented as intended^[12]. Rubenstein observed that, in a role of top management or supervision, there should be a clear idea of the objectives for which the company supports its R&D.^[12] Conversely, in an intensive empirical study using a quantitative approach study made by Bourgault, & Nathalie, on decision-making processes in New Product Development (NPD) linked to team autonomy, revealed that, formal decision-making process is even more important for distributed teams that are highly dispersed. In addition, autonomy is very important for the success of dispersed teams while formalization will add value to teamwork, most especially when team distribution is on the increase. This may see less formal decision-making process and teams may use it as a strategy, however, the top management should retain central role on the decision of how far should dispersed team be empowered.

2.1.5 Effective processes

How should industries new product manager take to improve new product performance? In the past decades, a lot of research into reasons for new product success and failure has contributed to effective new product management. It is crucial to acknowledge technical opportunity, market, proficient internal R&D management, decision-making process, and logistics^[13]. In addition it is also important to have

modularity in an effective process ^[14]. This is advantageous in today's competition as a strategy to improve on the lead time. In addition this is also used to catch up with the growing diversity of the market demand in variety of products.

2.1.6 R&D performance

The ideology of performance in new product and innovation was also theorised as capitalist economic evolution; process of the innovative renewal of business routines. In addition, the development of economics requires coordinated efforts within the "fundamental fields" of theory, history, statistics, and economic sociology ^[15]. Although Research and Development (R&D) projects are necessary for outstanding corporate performance it still remains a big risk. Some studies revealed that many new products remain stable at less than 55%. Although this is the case, the past decades have revealed that for instance, in the 70s' and 80s', new products accounted for 20 % and 33 % of corporate profits respectively ^[16]: 139, and the number is still at the increase today; since this is the focus for many firms, the cost is also increasing.

An intensive study made by Keller, revealed better performance in, technical quality, and better budget of cross-functional teams in research and new product ^[17]. However, there is still need for individual effort in the teams. In addition, Trent made a study on managers on how global leadership teams are coping with these challenges of essential qualities revealed that, teams should also be agile in their thinking and who to involve in the decision-making processes, flexible and have a charter and operating principles ^[18]. This save a lot of time and that may be caused by bureaucracy and un-necessary waiting or confirmation from the superior authority, yet some times, the market makes the decisions. Berman argued that, a firms' strategy process, that involves market with technological knowhow, would bare fruits in a number of innovative sectors. When responding to market changes, firms may find themselves setting the pace of innovation in their industries, consequently leading the competition ^[19]. For that matter, firms should value their customers a part of the brain power that drives innovation and performance.

Conversely, the model in this study is related to performance and Total Quality Management (TQM). Total Quality Management has been considered as a management tool for many businesses to keep the competitive advantage ^[20]. There are some earlier studies that argued that quality could be a strategic advantage core variable for firms in competition. A study made on improving Product Development (PD) performance using concurrent engineering (CE) suggested that, CE has diverse views and applications in and has potential to improve the performance on innovation and New Product Development ^[21]. The study examine further how responsible is Total Quality Management in increasing the performance of firms.

3 Results

3.1 Key success words in next five years period

Below (Fig 3) is the graph of the answers to the question; what are key success word in next five years period?

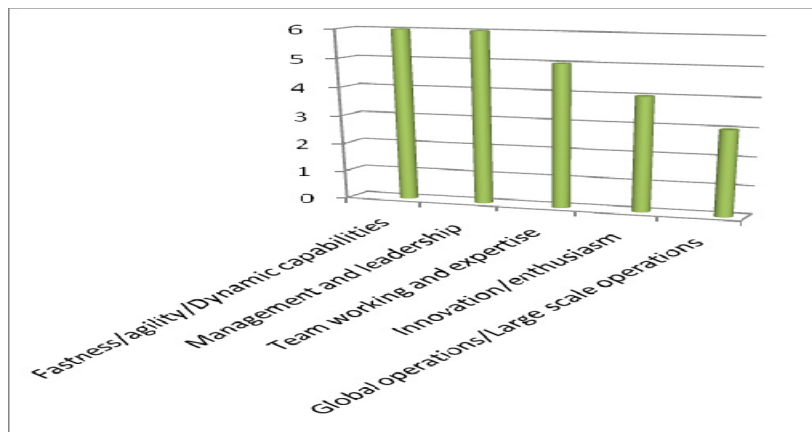


Figure 3 Key Success Words

The X-axis lists all the categories which are mentioned most often. The Y-axis shows the number of answers in the each category. On the graph we can see that all of the interviewee said that in the future most important issues are the reaction fastness to the changes around the company as well as

management and leadership skills. Especially for high tech companies where technology develops rapidly, it is lifeline for the companies to be fastness and agility.

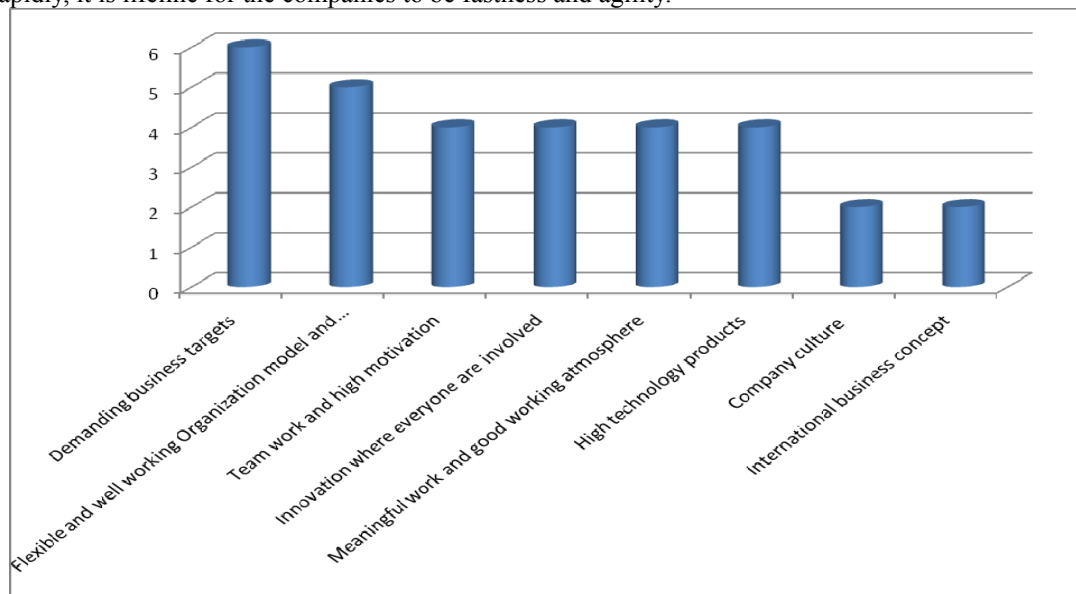


Figure 4 Ideal Company Profiles

3.2 General indicators of factors affecting success in the case study

Dynamic capabilities in high technology power electronics field based on the analyzes and interviews that were made can we summarized following key success factors or classes under the dynamic capabilities to be most important factors in high technology power electronics field:

- ✧ Strategy
- ✧ R&D Performance
- ✧ Operational excellence
- ✧ Intellectual capital

4 Conclusion

It seems that firm's size as well as globalization level effects to the importance level of classes defined above. We can summarize that international operated companies need wilder competence and knowledge platform than local companies. Entrepreneurial strategy, effective processes, innovativeness and dynamic capabilities which take environment changes to the account are one way to develop a more agile customer oriented company^[22] and^[23] in order to avoid failure^[24]. Working in collaboration with customer and partners, it is possible to understand customer needs more deeply and to achieve more faster, flexible, and more agile processes to support the changing customer needs^[25]. The aim of this study was to understand and to analyze factors that are most important to the customers in a power electronic business industry. One of the key findings was the importance of effective information flow in a global business. This is related to the communication of technical, delivery, installations and service matters.

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The Current Situation and Strategy Choice of Technology Sourcing Foreign Direct Investment in the U.S. by Chinese Enterprises*

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Abstract: The paper uses qualitative analysis method to describe current situation of technology sourcing foreign direct investment (TSFDI) by Chinese enterprises in the United States from viewpoints of investment motive, principal investors, investment industry, investment destination and entry mode, showing a good development but still lag behind. In order to enhance overseas technology sourcing effect, the paper concludes effective strategies less discussed in existing studies. Chinese government should promote private enterprises to join TSFDI and encourage the service sector to participate in FDI, especially to seek knowledge in high-end services in the US. Besides, Chinese enterprises should strengthen their regional layout in technology centers and industry clusters in the US, and comprehensively utilize a variety of entry modes.

Key words: Chinese enterprises; Technology sourcing foreign direct investment; Technology innovation

1 Introduction

In early 20th century, global economy has entered into an era mainly driven by knowledge and technology. There is no firm of any country in international economic competition not to build its competitiveness on technology and capability. Recently, technology sourcing foreign direct investment(TSFDI) has become an important channel of international technology diffusion and an essential mechanism of enhancing technological R&D efficiency for multinational firms.

Technology Sourcing Foreign Direct Investment, namely TSFDI, refers to firms with leading efficiency domestic but lagging behind foreign technical level buy R&D departments of high-tech multinationals abroad, or set up overseas technology development subsidiaries and R&D institutions with sole proprietorship or joint venture, aiming at gaining crucial knowledge such as advanced technology and organizing ability to improve competitiveness effectively.

TSFDI Study started in discussion on FDI's motives and determinants by enterprises from developed countries. Kogut and Chang (1991) investigated Japanese enterprises investing to the U.S. and drew conclusions that access to technology was the motivation of Japanese FDI, and joint venture was an important way. Similar conclusions were drawn by Yamawaki(1993). Neven and Siotis(1993,1996) argued technology was an important driver for American and Japanese FDI, and M&A, joint venture and participation were more likely to be used by TSFDI enterprises to maximize technology spillovers. Branstetter(2001) showed FDI in the US was an important way to acquire knowledge overflow for Japanese enterprises. Cantwell(2004) pointed out American companies investing in British manufacturing was indeed to get technology, with obvious industry difference in technology acquisition effect. Pradhan J. P. and Singh N(2009) found India's auto manufacturing enterprises went abroad through FDI to get technology, market and information.

Study on R&D internationalization also offers evidence that seeking technology may be FDI's motivation. Cantwell, Hodson (1991) and Fors (1998) found setting up R&D institutions abroad was driven by technology acquisition. To gain knowledge from 'center of excellence' in foreign countries was the purpose. Serapio and Dalton (1999) analyzed the U.S. R&D inflows and concluded that foreign parent companies in pharmaceutical, biotechnology and electronics had established or acquired local R&D institutions to obtain technology and improve their global capacity in technological development and innovation. Kuemmerle (1999) pointed out in order to gain more R&D resources, multinationals built their R&D institutions mainly near universities. Based on British manufacturing analysis, Nigel Driffield, James H. Love (2003) proved technology was overflowed from domestic industry to foreign multinationals and the reverse technology spillover confined to relatively intensive R&D industries.

To sum up, TSFDI study starts late and is not systematic. Conclusions based on empirical analysis

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are different and analyzing methods need further improvement. Especially, further research on Chinese TSFDI in a particular host country is less. Thus, the study on Chinese TSFDI in the U.S. is of theoretical significance. Besides, under the background of increasing TSFDI, the discussion on features, problems and strategies of Chinese TSFDI in the United States will enable Chinese firms be clear about the gap between themselves and leading multinationals, and their future development direction: acquiring technology spillovers from host countries to improve international competitiveness.

2 The Current Situation and Characteristics of Chinese TSFDI in the U.S.

Compared with TSFDI in the U.S. by multinational companies from developed countries, Chinese enterprises started to implement TSFDI in the United States late, and lacked experience and technological strength, thus presenting following features in investment motivation, investment subject, investment industry and destination, and entry modes.

2.1 Investment motivation: seeking technological advantage and nurturing domestic R&D

Different from TSFDI motivation (for both technological advantage using and technology learning) in US by multinationals in developed countries, Chinese TSFDI in US is mainly to seek technology advantage. By purchasing strategic assets such as technology, brand and transferring new technology, Chinese enterprises improve transnational operating efficiency especially technology innovation ability, and nurture domestic product R&D. Chinese enterprises attach great importance to the US market. Lixin Cheng, the president of north American of ZTE, believes that the US is the world's most high-end and biggest telecom market and ZTE should take the leading position in American market to become the world's outstanding communication enterprise. Once setting up the brand in US market, for the global is an exemplary role. In addition, innovative ability seeking from US can also regurgitate product R&D in other markets. Therefore, the purpose of Chinese TSFDI in the US is to acquire advanced technology to enhance competitiveness in domestic and international market.

2.2 Diversified investment subjects

Chinese TSFDI in the US is mainly conducted by large and medium-sized enterprises with strong technological strength. Relying on existing economic power, technical ability and policy support, they set up international joint venture and wholly owned enterprises in technology-leading developed countries and developing countries, learning and absorbing advanced technology and high-tech resources. Investment subjects tend to be diversified in recent years. Take Chinese direct investment stock in the U.S. for example, from 2000 to 2012 in the third quarter, a total number of 593 Chinese direct investment took place, with 149 deals by state-owned enterprises, involving the amount of \$12.609 billion, accounting for 55.7%; and 444 deals by private sector, occurrence amount of \$10.016 billion, accounting for 44.3%.¹ Especially in industries of electronic and information, mechanical manufacturing, biomedical, aerospace and vehicle transportation and renewable energy, Chinese direct investment in the U.S. belongs to typical TSFDI. In these sectors, state-owned enterprises' investment value is \$4.607 billion, accounting for 49.7% and private sector's investment amount is \$4.659 billion, accounting for 50.3%. Take Chinese investment flows to the U.S. in these industries for example, state-owned enterprises' investment amount accounted for above 50% in calendar year 2009-2011.² When Chinese firms go abroad supported by government's policy or conduct transnational M&As to acquire strategic assets, they should pay attention to avoid bringing negative images of threatening national security to host country's government. Especially, Chinese state-owned enterprises which get low-cost overseas M&A loans to buy American key technology firms in sensitive industries, are vulnerable to U.S. government's resist. Chinese TSFDI investors tend to be diversified, and listed companies and private enterprises without a close connection with government are more welcomed by the U.S.

2.3 Investment industry: concentrated in high-tech manufacturing and recently involved in advanced services

Chinese TSFDI mainly tend to invest in high-tech manufacturing. Take China's direct investment in the U.S. for example, since 2008, the biggest growth has been in manufacturing, with both acquisitions and greenfield investment, including strategic assets-seeking M&A. From 2000 to 2012 in

¹ Daniel Rosen, Thilo Hanemann. Chinese FDI in the United States: Q3 2012 Update[R]. <http://rhgroup.net/interactive/china-investment-monitor,2012-10-08>

² Daniel Rosen, Thilo Hanemann. An American Open Door? Maximizing the Benefits of Chinese Foreign Direct Investment[R]. http://www.asiasociety.org/files/pdf/AnAmericanOpenDoor_Chinese.pdf, 2011-05-04

the third quarter, according to investment value, most Chinese TSFDI in the U.S. was in industrial machinery, equipment and tools, followed by electronic equipment and parts. And there is a certain correlation among investment industry, investment subject and entry model. From table 1 and table 2, for Chinese FDI to the U.S., in the aviation and automobile transportation industry, state-owned enterprises dominate and opt for M&A; In IT industry, private enterprises dominate and often adopt transnational M&A; In biological medicine, private enterprises dominate and use both greenfield and M&A; In machinery manufacturing, state-owned enterprises dominate and private firms perform actively, mainly adopting greenfield and starting to use M&A; In renewable energy, state-owned and private companies are all involved and pay equal attention to both greenfield and M&A.

Recently, Chinese companies began to seek assets in American advanced services by cross-border M&A. In May 2012, with \$2.6 billion, Dalian Wanda Group Corp Ltd, the largest theater owner in China and Asia, acquired AMC Entertainment, the world's second-largest cinema chain. Wanda's merger with AMC acquired high-quality resources in the whole world, including 346 theaters, a total of 5028 pieces of screens, and became the largest and defining M&A by Chinese private enterprise entering to the cultural industry in the US. In December 2012, China's enterprise group led by Xinhua Trust spent \$5.28 billion to acquire a 90% stake of international aircraft leasing finance company (ILFC), under American international group (AIG), and mastered its customer resources of more than 80 countries and regions in the world, and more than 1000 aircraft and new orders of 239 energy-saving planes.¹ In March 2013, Shenzhen Huada Gene made a \$118 million acquisition of Complete Genomics company in the US, the innovation leader of human's whole genome sequencing. The combination of two companies would create the integration of complementary advantages of both sides in science, technology and R&D, which enabled Complete Genomics to become a more successful global innovators, and also made Huada Gene to obtain complete and accurate technology of human genome sequencing.² China's TSFDI in the U.S. has begun to expand into high-end services and Increasing Chinese services multinationals go abroad, seeking cutting-edge technology to build strong global competitiveness.

Table 1 The Ownership Distribution of Chinese TSFDI in the U.S. in 2007-Q₃2012 (\$ millions)

industry \ year	2007		2008		2009		2010		2011		Q ₃ 2012	
	G	P	G	P	G	P	G	P	G	P	G	P
Aviation, Automobile Transportation	0	80	1	7	101	10	471	13	621	16	156	4
Electronics, Information Technology	7	67	2	252	12	10	33	206	32	396	3	15
Biological Medicine	0	3	0	375	5	1	53	40	0	76	0	22
Machinery Manufacturing	4	102	0	24	1350	45	1275	33	31	53	0	87
Renewable Energy	0	16	0	20	75	49	219	105	12	148	7	77

Source: <http://www.rhgroup.net/interactive/china-investment-monitor>
 G stands for government owned and P stands for privately owned.

Table 2 The Entry Mode Distribution of Chinese TSFDI in the U.S. in 2007-Q₃2012 (\$ millions)

Source: <http://www.rhgroup.net/interactive/china-investment-monitor> G stands for greenfield and A stands for

industry \ year	2007		2008		2009		2010		2011		Q ₃ 2012	
	G	A	G	A	G	A	G	A	G	A	G	A
Aviation, Automobile Transportation	38	42	3	5	11	100	30	454	240	396	156	4
Electronics, Information Technology	27	47	14	240	19	3	40	199	82	346	6	13
Biological Medicine	3	0	2	373	6	0	7	86	41	35	15	6
Machinery Manufacturing	81	25	24	0	1004	391	31	1276	75	9	17	70
Renewable Energy	16	0	0	20	49	75	305	20	127	33	68	16

¹ Daniel Rosen, Thilo Hanemann. Chinese FDI in the United States: Q4 2012 Update[R]. <http://www.rhg.com/notes/chinese-fdi-in-the-united-states-q4-2012-update>, 2013-1-16

² Daniel Rosen, Thilo Hanemann. Chinese FDI in the United States: Q1 2013 Update[R]. <http://www.rhg.com/notes/chinese-fdi-in-the-united-states-q1-2013-update>, 2013-4-30.

acquisition.

2.4 Investment destination: distributed in technological forefront headed by California

Chinese TSFDI mainly targets at developed countries and some developing countries of industrial cutting-edge technology. The U.S. is rich in advanced technology, such as core techniques in computer, aerospace, new materials and etc. Thus, American is a preferred location by Chinese TSFDI. Take Chinese TSFDI stock in the U.S. for example, from 2000 to 2012 in the third quarter, California is an important area for Chinese investors, with a total number of 163 deals and investment amount of \$1.4 billion. Electronic equipment and IT industry are hot in California, with investment amount of \$878 million, 62.7% of which flowing into California for acquiring advanced IT resources (see Table 3). Besides, industries such as renewable energy, biological medicine, machinery manufacturing, aviation and automobile transportation are also targets for Chinese enterprises. California has many obvious advantages. California is the largest market in the U.S. and the portal to the rest of American market; California is the global leader in high-tech and high value-added service. Chinese enterprises are not only weak but also eager to invest in these industries. These unique advantages attract Chinese investors to California.¹ New York ranks second, with the number of 47 deals and a total amount of \$3.2 billion. Electronic equipment and IT industry become the first goal with \$1.94 billion flowing into, followed by renewable energy, biological pharmaceutical industry, etc. Texas ranks third with a total of 46 deals and amount of \$2.7 billion. Besides fossil fuels and chemicals industry (\$1.408 billion), machinery manufacturing is dominant, with investment amount of \$1.132 billion, followed by electronic equipment and IT, renewable energy industry. Illinois is the fourth with a total of 40 deals and the amount of \$2 billion. Machinery manufacture ranks the first place for \$1.537 billion, then for renewable energy (\$278 million), electronic equipment and IT industry (\$105 million). Michigan ranks fifth with 34 deals and \$958 million. Air and automobile transport with \$912 million is in the first place. Thus, industries such as electronic equipment and IT, high-tech machinery, renewable energy, biological, pharmaceutical, aerospace and vehicles transportation have become investing targets for Chinese TSFDI. California, New York, Texas, Illinois and Michigan, based on their respective advantages, build technological innovation forefront in different industries and become Chinese TSFDI's target destinations.

Table 3 The Destination Distribution of Chinese TSFDI in the U.S. in 2005-Q3 2012

(\$ millions)

industry \ location	California	New York	Texas	Illinois	Michigan
Aviation, Automobile Transportation	14	3	7	37	912
Electronics, Information Technology	878	1940	70	105	0
Biological Medicine	35	51	1	0	0
Machinery Manufacturing	24	0	1132	1537	31
Renewable Energy	114	103	41	278	0

Source: <http://www.rhgroup.net/interactive/china-investment-monitor>

2.5 Entry mode: adopting transnational technology sourcing M&A to obtain creative assets

Chinese multinationals are increasingly using transnational technology sourcing M&A in the US, in order to quickly absorb and master important creative assets of target enterprises, and regurgitate domestic technique defects. Take Chinese FDI in the U.S. for example, from 2000 to 2012 in the third quarter, a total number of 593 cases of Chinese FDI took place, with 389 cases of greenfield investment(\$3.575 billion), and 204 cases of acquisitions(\$19.05 billion). In 2010, there were 25 greenfield projects and 34 acquisitions and the number of transnational M&A started more than greenfield. The investment amount of M&A is much higher than greenfield overall. When it concerns host country's economic security, entry mode is closely related to many factors such as industry, specific technology and investment subject. Take Chinese FDI in the U.S. for example, in politically sensitive sectors such as aerospace, oil, communications and etc, if Chinese firms use cross-border M&A, they will be restricted to buy below the holding level. In insensitive industries, Chinese firms are increasingly buying assets rather than equity, and private enterprises and listed companies are more popular. Recent Chinese FDI in the U.S. Shows that the proportion of greenfield investment is higher than the average in

¹ Daniel Rosen, Thilo Hanemann. Chinese Direct Investment in California[R]. <http://www.asiasociety.org/centers/northern-california>, 2012-10-30

other countries before 2010. The greenfield investment is mostly conducted by Chinese owned companies in communications equipment, renewable energy, biotechnology, aerospace, engine and pharmaceutical.

3 The Strategy Choice of Chinese TSFDI in the U.S.

Dominated by multinationals in developed countries in fields of technology innovation and TSFDI, strategy choice should be made by Chinese TSFDI enterprises to promote technology acquisition effect.

3.1 Multiple support for private enterprises in TSFDI

As for multinationals in developed countries, both large-scale group and small and medium innovative enterprises are important subjects to promote TSFDI development. Thus, a strong enterprise team of flexible mechanism and diversified subjects is needed in Chinese TSFDI. In July 2012, the national development and reform commission (NDRC) announced the 12th five year plan about guiding principles of China's inward and outward FDI development. In terms of Chinese outward FDI, investment decision-making quality and private sector investment promotion are both emphasized. Thus, under the guidelines, small and medium-sized enterprises should be encouraged to participate TSFDI supported by policy guidance and financial backing. Especially involving in M&A in politically sensitive industries of developed countries, Chinese private companies tend to avoid the negative image of threatening national security and the boycott of developed countries' governments, to successfully obtain key technology.

3.2 Strengthening TSFDI layout in high value-added service

In terms of TSFDI by enterprises in developing country, Indian firms conduct TSFDI in high-end service industry gathered with intangible assets, to achieve strategic breakthrough quickly. In high-end service industry, most Indian investment focuses on industries of information services and software services. The seven biggest Indian multinationals in service sector are engaged in services of processing data, software and computer programs. India's technology sourcing M&A often occurs in the service industry of telecommunications software, and M&A object is mainly American and British companies. Thus, Chinese enterprises should strengthen TSFDI in high value-added services on the basis of consolidating TSFDI in high-tech manufacturing in order to improve investment efficiency and to maximize overseas technology acquisition effect.

In July 2012, NDRC published the 12th five year plan, which listed advanced manufacturing, energy, mining and agriculture as priority and encouraged firms to conduct FDI in high-tech manufacturing, R&D and advanced services. This suggests that the Chinese government is actively encouraging and guiding service multinationals to invest abroad, and also provides institutional guarantee for Chinese enterprises to promote TSFDI in the US.

3.3 Maximizing spillover effect in industrial clusters of leading technology

Chinese TSFDI in the U.S. mainly concentrated in California, New York, Texas, Michigan and Illinois. California and New York are clusters of advanced IT enterprises. Texas enjoys developed manufacturing, with Illinois preferring developed machinery industry and Michigan possessing developed auto transportation. Based on their advantages, these states build technological innovation forefront in different industries. At the same time, industrial clusters are concentrated with resources and technology in whole value chain, such as strict buyers, specialized suppliers, human resources, financial institutions and well-developed supporting organizations. Enterprises in the cluster are likely to acquire talents, information and new technology, to be more capable of innovation. Therefore, on the basis of original geographical distribution, Chinese enterprises should strengthen strategic layout of industrial clusters of leading technology in the US.

3.4 A Comprehensive and flexible use of diversified entry modes

Experience of TSFDI by leading multinationals shows that a comprehensive and flexible use of various entry modes such as setting up overseas R&D institutions, establishing international technology alliance and conducting transnational M&A is the best choice. In recent years, Chinese companies are increasingly using transnational technology sourcing M&A in the US, in order to quickly acquire creative assets. However, recent events indicate that Chinese M&As towards key technology industries and enterprises often suffered block from the U.S. Congress. In order to invest smoothly, China's enterprises should fully understand characteristics of technology, enterprise and environment, use various entry modes of establishing overseas R&D institutions, international technology alliance and transnational M&A comprehensively and flexibly.

4 Conclusion

Chinese TSFDI in the US, a global technology-leading nation, just get started, showing a good development in investment motives, principal investors, investment industry, investment destination and entry mode. However, because of late start, lack of experience and technical strength, Chinese TSFDI has obvious gap with advanced multinationals. To promote overseas technology sourcing effect and regurgitate domestic enterprises and industries effectively, under the guidance of national FDI principle, Chinese enterprises should actively and flexibly select the strategy: private enterprises of strong international competitiveness should join TSFDI; technology acquisition in high-tech manufacturing should be consolidated and technological layout of high value-added services should be strengthened; the regional layout of technology hub and industrial clusters in America should be strengthened; various entry modes should be comprehensively utilized.

TSFDI by enterprises in developing countries is a relatively new research subject, involved in international economics, development economics, management economics and other fields. In future, China's country-specific and industry-specific TSFDI will become one research direction. Besides, the in-depth exploration and empirical analysis on micro mechanism of technology upgrade and independent innovation through TSFDI will be another exploring direction.

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A Study on Credibility in Product Market and Its Influence on the Market Transaction

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Abstract: Credibility is the important behavior code which must comply in modern business conduct, but also an essential means to ensure fair market order. This article analysis merchandise transactions credibility between businesses and consumers, discusses the game process of credibility to build. The study showed that: when the institutional environment constraints of the market environment is effective, companies have an incentive to choose trustworthy, trade fairs occurs, consumers will receive a larger utility, enterprises have larger income; The key of market credibility to build is institutional environment.

Key Words: Credibility; Product market; Market transactions

1 Introduction

In the commodity trading market, credibility is a commitment made by the enterprises to consumer that the information of product quality, performance and so is true, this commitment usually does not have the legal enforceability. So, why make a commitment, why consumers believe this commitment?

In reality commodity trading market, the product information between enterprises and consumers is asymmetric, usually the understanding level of enterprises about its products is far beyond the understanding level of consumers such as cosmetics, Enterprises fully understand how much effect, but consumers do not understand. Consumers based on what to buy them? The first way is to collect all market and product information, to be fully understood before deciding to buy; the second approach is based on advertising and other readily available information and enterprises' commitment to deciding to buy. The first way, the information collection cost is too high; often more than the value of the consumers buy goods, this way consumers are not commonly applied. The second approach is dependent on the information of enterprises disclosure and believes in its authenticity.

To ensure that the interests of consumers are not compromised, manufacturers must be committed to its authenticity of the information disclosed, is the credibility of the enterprise. Credibility is a signal, indicating that the information is true. For enterprises, if not trustworthy, does not fulfill its commitments, it is necessary to lose consumers' money votes, in this sense, credibility enable enterprises to have to pay the price of telling lies, fraud, a enterprises' credibility is higher means the cost of tell lies, deceive is greater, and thus the more trust of consumers you can get.

2 Basic Concepts of Game Theory

Game theory studies are the theory of respective decision-making optimization among two or more than two interest groups through interaction. It with general decision-making optimization theory is different: it's interests, game theory involved in the conflict among the parties; party to implement the optimization of their decision, in order to maximize their individual interests; the interaction between people and other decision-makers in decision-making, it is a personal decision will affect another person, a person's decision will affect other people; in game theory, think that the participants are rational, that is to say the party has the ability to engage in logical thinking of rational level.

The concept of game theory contains rich content, the main action, participants, strategy, payment, information, results. In the various elements, the description of a game, must include three elements of participants, strategy and payment, these factors of operations and information are to increase the content. Action, participants and the consequences all become the "rules of the game". The game analysis, mainly in order to make the rules of the game is balanced.

The participants: in a game, the participants are the main body responsible for decision-making, participants must rely on the decision to make their payments to maximize. Participants may be composed of individuals and groups.

In order to facilitate the system analysis, includes not only the people involved in the general sense, in game theory, "natural" exists in the virtual participant. When the information is incomplete, natural selection participants in the game. For the general participants, the difference is, as a participant in the

virtual, "natural" does not have the pay and objective function of corresponding, that is to say, to nature, there is no difference between the results of all. In this paper, using N to represent natural, with $I = 1, \dots, N$, represent participants.

Action: action corresponds to the participants in the game process, when nodes appear in a game, and the decision variables corresponding to the participants. In general, the I in an action with AI said, if you want to express the set of all the available I choice of action, denoted by $A_i = \{a_i\}$. The result of action, and can be connected, can also be discrete.

In a game of n person, with the combination of actions is represented by the n individuals involved in the action of the set $a = (a_1, \dots, a_n)$, among them, AI said in the I element action. Here, there is a problem of relationship between action and is involved in the operation sequence. At the end of the game, one of the crucial factors to influence the results is the action sequence. In fact, different action sequence difference between dynamic and static game is made. We can see that, for those who participate in game, although have the same combination of actions, but when the selected action order is not the same, choose the best will correspond to different participants, is the result of the game is not the same.

The information: information is involved in the game of knowledge, especially associated with natural selection, and other participates about knowledge of action and characteristics. In game theory, in order to describe the basic characteristics of participants, description the concept of information set, information can be set that is in a specific moment, the participant to the variable value knowledge.

The strategy: the strategy is participants in certain information set condition selected action rules, strategy identified the involvement people in the choice of what kind of action at when. In the centralized information relates to a participant on before the relevant participants other action knowledge, participants can be determined according to the strategy for the involvement of other people how to make action decision, so people see what can be done according to the strategy, participation.

In general, said the I in a particular strategy with S_i for the actual, corresponding to the I in the strategy combination is $S_i = \{s_i\}$. If the N participants, a total of selection strategy in N, it will form a strategic combination, using n-dimensional vector expressed as: $s = (s_1, \dots, s_n)$

The payment: payment in game theory mainly refers to base on the specific strategy combination, obtained by the utility level. The basic characteristics of the game, to a participant, the payment has to depend on the strategic choice, on the other hand is also affected by the strategic decision related in other people's strategic choice, for all the people involved in the formation of functional relationship.

The results (outcome): the game analysis is more interested in the result, such as balanced actions combination, balance strategy combination and the equilibrium payoff combination.

The equilibrium (equilibrium): a balanced representation of all people involved in the game the best strategy combination, general with $s^* = (s_1^*, \dots, s_n^*)$ as equilibrium.

3 Analyses on Credibility Construction Game

If the transactions of enterprise and consumer are a one-time, then enterprises selling products will have two choices: one is honest, the other one is a dishonest; consumers also have two choices: one is to buy, one is not to buy. So the four possible strategy combination: 1 enterprise trustworthiness, consumers purchase; 2 enterprise trustworthiness, consumers do not buy; 3, the enterprise is not trustworthy, consumers purchase; 4 enterprises are not trustworthy, consumers do not buy. In different market environment, enterprises and consumers have different market behavior.

(1) Assume that the business incredibility will not be punished

First, corporate incredibility will not be penalized; severely damage the interests of consumers, but the income is still positive.

		enterprise	
		trustworthy	not trustworthy
customer	buy	100,100	50,150
	do not buy	0,0	0,0

Figure 1 Payoff Matrix

Assume that trustworthy and their income is 100, and consumers buy genuine products, its revenue is 100; nor punished when the enterprise is not trustworthy because of its deceiving consumers, their

income will be increased to 150, and consumers to buy low-value products, income for 50 (still available).

As shown in figure 1, the first column data of payoff matrix is the consumer's income, the second column data is the enterprise's income. In this environment, from the perspective of enterprises, consumers buy, the optimal choice is not trustworthy; consumers do not buy, the best choice is to be dishonest or trustworthy; from the consumer point of view, enterprise credit, the optimal choice of consumers are purchase, enterprises do not keep promise, optimum choice of consumers are buying because the commodity is a must for consumers, and the quality of goods is not too bad, still have some positive effect. In this one-shot game situations, the equilibrium is that (consumer purchase, enterprise does not keep the credit), transaction can still occur, but the consumer interests have been violated.

Second, enterprise incredibility, will not be penalized; severely damage the interests of consumers, income is negative

If the enterprise trustworthiness, the yield is 100, and consumers buy genuine goods at a fair price for the product, its yield is 100; when the enterprise is not trustworthy due to deceive consumers and not be punished, the revenue will be increased to 150, and consumers due to buy useless products, earnings for the -50 (product useless).

In this case, from the perspective of enterprises, consumers buy, the optimal choice is not trustworthy, consumers do not buy, the best choice is trustworthy or not trustworthy; from the consumer point of view, enterprise credit, the best choice is to buy; enterprise does not keep the letter, the best choice is not to buy. Equilibrium is (do not buy, not trustworthy).

(2) It is assumed that the enterprise incredibility will be punished, but to a lesser punishment

First, corporate incredibility will be punished, but to a lesser punishment; damage to the interests of consumers, but the benefits are still positive.

Assume that trustworthy and their income is 100, and consumers buy genuine products, its revenue is 100; when companies are not trustworthy deceive consumers income will be increased to 150, assuming that the deception consideration of -20, then business revenue becomes 130, and consumers to buy low-value products, income is 50 (still available).

From the business point of view, consumers purchase, the optimal choice is bad faith, consumers do not buy, the optimal choice of bad faith or trustworthy; from the consumer point of view, enterprise trustworthy, the optimal choice of the consumer are purchase, enterprises do not keep promise, the optimal choice of the consumer are also purchase, in this case, the equilibrium is (consumer for purchase, bad faith enterprise).

Second, the interests of consumers with the great damage, negative effect.

If the enterprise trustworthiness, the yield is 100, and consumers buy genuine goods at a fair price for the product, its yield is 100; when the enterprise does not keep your words to deceive consumers benefit will increase to 150, if cheating price for -20, then the profit becomes 130, consumers buy products because useless, earnings for the -50 (product useless).

In this case, from the business point of view, consumers buy, the optimal choice is bad faith, consumers do not buy, the optimal choice of bad faith or trustworthy; from the consumer's point of view trustworthy, the best option is to buy; companies are not trustworthy, the best option is not to buy. Environment is generally not disloyal, rational consumers expecting companies is not trustworthy, the final choice of consumers are not to buy.

(3) It is assumed that the enterprise will be severely punished incredibility

First, when corporate incredibility will be severely punished; damage to the interests of consumers, but the benefits are still positive

Assume that trustworthy and their income is 100, and consumers buy genuine products, its revenue is 100; income will increase to 150 when the companies are not trustworthy deceive consumers, assuming that the consideration for the deception -200 (be severely punished), then the income becomes -50, and consumers buy low-priced products, revenue was 50 (still).

From the business point of view, consumers to buy, the optimal choice is trustworthy, consumers do not buy, the optimal choice is trustworthy or bad faith; from the consumer point of view, and trustworthy enterprises, the optimal option is to purchase, corporate bad faith, the optimal choice of consumers is to buy. Given consumers purchase, the optimal choice is trustworthy, balanced (purchase, keeping promises).

Second, the interests of consumers have a lot of harm, the utility is negative.

Assume that trustworthy and their income is 100, and consumers buy genuine products, its revenue is 100; income will increase to 150 when the companies are not trustworthy deceive consumers,

assuming that the consideration for the deception is -200, then business revenue becomes -50, and consumers buy useless products, gain of -50 (useless).

In this case, from the perspective of enterprises, consumers purchase, the optimal choice of enterprise is a trustworthy, consumers do not buy, the optimal choice of enterprise is a trustworthy or not trustworthy; from the consumer point of view, enterprise credit, the best choice is to buy; enterprises are not trustworthy, the best choice is not to buy. In a generally good credit environment, rational expectations to the enterprise are faithful, finally selection of consumers is buy, enterprises will be trustworthy.

4 Conclusions

When the market environment and institutional environment fail, enterprises dishonesty will not be penalized or only receive a lighter punishment, enterprises choose not to keep credit. At this time, the market will have two kinds of situations, one is the interests of consumers have been infringed, but the deal still occurs; the other one is transaction does not occur. The first case is a lot of fake and shoddy goods on the market, poor corporate integrity, but consumers still buy goods, the transaction will still occur. The economic consequences of the second case are the consumer money in the bank, resulting in the enterprises' products can not be sold, market consumption is not enough, and the whole society's consumption scale is less than optimal. When institutional environment constraints of the market environment is effective, enterprises have an incentive to choose trustworthy, Fair happens, consumers get bigger utility, enterprises get larger gains.

The key of market credibility construction is institutional environment.

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Research on the Grain Processing Industry in the Central Region of China*

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Abstract: The implementation of strategies for boosting the rise of Central China gives a rare opportunity for the development of grain processing industry of Central Region. The development of Grain Processing Industry will improve the grain production level of Central Region and even that of whole country. This paper analyses the grain processing effects on food production, introduces the current situation of grain processing industry through a lot of data and depth study the existing problems of grain processing industry in Central Region, and puts forward some proposals to promote the development of grain processing industry in Central Region.

Key words: Central Region; Grain processing industry; Grain production

1 Introduction

Grain is the foundation of economic development, social harmony, and national independence. Furthermore, it relates to the economic independence and security, the social stability, and the realization of well-off society. Since 2004, the *Central No.1 Document* has proposed to accelerate the development of agricultural product processing industry, including the grain processing industry. In 2008, after the adjustment of tax directory of the primary processing of agricultural products, the tax burden of the grain processing enterprises was greatly reduced. In 2009, the *State Council opinions on further promoting the development of small and medium-sized enterprises* gave a key support to the development of these enterprises, and the macro environment for the development of grain processing industry was gradually improved. *Grain and oil processing industry in the Twelfth Five-Year Plan*^[1] and *Grain processing industry development plan (2011-2020)* were enacted in 2012, which provided a solid policy foundation for the further development of the grain processing industry.

As China to further strengthen policies to aid agriculture and to benefit farmers, grain processing industry is increasingly concerned by many relevant researchers. Ding Shengjun^[2] studied on the decision power for driving the development of grain processing industry is the ability of science and technology innovation, and the guiding ideology, basic principle and correlation content of science and technology integration innovation for grain circulation will be expatiated. Li Lite^[3] pointed out that agricultural products processing has already been a bottleneck which restricted the agricultural development. The primary outlet of agricultural products and grain processing is industrialization of dining table food. Wang Chunhua^[4] researched the problems and causes of food processing industry of China, and gave some countermeasures to solve the problems. Meanwhile, the *Plan to boost the rise of Central Region*^[5] was discussed and passed by the State Council on September 23, 2009. It is clearly noted that the government should focus on strengthening the building of grain production bases, improving the agricultural comprehensive production capacity, and building the Central Region as the grain production bases with high and stable yield. So, this paper researches on the problem of grain processing industry in Central Region has important theoretical and realistic significance.

2 Effect of Grain Processing on Food Production

2.1 To regulate the balance between grain supply and demand

Grain Processing is a balance between grain supply and demand. In developed countries, grain processing industries can make a timely processing of the superfluous food, which is good to keep a stable grain price and to ensure the peasants' production can be timely afforded financially. Thus, a good circle, from production to consumptions and stimulating reproduction, will be formed. Especially at present, conditions of food productions are further improved, so the development of food processing industries is an important way to prevent the situations that there is no food to be purchased or a huge price fluctuating.

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2.2 To effectively promote the circulation of grain

Food processing industry is an important part of developing modern agricultures. The development of grain processing industry can effectively link up the food industry chain, promote food production, and increase the income of farmers. At present, the state has put forward a series of preferential agricultural policies, the relationship between grain supply and demand continues to improve, and the food supply is abundant. So speeding up the development of food processing industry has become more urgent.

2.3 To improve the people's living standards

Food processing industry affects thousands of households' living and their daily meals. The improvement of people's living standard has put forward higher demand for it. The food processing industry also plays an important role in the realization of the convenience main food, the formation of convenient and quick market supply system, and the improvement of food structure.

2.4 To solve the "Three Rural Issues"

The main methods to solve the "Three Rural Issues"(the problems about agriculture, rural areas and peasantry) are the development of food processing industries and the improvement of agricultural industrialization. Through the deep processing of food products, the added value of food products and the comprehensive utilization rate of food resource will be greatly enhanced. Thus, a new way to increase the grain yield and the farmers' income is opened up. The development of food processing industries has double effects on increasing the employment of rural labor force and carrying forward the advantage of agricultural resources. Since food distributing centers are always in small towns, the food processing industry can improve the construction of those towns, as well as the developments of the tertiary industry to absorbing more labor forces.

3 Current Situation of Grain Processing Industry in Central Region

3.1 Production capacity of grain processing industry in central region

The data in Table1 shows that the annual production capacity of unhusked rice and wheat of Central Region in 2010 accounted for the proportion of the nation's total is 46.4% and 43.8%, respectively. It is almost close to half of the nation's total, which indicating a higher proportion of rice and wheat in Central Region. The proportion of soybean production capacity is 5.6%, relatively low. In general, the production capacity of the grain processing industry in Central Region is high^[6-7].

Table 1 2010 Annual Production Capacity Summary Table (units: 10,000 tons)

Region	Unhusked Rice	Wheat	Soybean
Shanxi	11.4	300.5	62.8
Anhui	2448.3	1427.5	50.1
Jiangxi	3016.6	13.0	1.5
Henan	524.4	4699.2	214.0
Hubei	2996.2	507.6	69.0
Hunan	2294.3	41.0	0.9
Central Region In Total	11291.2	6988.8	398.3
Nationwide In Total	24339.3	15953.7	7063.6
Proportion of Central Region to Nationwide	46.4%	43.8%	5.6%

3.2 The yield of grain processing products in central region

It can be found in Table 2 that the processed rice accounting for the proportion is 52.7%, which is more than half of the nation's total, ranked first; the second is the grain food processing products, the proportion is 47.6%;the third is wheat processing products, the proportion is 44.3%, which is close to half the level of the national total; and the fourth is cereals and potato processing products, accounted for only 32.7%; the last row is the corn processing products, only 13.8%, less than 15%. As it can be seen, the yield of processed grain products of Central Region is good in 2010^[6-7].

Table 2 2010 Grain Processing Products Yield Table (units: 10,000 tons)

Region	Rice	Wheat flour	Corn processing products	Grain food	Grains and potatoes
Shanxi	2.1	51.1	69.2	1.0	0.5
Anhui	961.1	744.2	155.0	126.0	18.8
Jiangxi	940.8	1.8	3.5	38.3	1.2
Henan	201.5	2297.9	231.5	152.8	34.4
Hubei	1062.4	214.1	6.2	102.4	19.6
Hunan	678.9	23.0	0.6	78.4	23.6
Central Region In Total	3846.8	3332.1	466	498.9	98.1
Nationwide In Total	7294.8	7528.6	3373.7	1047.2	299.9
Proportion of Central Region to Nationwide	52.7%	44.3%	13.8%	47.6%	32.7%

3.3 Major economic indicators of grain processing industry in central region

Table 3 2010 Main Economic Indicators Summary Table (units: 100 million RMBYuan)

Region	Total industrial output value	Industrial added value	Product sales revenue	Export delivery value	Total profits and taxes	Total profit
Shanxi	68.0	7.9	66.7	0.2	2.7	2.3
Anhui	1044.1	118.4	1025.4	14.7	37.0	26.5
Jiangxi	558.3	57.3	559.5	1.6	14.0	11.2
Henan	1224.6	141.1	1185.7	2.7	44.5	31.9
Hubei	1010.1	258.4	987.4	4.7	34.7	24.8
Hunan	642.7	77.0	625.1	1.1	22.8	18.1
Central Region In Total	4547.8	660.1	4449.8	25	155.7	114.8
Nationwide In Total	15408.9	1994.1	15283.8	194.1	624.8	432.8
Proportion of Central Region to Nationwide	29.5%	33.1%	29.1%	12.9%	24.9%	26.5%

In 2010, the total industrial output value of grain processing enterprises in the Central Region is 454.78 billion RMB Yuan and its proportion is 29.5%, industrial added value is 66.01 billion RMB Yuan and its proportion is 33.1%, sales income is 444.98 billion RMB Yuan and its proportion is 29.1%, the export delivery value is 25 billion RMB Yuan and its proportion is 12.9%, profits and taxes amounted to 15.57 billion RMB Yuan and its proportion is 24.9%, total profit is 11.48 billion RMB Yuan and its proportion is 26.5%. The data in Table 3 show that the nation's total industrial added value is the best, followed by industrial output value and sales income^[6-7].

4 Problems of Grain Processing Industry in Central Region

4.1 The development mode is still scalable

The development of the grain processing industry has brought a series of new atmosphere to the Central Region's economy; there have also been a lot of problems. Such as the small-scaled grain processing enterprises, extensive mode of production and operation, low development, scattered layout, the relative surplus of primary processing capacity, and the low capacity utilization of paddy and wheat processing industry. It not only has the backward production capacity which needs to be eliminated, but also has the structural overcapacity which is caused by the single product type, and the regional overcapacity which is caused by the unreasonable industrial layout. Overall, the relative overcapacities, the waste of resources by the redundant construction, and the other issues have appeared in various degrees driven by market forces. Although, it initially appeared processing leading enterprises group,

but the quantity is still low, the majority is still the small and medium-sized enterprises with weak market competitiveness.

4.2 The quality standard system is imperfect

Quality standard system, inspection and monitoring system, grain safety and quality certification system of grain processing industry are not perfect. Technical requirements of some products are low and lack of uniform standards. Grain hygiene and safety supervision system needs to be further established and improved. Testing instruments of grain quality monitoring department at all levels are relatively backward, the capacity of grain quality and safety testing is weak, and the quality traceability system from raw materials to product has not yet been established. Some enterprises have the weak awareness of law and sincerity, illegal use of grain additives, adulterated, shoddy phenomenon are still existing. Grain safety incidents often happens, the level of grain safety needs to be improved.

4.3 The technology innovation is weak

Grain processing enterprises pay less attention to scientific and technological research and development (R&D). The investment is insufficient, the technological innovation system is not perfect, the basic research is weak, the number of innovation platforms (national engineering technology center, laboratory and enterprise R&D center) is small, and the independent innovation ability of the enterprise is low. Some of the key detection technologies and equipments are relatively backward, risk assessment and control technologies are not widely used, safety assessment of new products are lacking. Enterprises as the mainstay of technological innovation system are not yet fully established, so the innovation capability of enterprise is weak, and the core technology is far behind the world's advanced level. Because the production equipments are obsolete, which seriously affects the market share of grain products and the development of grain processing industry in Central Region? Lack of creative talents and management personnel, most of key technologies and equipments are in the imitation stage, the reserves of scientific and technological achievements are less, and the transformations are slow, the technological content of products is low, high quality products are less. All of these restrict the upgrade of grain processing industry.

4.4 Processing regulation mechanisms are inadequate

Modern grain processing system has not yet been established. Grain processing enterprises are small-scale, quantitative, scattered layout, extensive management, low industry concentration, and irrational industrial structure. The overall development levels of them are not high. The effective convergence of grain processing, production, distribution, consumption and other aspects are not close, the dynamic mechanism to adjust the balance between supply and demand of grain processing has not been formed. Grain industry chain is still mainly based on the grain production supply chain, the downstream processing demand still can not form effective planting instructions, but this supply relationship has restricted the development of downstream processing sectors. The main grain production is relatively backward, small workshops and intensive modes of production are still the mainstay of the market, the grain emergency processing system has just started.

5 Conclusion

5.1 Increase the preferential policy support

To effectively implement the transformation of value-added tax policy, the research and development costs of new products, new technology, new technology credit income tax policy, and the imported foreign technology and equipment shall be exempted from import duties policy. The key grain primary processing enterprises shall be exempted from enterprise income tax. To continue implementing the various preferential policies is to support the development of the grain processing industry. For the technology upgrading, key equipment localization, staple grain industrialization, emergency processing system, major technical innovation and industrialization these key projects, it can take the national discount or subsidies to support them. Effectively implement the grain processing industry tax relief, credit and other preferential policies, and actively guide social capital to invest in the field of grain processing industry.

5.2 Improve grain quality and safety supervision

The problem of grain security is the most concerned and the most direct livelihood issue for the people and it is the lifeline for the development of grain processing industry. Establishing and improving the quality standards system and the quality safety inspection system to ensure the quality and safety of grain products. Guiding enterprises to establish the quality assurance system and the quality security system of the whole process from raw materials to finished products, and promote the healthy

development of grain industry. Enhancing the capacity-building of grain security and detection monitoring are helpful for constructing a complete industrial chain system covering multiple aspects from farm to table. Establishing strict risk monitoring and risk assessment system, access system, and recall system, to make the development of grain processing industry in Central Region into the security-oriented track.

5.3 Enhance the science and technology support

At present, the independent research ability of the grain processing industry is still relatively weak. The Central Region should strengthen the basic research to support the development of intensive and efficient utilization technology, cleaner production technology, saving energy and reducing consumption technology. Meanwhile, it should accelerate the industrialization of high-tech achievements, and make full use of the integration of excellent traditional technology and high-tech to promote the progress of science and technology of grain industry. In addition, cultivating grain processing industry technology innovation platform and R & D base, and attaching great importance to the development of the grain processing equipment manufacturing industry, both play a decisive role in the development of the grain processing industry in Central Region.

5.4 Strengthen the government's macro-control

All local governments must publish the related policy for the development of grain processing industry according to law. And timely put forward industrial investment guidance to make the enterprise clearly knew the encouraged, restricted and prohibited investment projects, and avoided blind and repeated construction. Enterprises should be encouraged to carry out the reorganization of assets through equity participation, holding, mergers, alliances, joint ventures, cooperation and other forms. A group of large modern grain processing enterprises should be trained with high technical level and the national competitive ability to enhance the competitiveness of enterprises. At the same time, we should continue to strengthen the monitoring work of grain processing capacity, and to further strengthen the statistical work of grain processing industry. Completing the statistics of grain processing industry, mastering the basic situation of grain processing enterprises in Central Region, and continue to revise and improve statistics system and index system of grain processing industry.

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Analysis on Logistics Infrastructures Site Selection Model

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Abstract: Logistics network infrastructure location is not just a simple issue to determine the logistics infrastructure location, it affects all aspects of enterprise management and it has an important influence on the survival and development of some an enterprise. This paper briefly describes the significance of the model in logistics infrastructure location, and respectively discusses the general steps of model methods adopted in single logistics infrastructure location and multiple logistics infrastructure location. Then there is comment on various kinds of model methods. At last, the paper puts forward that we should pay more attention to how to combine computer simulation with operators' experience in model method, and make it more convenient for managers and analysis to use.

Key words: Model method; Single logistics infrastructure location; Multiple logistics infrastructure location.

1 Introduction

With the accession into the WTO, modern logistics in China possesses a great development opportunity^[1], and the logistics network infrastructures (LNIs) should be re-engineered for the improvement of the effectiveness of the urban logistics system^[2].

Logistics network location problem is one of the most important logistics management strategic problems and it plays a key role in the whole logistics system. Logistics network location is not only to determine the number and the location of infrastructures, as well as some specific related network schemes. Logistics hub, central distribution center, cross docking center, regional distribution center and distribution center are the important areas of LNIs^[3].

For a single enterprise, the whole logistics system and other structures are determined by the network planning. And, in turn, other planning, such as inventory, transportation planning can also affect the location decisions. Therefore, site selection and have close relationship with inventory and transportation costs.

As to inventory, if the number of infrastructures in a logistics system is gradually increasing, it must result in the increase of the inventory cost. So, for logistics managers, a merger, reducing the number of infrastructures and increasing the size of the infrastructure is important measures to reduce inventory costs. That partly explains why managers often build so many logistics parks and logistics centers to realize the mass distribution.

As to transport, the increase in the number of infrastructures, such as the distribution center, can reduce the transportation distance and reduce the transportation cost. But when the number of infrastructures increases to a certain amount, increasing the frequency of transportation will result in an increase in transportation costs since a single order quantity is too small. Therefore, determine the reasonable number of infrastructures is also one of the main tasks of the location planning.

In conclusion, logistics network infrastructure decisions are not just a simple issue to determine the logistics infrastructure location, it affects all aspects of enterprise management and it has an important influence on the survival and development of some an enterprise.

In this paper, we respectively discuss specific steps and model methods of single or comprehensive logistics infrastructure location decision.

2 Single Logistics Infrastructure Location Problem

2.1 General steps of single logistics infrastructure location

Single logistics infrastructure location usually includes the following main steps:

The first step is to definitude objectives.

Enterprise must make it clear before logistics infrastructure location that setting up a new infrastructure in a new location conforms to the goal and operation strategy of enterprise development, and can bring bigger profits for enterprises. Once the goals are clear, the corresponding leaders should prepare for location decision.

The second step is to determine the preliminary alternative schemes (feasible solutions).

It is involved in collecting data, preliminary screening and arrangement of influence factors according to their importance to the model methods, and making intelligent trade-offs, etc. If necessary, it is reasonable to consult experts, relevant departments and the public opinions. On the basis of the collected data, we can list the factors, then carry on the processing and screening, and identify priorities for tradeoff. Finally, we should make goals relatively concentrated and draw up several preliminary alternative schemes.

The third step is introduction of model method and making a detailed analysis of the preliminary alternative schemes.

Analysis methods used here can be qualitative or quantitative, which fundamentally depends on the factors to consider. For example, transportation cost, construction cost, labor cost can be completely quantified, so these factors can be directly compared and analyst by calculation. While other factors, such as living environment and cultural atmosphere can only be qualitatively analyst, or we can also use classification weighting methods to make an artificially quantitative analysis. Of course, some factors can be qualitative and quantitative at the same time, such as the location measurement method, etc.

The fourth step is making comprehensive comparison to determine the optimal conclusion (optimum).

After the detailed analysis on each alternative scheme, we can get the quality comparison between solutions, or find other better solutions. Then we can select the final plan and prepare detailed proof materials to submit to decision makers for approval.

2.2 Common single logistics infrastructure location model methods

The commonly used single logistics infrastructure location methods include comparison method, orthocenter method, and so on.

(1) The comparison method

This is a simple method of infrastructure location, and it is especially adapted to the comparison of non-economic factors. When several site solutions are similar in terms of cost and benefit, the non-economic factors could be the key factor. At this point, the method of comparison between advantage and disadvantage of several schemes can be used for analysis and comparison.

(2) The orthocenter method

The orthocenter method often used for warehouse selection, the main consideration is the distance between the existing infrastructures and the amount of the goods which are transported. In the simplest case, we assume that the costs of outgoing transport and transport are equal in this method.

At first, we should consider the issues in a two-dimensional coordinate system. The establishment way of the coordinate can be determined by the specific needs, (for example, international location is often established by latitude and longitude coordinates). The original location and the destination should be marked in the coordinate system to determine the relative distances of each point. So, we can get the location which is corresponding to the point whose coordinate is the center of gravity as the optimum choice.

2.3 Comment on the model method of the single logistics infrastructure location

First, we must have a sober understanding of the function of model. We should make it clear that there is no any kind of model is suited for all of the features of location selection. It is impossible to immediately find the final decision once we get the model solution. Therefore, the model can only provide guidance for location decision. We should fully understand advantage and disadvantages of the model method to make full use of it.

The advantage of single infrastructure location problem in the model method is obvious. Model can truly reflect the actual problem, so it has practical reference significance for management solution.

But like many other practical fields of social science, we adopted many assumptions in the model, and the actual situation is simplified. The simplification will inevitably affect the authenticity and applicability of the final result, which is the main defect of the model method.

In general, assumption and simplification of the model are summarized as following.

(1) The assumption of the destination. The number of the demand is often assumed to focused on one point, while the actual demand comes from dispersive and numerous places, which can lead to some calculation error since the calculate the transportation cost is based on a single place rather than to the actual single points.

(2) Variable cost hypothesis. In this type of site selection model, the location is often selected according to the variable costs. In this assumption, there is no difference between the capital cost needed for the warehouse construction in different locations, as well as for other costs which are used in operating in different locations (such as labor cost, inventory holding costs, and so on).

(3) Hypothesis of linear transport rate (Ronald H.B allou, 1973). In the analysis of total transportation cost, we usually assume that the freight rate is proportional to the distance. However, in fact, most of the freight rate is constant, and the rest can increase according to the distance (Ronald H.B allou, 1993).

(4) The assumption of straight line route. In the model, the routes between warehouse and other network nodes is usually assumed as a straight line. In fact, it rarely happen. Since transportation always proceed in a certain road network, in the existing railway system or in loop line around city streets within the network. In practice, in order to respond to this situation, we can introduce a scaling factor, which can help us to turn the linear distance into approximate mileage of highway, railway and other transportation networks. For example, adding 20% to the calculated linear distance can get highway direct line mileage, and 24% are short railway mileage. If it is a city street, the general scaling factor can be 41%.

(5) "Static state". There is no time dimension in this type of site selection model, thus it can't reflect the change income and cost that may cause influence in future.

3 Multiple Logistics Infrastructure Location Problem

Fixed infrastructure location problem is a important strategy scheme in the whole logistics network, and it determines the pattern, structure and shape of the entire logistics system. At the same time, the single infrastructure site selection planning in the real logistics network system is relatively few, while the multiple infrastructure location, which is installed many logistics in structures in some a certain area, can be found everywhere^[4,5].

3.1 Common model methods for multiple logistics infrastructure location

3.1.1 Accurate method

Accurate method is a general term of a kind of method, these methods can get optimal solution by accurate using quantitative analysis, or its accuracy can be quantitative evaluation of the solution.

Obviously, in the point of the accuracy of the results, this method is perfect. But pursuing high accuracy must result in a loss of efficiency. At the same time, the background, definition and description of some practical problems can't be quite accurate. In this case, the pursuit of accurate results can turn out the opposite outcome.

Specifically, the following multiple centers method and other mathematical programming methods can be classified as one of them.

(1) Multiple centers of gravity method

The method is a continuation of the precise gravity method of single infrastructure location problem which is mentioned above. In fact, this kind of thought also has a deep root and a wide range of applications in statistics.

If the points we need to locate are not single, it's necessary to assign the designed locations in the warehouse to the beginning and the end of the logistics points in advanced. Thus formed several commencement and termination communities whose amount is equal to the amount of the designed warehouses. Then, we can use precision orthocenter method to find out centre of gravity of each commencement and termination community.

There are many commencement and termination point allocation method for warehouse. One of them is the "shortest distance method", which combined the nearest points to find out the location of centre of gravity of each community, then redistribute each point to the location of known warehouse, and get the revised center of gravity position of each community, then iterate until the renew position no longer change.

With an increase in the number of warehouse, transportation cost of logistics system will gradually decrease. While the total fixed cost and inventory holding costs will rise. The optimal solution of multiple orthocenter method is the solution of minimizing the sum of all of these costs.

(2) The mixed integer linear programming

In fact, most of the warehouse site selection problem can be described as follows:

Determining the number, scale, and location of warehouses in logistics network to minimize the linear variable cost and fixed cost during delivery of all products to the lowest with the restraint of following conditions:

The workload is no more than the supply of each factory capacity;

- ① All of the product requirements must be met;
- ② The throughput cannot exceed the capacity of each warehouse.

- ③ The warehouse can't start work before the cargo handling capacity is smallest.
- ④ The products consumed by the same consumer must be supplied by the same warehouse.

For planners with operational research background, such a situation is very basic and common. This is just a routine problem can be solved by linear programming - transportation model.

For composite infrastructure location problems, such as a multiple distribution centers location problem for a company who has multiple factories or warehouses, linear programming transportation, makes the minimal method can be used to minimize the total freight costs of all infrastructures. In fact, the advantage of linear programming in the whole network demand allocation process is obvious. Mixed integer linear programming method absorbs the advantages of linear programming, and takes the fixed cost into consideration, which comes from the thoughts of integer programming and formed a kind of model method which has unique advantages.

At present, the scientific management level is relatively low in many local companies of China, and a lot of related work can't be accurate quantification. This situation make it to be a trend that you must pay more on the data acquisition and preprocessing if you want use more "advanced" theoretical model method. So the model method like mixed integer linear programming method will be more popular. We will use this method in the following case.

3.1.2 Simulation method

As mentioned in the preamble, although the precision of the optimal solution provided by the mathematical location model seems to be convincing, but it must make a series of assumptions and simplification to get an accurate solution, while pursuing high accuracy must result in a loss of efficiency. At the same time, The mathematics aesthetic of accurate models of often prompt logistics system analysts to be "keen on relationships between model, calculation and other quantitative relationships, even the role of the model will be exaggerated, while the issues itself will be ignored, which is meaningless to solving problems, and the pursuit of accurate results can turn out the opposite outcome.

Simulation method can be perfect for this situation. So-called simulation is describing the logistics system with algebra and mathematical logic language, then setting up the model, and reproducing behaviors and activities through the model processing to make people mastering disciplinarian of analysis without building and operating an actual system.

Simulation model and arithmetic location model are different in many aspects. In a word, if the arithmetic model is seeking the best warehouse amount, location and size, then the simulation model is repeatedly simulating all kinds of situations under the premise of given multiple warehouses and multiple allocation schemes to find out the optimal network design method. On the one hand, the simulation method ensures that the description of the problem itself is comprehensive and accurate. On the other hand, it can make analysts taking full advantage of accumulated skills, experience and insight to be thoughtful of various possibilities.

3.1.3 Heuristics

In a sense, it can be said that heuristics is inspired by simulation method. Science precise solution requires a lot of costs, while some valuable experience that people have accumulated in the long-term is often ignored, so people start to think about why we can't change the situation? So they begin to consciously apply the rules that they already grasped to guide analysis and reduce the time and cost spending on computing analysis.

Heuristics can cover any principle and concept as long as these principles and concepts are helpful to reducing the solving time. In practice, we often use heuristics to describe some principles that can assist in solving problems. Whenever we use these practical principles to select site, it can greatly accelerate the process of finding the best solution from the alternatives.

Although heuristics can't guarantee to find the optimal solution, but using this method can make the best of people's subjective understanding of different situations and greatly reduce the requirement of computation time and memory space, so people often use this method in site selection.

3.2 Comment on multiple site selection model

The location selection model has experienced a long development course since the early model appeared in land economics. Now it can easily solve many complicated site selection problems.

More and more large-scale multiple infrastructure location models have been widely applied in the logistics location selection practice now, which does huge help to site selection. This method can be used in many situations, such as large distribution network with hundreds of warehouses, more than 20 kinds of products, 15 factories and more than 200 consumption areas, and supply network with only one

warehouse which is supplied by hundreds of dealers. In the fields of defense, retail, consumer good, industrial product and other industries, this model has been used by many enterprises.

These models provide important basis to solving major policy decision problems of enterprise management. They are powerful, and can be used repeatedly in various forms of logistics network design, and provide the necessary planning details. They cost little in processing, and can bring huge benefits to the consumers. What's more, many enterprises can get the information data required in this model easily.

However, these models haven't been used in practice, the reasons are as following. At first, the problem of "non-linear" relationship should be solved. Like the single infrastructure location problem, the cost of inventory policy, transportation fee structure and purchasing economies may be nonlinear and discontinuous. Promoting accurate and efficiency is still a problem need to be solved quickly.

Secondly, there is a problem about "integration". There are various kinds of model method, so the operators can hardly avoid the influence of choosing which one. The ideal situation is promoting further consolidation related methods, and forming a integrated network planning solution to solve the problem of synchronization inventory, transportation decisions and site selection at the same time, rather than solve each problem respectively.

Thirdly, we should pay more attention to the profit effect in the network design processing because the amount of warehouse calculated by the model method is often larger than that determined under the condition of promoting customer service and minimizing cost.

Fourthly, the model should be convenient for managers and planners to use, which can make the model method used frequently in strategic planning and budget, rather than only used occasionally for strategic planning. This requires that there is close relationship between model and enterprise management information system to get the model data needed for the operation quickly.

All in all, despite the settlement method and applicable scope of the various model methods are different, each model can be used by analysts and managers who have some specific skills to get significant result. The model methods will be more convenient for decision makers in the future.

4 Conclusions

In the above section, we systematically describe the single logistics infrastructure location model method and multiple logistics infrastructure location model. We can see that each model each has its own characteristics through the description of the two methods of model. Therefore choosing proper model is significant for the accuracy of results.

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Research on the Implicit Theories of Creativity of Industrial Designers in China

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Abstract: Professional designers, university teachers and undergraduates in the domain of industrial design were surveyed in this study to explore the implicit theories of creativity of industrial designers in China. The study, conducted through factor analysis, found that the implicit theories of creativity of industrial designers mainly involves the following eight factors: "Agreeableness", "Enterprise", "Exploration", "Wisdom", "Knowledge and skills", "Convergent thinking", "Divergent thinking" and "Challenge". Three groups of respondents in this study highly valued "Agreeableness" and "Enterprise" as contributive factors to creativity, while giving lower priority to creative thinking. In addition, this study also found that there are certain discrepancies in views on the implicit theories of creativity of industrial designers among the three groups of respondents. The above-mentioned discrepancies are likely to reflect a standard difference between employers and universities regarding how to assess creative designers.

Key words: Creativity; Industrial designer; Implicit theory; Explicit theory; Social validity

1 Introduction

Creativity is an important index to judge whether or not a designer is outstanding. However, being rich and complex, the connotation of creativity is not merely an academic concept, but a public concept with realistic significance. Therefore, in addition to grasping the theory of creativity from the academic research perspective, it is essential to know how the public, especially professionals in specific domains, interprets the term "creativity". In fact, it will not only help us testify and supplement the established theories of creativity, but will also help us find out the existing problems in the screening and cultivation of creative talents. From this perspective, this study attempts to conduct a investigation and analysis on the implicit theories of creativity of industrial designers for the purposes of enriching our knowledge on the nature of creativity in the field of industrial design, and providing a solid foundation for the discussions of problems in relation to design education and design management.

2 Literature Review

2.1 The implicit theories of creativity

The famous "Creativity" speech was published in 1950 by Guilford when he was inaugurated as the chairman of American Psychological Association, since then opened the prelude to the scientific study of creativity^[1]. With progress of research, researchers began to notice the influence of environment on creativity, and recognized that creativity is not only a personal attributes, but also a value factor of social assessment. Therefore, the measurement, cultivation and development of individual creativity are closely related to the social context, and the individual creativity also largely depends on the perception, assessment and expectation by the public. Such a view is supported by the Pygmalion Effect and the Labeling theory. On the other hand, psychologists also found that people, at most of the time, reply on experience and intuition rather than rigorous scientific theory as the basis of measuring the individual creativity. As a result, some researchers began to reconsider their research methodologies, and pay more attention to the perception of creativity among ordinary people.

In 1985, the concept of implicit theories of creativity was clearly put forward by Sternberg on the basis of his implicit theory of intelligence^[2]. In his view, explicit theories, which are proposed by psychologist or experts in other fields, refer to a theoretical system of the concept, structure and development of creativity based on large sample tests and data analyses. The implicit theories, also known as "public view", are a set of views, formed in daily life or at work, on the concept, structure and development of creativity in individual minds. In addition, compared to the explicit theories, the implicit theories of creativity embody the attributes of social validity^{[3][4]}, which play an important role in the informal assessment (such as a job interview) and cultivation (such as interaction between parents and children) of creativity in real life^[5].

According to the different research paradigm, Christiane et al. divided the researches on the

implicit theories of creativity into two categories: One focused on the degree of consistency when people were evaluating individuals and products, attempting to reveal the implicit standard of creativity. The other was the study on people's understanding of creative talents, looking for the prototype of creativity in people's minds^[6]. In fact, most researches have fallen into the latter category in the recent 20 years, which mainly focused on the nature, cultivation and influential factors of creativity.

2.2 The implicit theories of creativity in the field of art and design

Interpretation of creativity differs from people in different fields, therefore, the field particularity plays an important part of revelation in the implicit theories of creativity. Helson said, the field most closely related to creativity is artistic interest, followed by the investigation, the society, the enterprise, then is the conventional and traditional field^[7]. Naturally, researches on the implicit theories of creativity in art-related fields have been highly valued by scholars. Sternberg had studied the professor's implicit theories of creativity in art, business administration, philosophy and physics. Results showed that, the implicit theories of creativity among professors in different fields largely overlaps, but professors of art attached more emphasis on imagination, originality and risk-taking^[2]. Runco et al. studied the professional artist and the college student's implicit theories of artistic, scientific, and everyday creativity, and found that there are significant differences between different types of creativity. For example, scientific creativity underlined logic, experiment, patience and thoroughness, artistic creativity focused more on understanding and expressions of emotion, and creativity in daily life placed greater emphasis on meanings, initiative and discretion^[8]. Romo et al. had investigated the implicit theories of creativity of 180 painters from five dimensions: impulse, experimentation, self-seeking, communication and mental disorders. The results found that significant differences could be seen between painters and undergraduates on the implicit theories of creativity^[9].

In the mean time, people's understanding of creativity also differs under different cultural backgrounds. Niu had reviewed the studies on implicit theories of creativity in both western and eastern cultures, and found that despite there were something in common, such as originality, imagination, intelligence, independence, etc., eastern cultures attached more emphasis on the social and moral components in the creativity, while western cultures emphasized sense of humor and aesthetics^[10]. Coincidentally, it happened that there were similar conclusions in the studies conducted by Rudowicz^[11].

Therefore, the author thinks that, regardless of field particularity and cultural background, the implicit theories of creativity will be meaningless. Chinese scholars should not mechanically copy the conclusions of western researches, instead, they should take Chinese as subjects, and explore the implicit theories of creativity in particular fields. This is the theoretical starting point of this study.

3 Method

3.1 Preliminary investigation

Questionnaire with 66 items was adopted in the preliminary investigation.

Items were gathered from two sources: First, items used by Sternberg^[2], Runco^[8], Romo^[9], Westby&Dawson^[12] and David^[13] have been translated and summarized. The other source is the in-depth interviews with 12 professional industrial designers, 6 university teachers and 15 undergraduates majoring in industrial design. Respondents were asked to write down the feature terms as many as possible to describe the industrial designers with high creativity. After that, all items had been analyzed and summarized.

Likert 9 sub-scales (1-9 point) was adopted in the preliminary questionnaire. 73 questionnaires were distributed in Changsha and Wuhan. The respondents included 36 professional industrial designers, 12 teachers teaching industrial design in universities and 25 undergraduates majoring in industrial design. 68 questionnaires were valid. In the process of analyzing and summarizing, items that made respondents feel difficult to understand or confused have been modified or removed, and a formal questionnaire with 52 terms was finally drawn up.

3.2 Formal investigation

626 questionnaires were released in the formal investigation. Respondents in the investigation consisted of three groups of professionals: professional industrial designers, teachers who taught industrial design in universities, and undergraduates majoring in industrial design. These respondents mainly came from 86 companies and 25 universities in Beijing, Shanghai, Guangzhou, Changsha and Wuhan. 589 questionnaires were valid. Demographic profiles of Respondents have been summarized in Table 1.

Table 1 Respondent Profile

	Male	Female	SUM
Industrial designers	114	98	212
University teachers	95	62	157
Undergraduates	85	135	220
SUM	294	295	589

When the questionnaires were reclaimed, the obtained data were calculated and analyzed. Items with a low level of average scores (below five point) has been eliminated. Ultimately, 40 items were retained for further analysis.

4 Results

4.1 Structure analysis for the implicit theories of industrial designer's creativity

The implicit theories of creativity of industrial designers presented an eight-factor structure when a factor analysis was conducted (seen Table 2). This structure was generated with KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy, KMO) of 0.864 and was highly significant at the 0.000 level. The total explained variance of these 8 factors accounted for 72.3%, and these 8 factors covered eight distinct aspects of industrial designer's creativity: "Agreeableness", "Enterprise", "Exploration", "Wisdom", "Knowledge and skills", "Convergent thinking", "Divergent thinking" and "Challenge". Among them, the variance of "Agreeableness", "Enterprise" and "Exploration" was more than 10%, which could be regard as three of the most important dimension to interpret the implicit theories of creativity of industrial designers.

Table 2 Factor Structure of the Implicit Theories of Creativity of Industrial Designer

Factors	Item (Factor loading)	% of variance	Cumulative %
Agreeableness	Enthusiasm (0.809), Optimistic (0.775), Confidence (0.828), Amicability (0.770), Generous (0.779), Team spirit (0.874), Tolerance of criticism (0.912)	12.121%	12.121%
Enterprise	Perfectionism (0.829), Diligence (0.818), Conscientiousness (0.812), Persistence (0.861), Ambition (0.810), Concentration (0.790)	10.319%	22.440%
Exploration	A broad range of interests (0.878), Curiosity (0.872), Thirst for knowledge (0.907), Risk-taking (0.889), Assertiveness (0.888)	10.016%	32.456%
Wisdom	Highly observant (0.909), Insight (0.829), Clarity of thinking (0.858), Be good at learning (0.904), Logical reasoning (0.896)	9.927%	42.383%
Knowledge and skills	Information-processing skills (0.898), Erudite (0.767), Practical ability (0.884), Interpersonal skills (0.618), Rich in experience (0.914)	8.691%	51.074%
Convergent thinking	Reasoning (0.873), Pragmatic (0.870), Chariness (0.848), Market-orientation (0.914)	7.911%	58.985%
Divergent thinking	Associative thinking (0.816), Imagination (0.762), Thinking flexibility (0.746), Innovation (0.758), Open-minded (0.822)	7.754%	66.739%
Challenge	Criticism (0.826), Skepticism (0.849), Independent thinking (0.859)	5.560%	72.299%

Table 3 shows a descriptive statistics on the top 10 and the last 10 items in this study. For the 20 items, the means and standard deviations are provided. As we can see, six of the top 10 items came from the "Enterprise" factor ("Ambition", "Concentration", "Diligence", "Perfectionism", "Conscientiousness" and "Persistence"), three belonged to the "Agreeableness" factor ("Enthusiasm", "Confidence" and "Tolerance of criticism"). This result appears to underline once again the importance of "Enterprise" and "Agreeableness" on the creativity of industrial designer.

However, in the last 10 items, 4 items were from the "Convergent thinking" factor ("Reasoning", "Pragmatic", "Chariness" and "Market-orientation") and 4 were from the "Divergent thinking" factor ("Associative thinking", "Imagination", "Innovation" and "Open-mind"). The results indicate that, compared with the creative thinking, professionals is more concerned with whether designers can do

their work with a sense of responsibility, and whether they can live in harmony with the leadership, customers and team members.

Table 3 Descriptive Statistics for the Top Ten Items and the Last Ten Items

Rankings	Items	Mean	Std Dev	Rankings	Items	Mean	Std Dev
1	Ambition	6.54	1.39	31	Information-processing skills	5.75	1.63
2	Concentration	6.48	1.39	32	Innovation	5.74	1.70
3	Persistence	6.41	1.28	33	Open-minded	5.69	1.73
4	Diligence	6.36	1.43	34	Skepticism	5.66	1.60
5	Perfectionism	6.34	1.41	35	Associative thinking	5.62	1.71
6	Conscientiousness	6.29	1.41	36	Imagination	5.62	1.71
7	Confidence	6.17	1.10	37	Market-orientation	5.61	1.70
8	Tolerance of criticism	6.16	1.44	38	Pragmatic	5.41	1.71
9	Assertiveness	6.15	1.52	39	Chariness	5.39	1.71
10	Enthusiasm	6.15	1.57	40	Reasoning	5.36	1.69

4.2 Discrepancy analysis on the implicit theories of creativity among the respondents

In consideration of the possible differences in the implicit theories of creativity of industrial designer among professional industrial designers, university teachers and undergraduates, a MANOVA analysis on all of the 40 retained items were applied in the study. As indicated in Table 4, three groups of respondents showed significant divergences in 11 of the 40 items.

Table 4 MANOVA Results

Items	Industrial designers		University teachers		Undergraduates		F.	Sig.
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev		
Erudite	5.61	1.39	6.07	1.70	5.69	1.92	3.700	0.025*
Interpersonal skills	6.27	1.37	5.76	1.96	5.89	1.99	4.315	0.014*
Insight	5.81	1.37	6.26	1.54	6.13	1.58	4.536	0.011*
Market-orientation	5.86	1.31	5.49	1.80	5.46	1.93	3.584	0.028*
Confidence	5.97	1.22	6.23	1.49	6.33	1.47	3.688	0.026*
Team spirit	6.28	1.30	6.06	1.41	5.90	1.59	3.630	0.027*
Tolerance of criticism	6.34	1.25	6.15	1.45	6.00	1.58	3.206	0.041*
Criticism	5.54	1.62	5.81	1.46	5.95	1.41	4.163	0.016*
Independent thinking	5.55	1.61	5.84	1.49	5.98	1.59	4.158	0.016*
Assertiveness	5.99	1.46	6.09	1.52	6.36	1.57	3.457	0.032*
Persistence	6.58	1.21	6.25	1.30	6.36	1.31	3.342	0.036*

** $p < 0.01$, * $p < 0.05$

In order to explain the differences more specifically, this study also performed a series of Independent sample t-test analyses using the SPSS software for all of the 11 items. Table 5 presents the results of the Independent sample t-test analysis.

As shown in Table 5, significant discrepancies were shown in 5 of the 11 items between professional industrial designers and university teachers. More specifically, professional industrial designers placed greater emphasis on “Interpersonal skills”, “Market-orientation” and “Persistence”, while university teachers attached more emphasis on “Erudite” and “Insight”. Besides, the results suggest near identical implicit views between university teachers and students. Only one of the 11 items (“Erudite”) exhibited significance among the two groups, and the remaining 10 items did not indicate any significant differences. However, large discrepancies could be seen between the professional industrial designers and undergraduates: 9 of the 11 terms differed significantly in these two groups. Comparatively speaking, professional industrial designers appeared to highly value

“Interpersonal skills”, “Market-orientation”, “Team spirit” and “Tolerance of criticism”, while the undergraduates seemed to concern more about “Insight”, “Confidence”, “Criticism”, “Independent thinking” and “Assertiveness”.

Table 5 Independent Sample T-Test Results

Items	G1—G2		G2—G3		G1—G3	
	t-statistic	Sig.	t-statistic	Sig.	t-statistic	Sig.
Erudite	-2.789	0.006**	2.024	0.044*		
Interpersonal skills	2.786	0.006**			2.368	0.018*
Insight	-2.902	0.004**			-2.218	0.027*
Market-orientation	2.200	0.029*			2.530	0.012*
Confidence					-2.735	0.007**
Team spirit					2.674	0.008**
Tolerance of criticism					2.550	0.011*
Criticism					-2.820	0.005**
Independent thinking					-2.787	0.006**
Assertiveness					-2.559	0.011*
Persistence	2.513	0.012*				

G1—G2: Industrial designers VS University teachers

G2—G3: University teachers VS Undergraduates

G1—G3: Industrial designers VS Undergraduates

** $p < 0.01$, * $p < 0.05$

5 Conclusion

As a complex psychological phenomenon, creativity has been always regarded as a result of multiple factors in explicit theories. For example, based on Robert Sternberg's Triarchic Theory of Intelligence, he proposed three-faced model of creativity, arguing that creativity was mainly driven by intelligence, intelligence styles and personality^[14]. Teresa Amabile considered creativity as the result of interactions of three factors: task motivation, domain-relevant knowledge and creativity relevant skills^[15]. John Feldhusen argued that creativity consist of three elements: knowledge, metacognition and personality^[16]. In this study, the author found that the implicit theories of creativity of industrial designers consisted of an 8-factor structure when a factor analysis was conducted (see Table 2). It could be observed that these 8 factors could be grouped into 4 categories: Knowledge and skills, Intelligence (“Wisdom”), Personality (“Agreeableness”, “Enterprise”, “Exploration” and “Challenge”) and Thinking (“Convergent thinking” and “Divergent thinking”). The above-mentioned results indicate that there is a distinct correspondence between the explicit theories of creativity and the implicit theories of creativity of industrial designers.

In addition, this study found that, compared with the creative thinking, subjects seemed to more concerned with the importance of “Enterprise” and “Agreeableness” to the creativity of industrial designer. Specifically, factor “Enterprise” involved the following items: “Perfectionism”, “Diligence”, “Conscientiousness”, “Persistence”, “Ambition” and “Concentration”, and the “Agreeableness” factor could be further illustrated by items like “Enthusiasm”, “Optimism”, “Confidence”, “Amicability”, “Generous”, “Team spirit” and “Tolerance of criticism”. Such finding is consistent with Yang's study to some extent. Yang argued that, the presence of collectivism moral and postnatal efforts in the Chinese implicit theories of creativity can be explained by cultural factors^[17]. But this study thinks that this finding was related to the working manner of designers. On the one hand, teamwork is one of the most common work patterns in design companies. In order to accomplish the design projects and pursue high quality, designers have to keep close communication with copy writer, account executives and other colleagues. On the other hand, designers with high “Agreeableness” scores might benefit from the broader social network and gather more information from various resources. Therefore, they may be much easier to get their creative potential inspired and developed.

Finally, this study found that there are certain discrepancies in the implicit views of industrial designer's creativity between professional industrial designers, university teachers and undergraduates. As shown in Table 5, perhaps because the university teachers and undergraduates sharing the same

environment, the implicit views from the two groups are in substantial agreement. However, discrepancies between professional industrial designers and the other two groups are rather large. Since the viewpoint of professional industrial designers is more similar to the objective requirement of the human resources market, such discrepancies are likely to reflect a standards difference between employers and universities in how to assess and cultivate creative designer. And what's more, those discrepancies may result in a number of undesirable effects. For example, a possible labour shortage in the design industry, low employment rate of undergraduates and an enormous waste of educational resources. To sum up, in order to reach a consensus about the nature and influencing factors of creativity in future, it is of great necessity to strengthen the cooperation and communication among design companies, universities and undergraduates.

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Research on Coupling Characteristics and Mechanism of Product Innovation Design Risk Conduction

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Abstract: This paper defines two concepts of coupling and the coupling effects of product innovation design risk conduction, it points out that the pure coupling, weak coupling and strong coupling could be happened in the risk of product innovation design because of the risk subsystems' interaction and mutual influence in product innovation design risk conduction, and it reveals the formation mechanism of the strong coupling of product innovation design risk. It guides to prevent the strong coupling of product innovation design risk.

Key words: Product innovation design risk conduction; Coupling effect; Pure coupling; Weak coupling; Strong coupling

1 Introduction

The concept of coupling in physics refers to two (or more) systems or movement forms affect mutually through various interaction. For example, if two pendulums are connected by a spring, each rolling on their vibration and influence mutually, this interaction is called pendulum coupled. If a more spring is added, then their vibration and fluctuation could have new change with the third pendulum. Similarly, In the process of product innovation design risk conduction, due to each process and function node of product innovation design has functional association relationship, and there is the risk of strategy, objective, system, process, quality and intellectual property which has its own characteristics in the process of product innovation design, it could develop its subsystems which interacts with each other and influences mutually, then develop the different matching relationship in the process of its conduction, finally it could change the flow and property of risk conduction. This phenomenon is called the coupling effect in risk conduction. There are two important factors which could determine the property of coupling effects in product innovation design risk conduction - the correlation degree of function node of product innovation design and the matching degree between risks.

2 The Coupling Characteristics Analysis of Risk Conduction of Product Innovation Design

As stated earlier, if we consider the process of product innovation design as a complicated risk system which consisted of many risk subsystems in the process of product innovation design risk conduction, so the status of risk conduction of the whole product innovation design depends on the mode of existence and the extent of coupling of each risk subsystem in the system at one moment.

Assumed that it is confronted with n kinds of risk, we can use variance to describe the existed risk status:

$$\sigma^2 = \sum_{i=1}^n \sum_{j=1}^n k_i k_j \sigma_i \sigma_j \rho_{ij} \quad (1)$$

In the above formula, σ^2 means the risk status of product innovation design, σ_i means the value of risk status of risk subsystem, k_i means the weight of risk system i in the whole risk subsystem set, ρ_{ij} means the relative degree between risk subsystem i and risk subsystem j .

The correlation coefficient ρ_{ij} presents the relative degree of two random variables, in terms of overall risks of product innovation design, the correlation coefficient presents the relative degree and the extent of coupling between various risks in the risk conduction of product innovation design, and it is the interaction force coefficient between each risk subsystem. It depends on the correlation degree between function nodes of product innovation design and the matching degree of risk property. The absolute value of correlation coefficient is less than 1, it means $-1 \leq \rho_{ij} \leq 1$. The value of ρ_{ij} also determines the speed, strength and time of product innovation risk conduction. The different value of

ρ_{ij} could lead to the different coupling effects of risk conduction.

2.1 The pure risk coupling of product innovation design

In the process of product innovation design risk conduction, at some moment coupling could be happened when risk flow i meet with risk flow j, then these two risk flow cross, interact and influence mutually. When the total risk flow after coupled is equal to that before, and the total risk flow remains the same quantity after passing the control node, it could not affect the total risk flow after coupled, it will have the effect of $1+1=2$, this status of coupling could be called pure coupling (Figure 1).

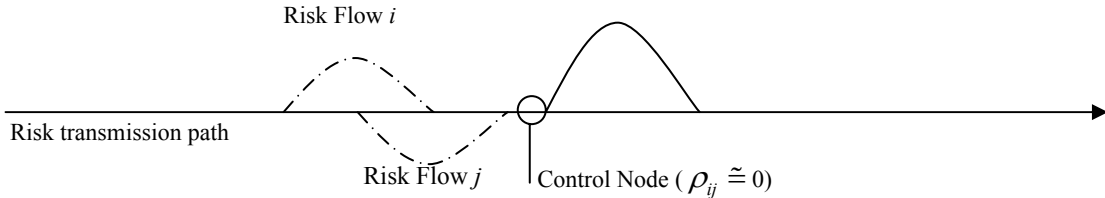


Figure 1 Pure Risk Coupling Diagram

2.2 The weak risk coupling of product innovation design(-1 ≤ ρij ≤ 0)

In the process of product innovation design risk conduction, at some moment coupling could be happened between risk flow i and risk flow j, when the total risk flow after coupled is less than before, it could weaken the total risk flow after coupled, it will have the effect of $1+1 < 2$, this status of coupling could be called weak coupling (Figure2).

Weak risk coupling is caused by the inadaptability between risks and the perfect measures of risk control, the longer the path of risk conduction is ,the weaker the total risk flow of the end, so it is easier to control and prevent risks, and the smaller the loss caused by risks is.

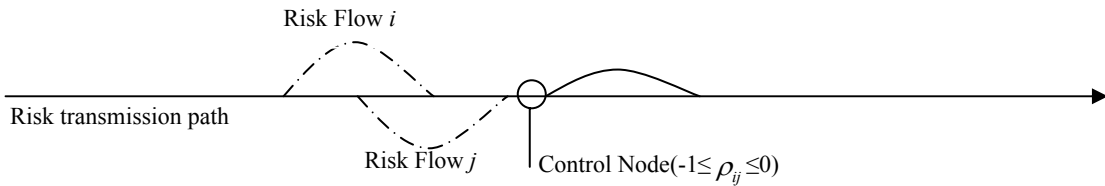


Figure 2 Weak Risk Coupling Diagram

2.3 The strong risk coupling of product innovation design(0 ≤ ρij ≤ 1)

In the process of product innovation design risk conduction, at some moment coupling could be happened between risk flow i and risk flow j, when the total risk flow after coupled is more than before, s it could reinforce the total risk flow after coupled, it will have the effect of $1+1 > 2$, this status of coupling could be called strong coupling (Figure3).

Strong risk coupling is caused by the conflict between risks and the worse measures of risk control, the longer the path of risk conduction is ,the more the total risk flow increases, so the strength will be increased rapidly, so it is harder to control and prevent risks, and the heavier the loss caused by risks is.

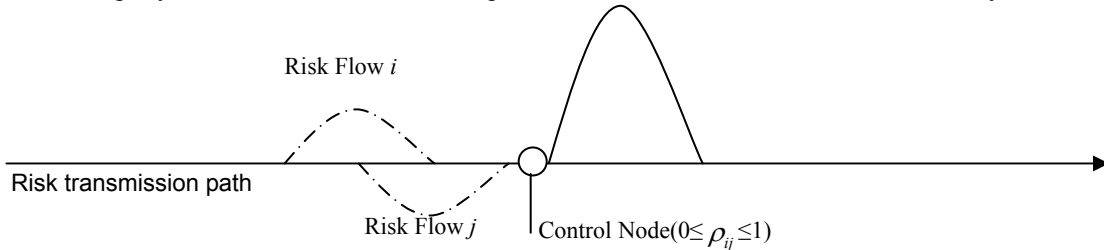


Figure 3 Strong Risk Coupling Diagram

3 The Analysis of Formation Mechanism of Strong Coupling of Product Innovation Design Risk Conduction

From the above analysis, in terms of product innovation design, the most concern is the occurrence

of strong coupling in the risk conduction of product innovation design, because ‘strong coupling’ could reinforce the strength of risk conduction, the range of conduction and the speed of conduction, so the total risk of product innovation design will be increased, it has a crippling effect on it. Therefore, the following text will deeply describe the mechanism of strong coupling in the risk conduction of product innovation design.

For the formation mechanism of strong coupling of product innovation design risk conduction, we could learn lesson from the concept of ‘strategic risk coupled trigger’ proposed by Liu Shengfu (2004), it can explain that how the coupling between subsystems can result in disharmony and uncertainty in product innovation design in the light of the principle of trigger, then the strong risk coupling could be happened.

The concept of trigger in physics means that it produces electronic pulses when the electric current and voltage reach a critical value, and then the trigger begins work and initiates the next working procedure. We can use the coupling trigger to test whether the coupling extent between risk subsystems can produce new pulses by stimulating trigger or not, but these pulses will break the linear equilibrium state of risk conduction system, and promote it to break the critical value of equilibrium states, it will increase risks rapidly or change risks, then it will lead to the occurrence of strong coupling.

The occurrence of pulse need meet certain criteria; it need filter and adjust by filter before the occurrence of strong coupling. Filter is also a physics concept; it means the filtering function and self-adjustment function of product innovation design, and the self-organize ability and self-repair ability of product innovation design.

As stated earlier, as a complete system, the product innovation design system has some Characteristics such as self-organize, self-adapt, and self-adjust and risk concentration release. These Characteristics could determine that if the existed risks of product innovation design is in a certain critical value, it can weaken and block risk coupling sets in the product innovation design by self-organize, self-adapt and self-adjust, it could not reach the critical value, so it remains in the state of pure coupling and weak coupling, and risk factors still remain in independent, static and partial states, it could cover and buffer negative effects brought by risks. However, these risks and negative effects have never virtually gone, they are temporarily in a state of covert and slow release. When the risk flows of product innovation design gradually increase, the static state will convert into dynamic state if broken the critical value by risk flows or reduced the critical value by inducements occurred in the environment, the form and intensity of interaction will gradually increase, the final result is that the new form of risks will conduct and spread in the product innovation design system after the risk flow dramatically increased or the coupling changed.

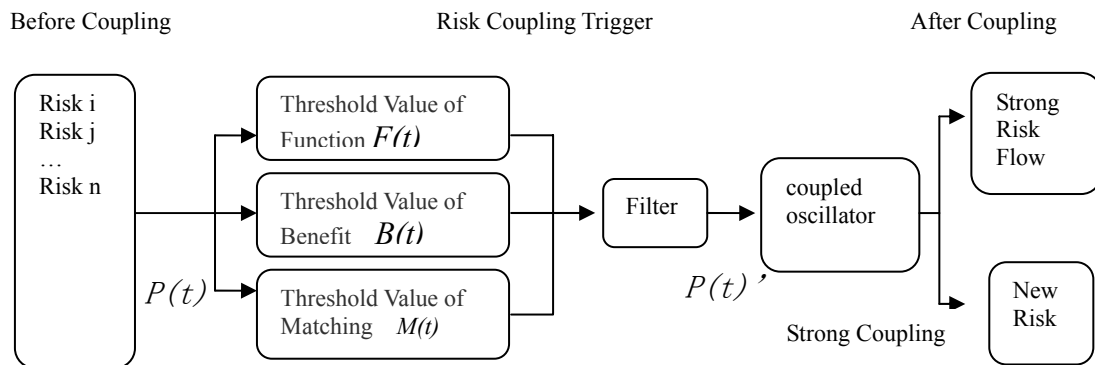


Figure 4 Risk Coupling Trigger Diagram

As described in the above diagram(Figure4).When coupling have been happened in the process of risk conduction between risk subsystems, it starts to produce pulse $P(t)$ and tries to pass the parallel threshold value(threshold value of function F , threshold value of benefit B , threshold value of matching M).when $P(t) > \text{Min}\{ F(t), B(t), M(t) \}$, $F(t)$, $B(t)$, $M(t)$ means the threshold value of function, the threshold value of benefit and the threshold value of matching respectively in the risk conduction, the pulse will pass through the threshold, and then be filtered by the filter, after that the new pulse $P(t)'$ will be generated. The coupling oscillation which generated by the new pulse passed through coupled oscillator will break the linear equilibrium state of risk conduction of product innovation design, it will increase risks rapidly or change risks, then it will lead to the occurrence of ‘strong coupling’.

When $P(t) < \min\{F(t), B(t), M(t)\}$, the pulse could not pass the threshold, and the extent of coupling between risk factors will be weakened by the self-organize, self-adjust and self-adapt ability of product innovation design, it will be controlled in a certain range to make it less than the threshold, therefore risk will remain in a state of 'weak coupling'.

4 Conclusions

In risk conduction of product innovation design, due to all kinds of risk subsystems interact with each other and influence mutually, it generates the dynamic coupling which occurred in the correlation degree of function node of product innovation design and the matching degree of different risks, the coupling effect of risk conduction of product innovation design could be happened.

The different value of correlation coefficient ρ_{ij} will bring about the different coupling effect of risk conduction of product innovation design, when $\rho_{ij} \cong 0$, it is called pure coupling, when $-1 \leq \rho_{ij} \leq 0$, it is called weak coupling, when $0 \leq \rho_{ij} \leq 1$, it is called strong coupling.

The formation mechanism of strong coupling of product innovation design risk conduction could be revealed by the working principle of 'strategic risk coupled trigger'.

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Evaluating and Studying Tourism Industrial Structure Benefit of Hubei Province of China *

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Abstract: Tourism Industry of Hubei Province of China has made gratifying achievements and has a certain scale after several years' developments. The problem of the dysfunctional structure has seriously influenced our economic interest. By analyzing problems of tourist structure of Hubei province of China, the author establishes an evaluation model with deviate-quota analysis method, and makes applied researches on tourist structure benefit of Hubei province of China, then proposes corresponding countermeasures and suggestions to optimize tourism industry structure of Hubei province of China on the basis of the analytical results.

Key words: Hubei Province; Tourism Industrial Structure; Benefit; Deviate-quota Analysis Method

1 Introduction

Chinese tourism industry has been growing faster and faster recent years, Hubei tourism industry has also made gratifying achievements. According to statistical information of national tourism administration, Hubei province of China accepted 274 million domestic and foreign tourists and earned 19, 9289 million in 2011, increased by 29.53 percent and 36.45 percent respectively. We can say loudly that Hubei tourism industry has had a large scale and played an important role in national economic system.

In spite of so many achievements, we should see that the objective factors restricting development of Hubei tourism industry haven't changed thoroughly. There's a big gap between Hubei and tour industry developed provinces. There are so many problems brought by its unreasonable inner structure. Research on optimizing tour industry structure of Hubei province of China has important significance for allocating resources rationally and efficiently, coordinating the internal relationship, improving its overall quality, and promoting efficient operation of Hubei tourism industry .

2 Problems of Tourist Structure of Hubei Province of China

The following expressions are about the extrusive difficult and problems of Hubei tourist structure:

2.1 Irrational department structure and backward infrastructure

Department Structure of Hubei tourism industry is still at a lower level, tourist revenue is mainly from high input while low output type, such low investment while high comprehensive benefits departments as tourist merchandise and hotel remain to rise.

Just look at the travel agency of Hubei, the ratio of international to national is not only lower to the national average, but also to surrounding provinces. Look from the lodging hospitality industry, star-grade hotels in Hubei are slightly less, high-grade reception facilities are not enough, which adverse to attracting high-spending tourists. Moreover, cruise ships in Yangzi River are developing rapidly while tourist failed to pick up, the distinctive contradiction between supply and demand of cruise ships cause the cruise business low efficiency and intense price competition, which is a vicious circle.

2.2 The imbalance of tourist regional development

Because of location and traffic factors, Hubei tourism development is of distinctive regional imbalance for a long time. The contradiction of strong south and weak north is prominent. Airports of Hubei province of China are mainly located in Wuhan, Yichang and Enshi, where earn much more tourist revenue than the other areas. Such areas as Shennongjia, Shiyan have much less tourist revenue although they have high reputation just because they have low accessibility which affected greatly their tourist revenue. Low accessibility brings high expenditure. Hubei tourism industry must deal with the problem of equitable distribution if we want to gain the comprehensive competitive advantage.

2.3 Simplistic product structure

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Tourism products of Hubei province of China are sight-seeing products such as three gorges and the culture of Three Kingdoms, which are low numbers and simplistic types. Sight-seeing products of Hubei province of China are homogenous competition and generalizing development. Such as three gorges products. Cultural tourism products with characteristics are aging Packed and scattered distribution, such low level development causes upgrading its quality a heavy task. Urban sight-seeing products are less well developed; urban image, landscape reservation and building work are a heavy task. The whole sight-seeing products are lack of sequential combination; we need to rebuild the ultimate, the pick and the important products combo setup.

2.4 Weak international market and low consumption national market

International tourist market of Hubei province of China has the following characteristics: firstly, the total amount is few while develop fast; secondly, foreign market holds a large proportion; thirdly, the Japanese and Korea market looked to further increase by China are not ideal to Hubei; Fourthly, Taiwan market has big fluctuations; Last but not least, the total expenditure of foreign tourist is on the low level. National tourist market of Hubei province of China has the following characteristics: Firstly, the main purpose of traveling is sight-seeing; secondly, 40 percent passengers are from Hubei province of China.

3 Evaluation Model on Effectiveness of Hubei Tour Industrial Structure

We must not only analyze the component part but also the benefit of tour industrial structure. It consists of economic benefits, social benefits and ecological environment benefits. Economic benefits can be reported by increasing income, improving rate of return on capital and expanding tax. This article is mainly concentrating on economic benefits.

We choose deviate-quota analysis method to analyze and evaluate the benefit of tour industrial structure. Concrete details are: based on the annual rate of growth, we guess and estimate a hypothesis, then compare the hypothesis to the actual growth, and then analyze the shift state of Hubei tourist structure to the average level of the whole country. The effectiveness state can be analyzed and judged at last.

According to the Shift-Share Analysis, three factors are related to economic growth of Hubei province of China, those are state factor, structure factor and area factor. Then we can write a formula of economic growth rate.

$$R_{vi} = U_t + V_i + W_i \tag{1}$$

$$U_t = \frac{G_t - G_o}{G_o} \times 100\% \tag{2}$$

$$V_i = \left(\frac{G_{it}}{G_{io}} - \frac{G_t}{G_o} \right) \times 100\% \tag{3}$$

$$W_i = \left(\frac{Y_{it}}{Y_{io}} - \frac{G_{it}}{G_{io}} \right) \times 100\% \tag{4}$$

There into, R_{vi} —economic growth rate of industry i of Hubei tourist industry; U_t —the t th year economic growth rate of national tourist industry; V_i —growth rate of industry i of national tourist industry; W_i —growth rate of industry i compared to national industry i ; G_o —base period revenue of national tourism industry; G_t —the t th year revenue of national tourism industry; G_{it} —the t th year revenue of national tourism industry i ; G_{io} —base period revenue of national tourism industry i ; Y_{it} —the t th year revenue of Hubei tourism industry i ; Y_{io} —base period revenue of Hubei tourism industry i .

According to the formula, if U_t doesn't change, then we can see each industry shift level relative to the whole country, then we can analyze and evaluate the effectiveness of each industry Structure. V_i reflects effectiveness of industry i to the whole industry, if $V_i > 0$, it means industry i growth faster than the whole industry, then its effectiveness is relatively better; While if $V_i < 0$, it means industry i growth slower than the whole industry, then its effectiveness is relatively poor. W_i reflects the comparative advantage of industry i of one place to the national industry i , When $W_i > 0$, the lager the figure is, the bigger industry i competitive advantage is; When $W_i < 0$, the smaller the figure is, the weaker industry i competitive advantage is.

1) If $V_i > 0$, $W_i > 0$, then the effectiveness of industry i structure higher than the average level, it means its effectiveness is relative better and has competitive advantage.

2) If $V_i < 0$, $W_i < 0$, then the effectiveness of industry i structure lower than the average level, it

means its effectiveness is relative poor and hasn't competitive advantage.

3) If $V_i > 0$, while $W_i < 0$, then industry i increases faster than the whole industry, while slower than the same industry of the whole country, it means industry i is lack of competitive advantage to the whole country.

4) If $V_i < 0$, while $W_i > 0$, then industry i increases faster than the whole industry, although the industry i of the whole country is poor, effectiveness of Hubei industry i is better than the whole country, and has competitive advantage. But the effectiveness of the industry structure is relative poor and weak to the whole industry.

4 An Empirical Study and Analysis of Hubei Tourism Structure Benefits

4.1 Empirical studies

This analysis is mainly concentrating not on quality but on quantity. Collecting some data, the author do some quantitative analysis to Hubei tourism structure effectiveness with method of Shift-Share Analysis. Just because of limited data, this article analyzes the effectiveness from the angle of international tourist revenue of Hubei.

The base period is 2004, then we can calculate U_t , V_i , W_i of Hubei tourist departments. As shown in the table:

Table 1 Hubei International Tourism Structure Effectiveness with Method of Shift-Share Analysis in 2010

Department	National foreign exchange composing(Billion dollars)		Hubei foreign exchange composing(Billion dollars)		U_t (%)	V_i (%)	W_i (%)
	2004	2010	2004	2010	2010	2010	2010
Total	257.39	375.46	1.92	2.09	——	——	——
Traffic	77.75	107.81	0.78	0.67	0.46	-0.0721	-0.5277
Shelter	31.24	43.53	0.18	0.12		-0.0653	-0.7267
Catering	19.42	24.51	0.08	0.04		-0.1966	-0.7621
Sight-seeing	13.07	21.3	0.07	0.1		0.1710	-0.2011
Entertainment	18.25	24.19	0.13	0.21		-0.1332	0.2899
shopping	57.98	89.55	0.37	0.4		0.0858	-0.4634
Post and Tele communications	8.81	11.43	0.08	0.07		-0.1613	-0.4224
Others	30.86	53.14	0.23	0.48		0.2633	0.3650

According to the table, we can get four types of the tour industrial structure effectiveness of Hubei:

1) Others departments: $V_i > 0$, $W_i > 0$, it means its structure effectiveness is higher than the average level of the international revenue of the whole country. More over, the increase of these departments received foreign-exchange is faster than international tourism industry. Then its effectiveness is better and has distinct competitive advantage. We can see that others department of Hubei are like this.

2) Traffic, shelter, catering and Post and Telecommunications departments: $V_i < 0$, $W_i < 0$, it means effectiveness of these departments of Hubei are all lower than the average level of the whole country, their increasing of foreign-exchange reception is lower than the average speed of international tourism industry. Then its effectiveness is not only behind to the average level but also behind to the whole tourism industry. These four departments are lack of competitive advantage.

3) Sight-seeing and shopping departments: $V_i > 0$, $W_i < 0$, it means their increasing of foreign-exchange higher than speed level of the whole country, while Hubei are lack of competitive power. This is because of our insufficient advertisements and simple project.

4) Entertainment departments: $V_i < 0$, $W_i > 0$, it means entertainment department foreign-exchange reception is slower than the international tourism industry, and our entertainment is better than the average level. We have competitive advantage to other provinces. But because of the poor effectiveness of the whole country, we are still reduced to absolute inferiority.

4.2 Analysis of the results

According the analysis above, there is a big gap of effectiveness between Hubei and the whole

country. Besides entertainment and other departments, our industry structure effectiveness are all very low, so it's a big vast to adjust and optimize the tourism structure for Hubei international tourist structure effectiveness.

1) Shopping department has weak competitive advantage. Although this department has developed fast these years and brought big profit, we are still lack of advantage to other provinces with development of the whole industry.

2) Shelter department are of low economic benefit, and loss of competitiveness. There are many reasons; the main reason is its runaway scale. Tourist hotel provided too many rooms that exceed market demands. Of course, it reflects our exploiting insufficient markets overseas. This is the main reason of our tourist hotel deficit each year.

3) Catering department has too big scale and low quality that it hasn't complete power. Recently, restaurants and boites are everywhere. Convenient to customers, but low quality. Single dishes, insufficient innovation and quality discrepancy, these are all influence its foreign exchange proportion.

4) Sight-seeing department earns lower foreign exchange than the average level of the department in the whole country. In the circumstance of the department increasing faster than the whole tourism industry, we haven't any competitive power. 3.6% revenue is from sight-seeing department in 2010 international tourist revenue, this data is lower than national average level (which is 5.1%), this is hardly sorts with our sight-seeing tourists. The main reasons are our ageing resorts and insufficient innovation, let alone the worse resorts environment.

5) Long-distance traffic has low structure effectiveness and can't compete with the whole country, which hardly sorts with our convenient location. Long-distance traffic plays an important role in our tourist revenue recently, but reduced to absolute inferiority compared to the whole country. So we must actively improve our traffic.

6) Entertainment department of the whole country is very low, but we have an advantage over the whole country. For the tourism industry, this advantage is disadvantage to other department. For years, tourism products of Hubei are relying on sight-seeing products, while facilities for leisure are exploited insufficiently. Belongs to Participation products, the entertaining products will play much more important role in tourism.

5 Conclusion

Hubei Province of China has obvious advantage with rich tourism resources, convenient transportation and immense developing potential. But we still have obvious shortage such as undeveloped and low industrial structure benefit. So, we must establish the new concept of development, improve competitive power of each department, adjust market structure, develop diversified products, develop and exploit tourist areas well and optimize its surroundings, those are all important things to optimize Hubei tourist structure.

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Study on the Construction of Industrial Safety Evaluation Indicator System*

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Abstract: In the open environment, the major factors determining the industrial safety, have been changed, and this article tries to reveal the nature of industrial safety and construct a set of evaluation indicator system in terms of 3 indexes of the first class, the generating capacity of industrial competitiveness, the industrial control, and the supporting capacity of industrial environment, as well as the quantitative analysis of 29 dimensions. And it also endeavors to point out that such factors as the capacity of industrial creation, core technology, and control force are vital to ensure the safety of industry. Firms should constantly update and strengthen themselves in the dynamic management changes, and ensure the industry safety of one country on the whole and in the long run.

Key words: Industrial Security; Evaluation Indicator system; Generating Capacity; Industrial control; Industrial environment

1 Introduction

Industrial security has been the core issue to restrain the economic development of all the developing countries, and the core basis of strategic orientation and policy option of each and every country. For every country, protecting its industrial security is the core to defend the economic safety as well as the country's security. Although China has become an industrial power and its manufacturing international competitiveness has ramped up to some extent, we still need to find that, indeed, this is the case that foreign-funded enterprises contribute a relatively large proportion to Chinese economy, according to the statistic data of China's industrial output. In the background of globalization, international capital flows in larger scale and with a higher speed, bringing redundant capital and mature technologies to developing countries, and simultaneously, allowing developing countries tremendous political risk and economic hazard. There exist many countries which have forfeited their control over crucial industries and core technologies, and in a sense, economic security and industry safety have become the core concern that curbs those nation's economic development.

2 Evaluation Indicator Systems

Follow the design principles of systematization, testability, strategy, and practicability of evaluation indicator system, and then select and ensure the generative capacity indicator of industrial competitiveness, the evaluating indicator of industrial control power and the supporting power of industrial environment to be the first-class indexes of industrial evaluation system. In this way, we then separately select and construct corresponding first-class indexes, basing on that result. Hence, the evaluation indicator system mainly includes the evaluating indicators of industrial competitiveness of industrial competitiveness, the evaluating indicators of industrial control forces and the evaluating indicators of industrial environment supporting power. The generative ability of industrial competitiveness is the essential issue of industrial safety, and the industrial control reflects how much foreign capital influences industrial safety, and the industrial environment is the cornerstone for industry to exist.

Hence, the evaluation indicator system mainly includes the evaluating indicators of industrial competitiveness of industrial competitiveness, the evaluating indicators of industrial control forces and the evaluating indicators of industrial environment supporting power. The generative ability of industrial competitiveness is the essential issue of industrial safety, and the industrial control reflects how much foreign capital influences industrial safety, and the industrial environment is the cornerstone for industry to exist.

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3 The Evaluation Indicator System of Generative Capacity of Industrial Competitiveness

(1) Evaluation indicator of generative capacity of industrial competitiveness

Any organization has no access to and has no need to create all the knowledge that it necessitates, and enterprise could absorb knowledge which it needs more economically and quickly through any variety of learning methods. It requires enterprise to enforce its knowledge identification and monitoring capacity, and the capacity to instantaneously track, observe, seek and select new external knowledge, especially tacit knowledge. The capacity to determine the acquisition, conversion and effective utilization of knowledge shall be the enterprise's absorbing capacity, including the value identification, the knowledge acquisition, the knowledge assimilation, the knowledge transfer, and the knowledge utilization.

Absorbing capacity contributes to the formation of innovation, and only if modern enterprises sustainably learn and innovate they can create and maintain this competitive advantage. It has been proven that enterprises with stronger absorbing capacity could present more powerful ability to learn, integrate external information and transform external information into corporate knowledge capital, which makes innovation possible.

The absorbing capacity particularly accents on the corporate awareness, grasp, application and development of external innovative opportunity, and then enterprise will transform them into internal knowledge which could match and coordinate with existing internal knowledge. The stronger the enterprise absorbing capability is, the more powerful the operating capability on external environment is. In the end, it will be more likely to introduce the overflowing knowledge of rivals into the enterprise.

(2) The capability to learn technology

The system of enterprise accumulating knowledge is the source of enterprise's core competencies. The ability of an enterprise's ability to learn, and knowledge translated into action is the ultimate competitive advantage (Jack Welch, 2001). The empirical study of the scholars of organizational learning ability Pilar & Jose(2005) concluded that: "organizational learning capability is the key factor to affect enterprise's innovation". Technology learning is a process to search for and gain useful knowledge from the external knowledge environment, and then digest it, and bring it into the technology orbit or rebuild technology orbit in order to enhance the integral technology capacity of the organization. Technology learning is the inevitable method to form and ramp up the technical ability, and its effectiveness depends on the absorbing capacity of tacit knowledge.

From the perspective of knowledge, the nature of firms to form their own independent innovation is that while improving organizational knowledge stock through social knowledge learning, firms also need strengthen the application of enterprise knowledge to improve the organization's knowledge level, and ultimately turns it into the latent innovation potentials. Bell(1984) systematically conducted a study on the innovation from the social knowledge learning, and he believes that the factors which determine enterprise's innovation is social learning ability, including learning in the operation, learning in the move, learning in the exploration and so on. Rainer,(2005) deemed that enterprise's independent innovation is subject to the constraints of knowledge stock and level, and the independent innovation is the function of enterprise's knowledge stock and level. He stated further that knowledge stock is the initial condition of independent innovation and determine the initial technical capacity as well as the pattern adopted to cultivate independent capability of innovation; the level of knowledge is the requirement to improve the independent innovation, and determine the formation speed of enterprise's innovation capacity. The mechanism between them is illustrated.

(3) Capacity of Human capital supply

The owner of human capital is both the practitioner of innovation as well as initiator of technical progress, and the bearers and disseminators of new technologies. In the Introduction to economic growth, Charles pointed out that: the great differences between human and non-human will lead to inefficient use of resources. The miracles of economic growth in countries of eastern Asia trigger the scholars to transfer their focus from the accumulation of physical capital to human capital accumulation. Human capital is the source of technological innovation and a necessary condition for technology diffusion, and also is an important factor to affect innovation capability, and plays a vital role in the innovation system. Human capital is one of the core elements to enhance the ability of technological innovation, improve industrial competitiveness, increase international competitiveness, acquire technology innovation system, and realize the generative capacity of competitiveness.

In the analysis of labor market human capital for the function of technical, Jacob Ming Seer

pointed out that human capital played a twofold role in the process of economic development: First, a stock generated by education and training skills. It is a production factor, harmonized with physical capital and “primitive” labor in the process of production of total output; Second, a stock of knowledge, it is a source of innovation, and a basic motivation of economic growth. Li Jingwen (1955) thought that, although the company is generally regarded as the actors to produce a source of technological progress, but the labor force, harnessing some knowledge, technology and capacity is the source of technological innovation. Both by self-technological innovation and by learning other’s technology, we still need to invest in physical capital and human capital. We could call upon higher innovative capacity only if we have a large number of scientists of high-tech and innovation. Obviously, human capital is the core element with the most motility; all innovation activities are inseparable from the human capital owners who have certain knowledge and skills. The size of the stock of human capital and the quality structure of human capital has a direct impact on the result of technical innovation. Wang Jinying pointed out that: In general, under certain conditions, the greater the investment in human capital stock, the higher the quality of human capital, and the more the technological innovations achieved. Technological innovation and technological advance have a strong dependent relation on the human capital.

4 The Evaluation Indicator System of Industrial Control

Industrial control theory is an industry safety theory that focuses on the study of foreign industrial control and the control of host industry security. Its core is to emphasize the control of native capital on their own industries, so as to reflect the change of the host industry’s security, but the promotion or demotion that native capital acts upon industrial control is reflected through the study of the strength of foreign capital control on the industry. The basic content of industrial control should contain the control of market, the technical control, the brand control, the control of equity stake of foreign capital. Foreign control or the degree of control could be expressed numerically via relative control rate.

(1) Control of the market. Foreign capital usually controls the host country’s market through acquisition, merger or reorganization and creates monopoly in certain industries, utilizing its comparative advantage in terms of capital, scale, technology, and management. Therefore, the foreign direct investment in the control of the market will affect the host country’s industrial development and the formation of its own complete industrial chain, thus affecting the industry safety. From a certain point of view, the mark of strength which shows the international competitiveness of the country’s industry is the share of a country’s specific industry in the world market, and industrial market share can directly reflect the realization of the international competitiveness of industry. The industry market share contains two indicators ---- the occupancy rate in international market and the rate in domestic market. The occupancy rate in the international market could be expressed by the proportion between host country’s total exports and the world’s total exports, reflecting the proportion of the country in the world export market. Domestic market share is to reflect the situation of the domestic industry’s competitiveness in the domestic market. The greater its share is, the more competitive it is in the domestic market. We could measure through the ratio of the sales of domestic industry in the domestic market and the total sales in domestic. Market concentration shows the economic dominance of a number of the largest enterprises in the specific industry, and it reflects the degree of both economic scale and trade barriers. It reflects the industry indicator of international control from the internal organization of the industry, and you can measure it through the absolute concentration, that is, the ratio of the sales of the largest enterprises within the industry to the total industry sales. Industry chain is a multi-level structure with technical links, which is oriented by the production of a certain kind of end-use products and services, constituted by all the production and services sectors that are interrelated, interdependent, and accompanied with supply and demand relation with each other, formed on the basis of the division of labor and collaboration, and erected through the gradual differentiation of the previously mixed industry procedure under the action of specialized division. If the industrial chain is divorced from the chain of global technology in a long run, there is no doubt that the chain is endangered to be dismembered or marginalized. The endpoints of Industrial chain reflect the absolute control of the industry, and if high-end is monopolized by the foreign enterprises, the development and safety of the industry will be seriously endangered.

(2) Technical control. Technical autonomy reflects that the industry has its own technology which is not dominated by foreign. It can judged by the ratio of the number of invention patents to the amount of the import of technology. Throughout the world, multinational companies integrate and utilize technological resources, control the high-end of technical chains, and dominate the core technology of

important industries, in order to constantly improve the industry's standards of technology and design, and to control industrial development on a global scale. This indicator reflects the survival dependence on foreign technology of domestic industry. It can be measured with the proportion of the output value of introduced technology of the year to the total value of output of that year. If the dependence of one nation's vital industry on foreign technology is very much large, the nation's industry would always linger at the bottom of the industry chain, and the industry development would have to build upon other nations'. The larger the dependence of industry technology on foreign is, the sustainability of international competitiveness will be, the more insecure the industry will be. The advent of the era of knowledge economy makes the world-wide technical standards competition increasingly fierce. The one whose standard is recognized all over the world could reap a huge market and economic interests, fostering the control and competitiveness of the industry. It is the paramount method for multinational companies to control the technology and market that companies dominate the key technology standards of industry and products. Economic benefit depends more on technological innovation and intellectual property rights, and the technical standards gradually become the highest expression of the form pursued by the patented technology. The creation and development of the standards reflects the highest technical level in an industry, and is the authority symbol of the industry. Only in this way could it become the worldwide leader.

(3) Brand control. The higher the owning rate of foreign capital is, the greater the extent of the effects of industrial safety would be. The indicator can be measured with the ratio of the number of total number of foreign brands to the amount of domestic industry brand. Because after the foreign businesses get the controlling position in the joint venture, they would put the brand of the host country enterprises on the shelf and take up their brands, through a variety of methods and means. Brand competitiveness is the outcome of brand competition, is a comprehensive capacity of brands to participate in the market competition, and is a capability erected to occupy markets, achieve dynamic competition advantage and attain a long-term profit because it is hard to be emulated by its rivals. The brand competitiveness mainly reflects in the effect of brand barriers, in the effect of brand market, in the effect of brand extension, and in the effect of brand driving. The brand determines the enterprise's core competitiveness, and is the motive power of the development of enterprises. If the enterprises tend to stand out in the fierce competition, it is necessary to establish an excellent brand, and to improve the brand competitiveness constantly.

(4) Control of foreign equity. The inrush of massive foreign capital will lead to the loss of state-owned assets and national brands; the foreign capital would monopolize the industry by acquisition and merger, or weaken the dominant position of state-owned economy in some industries and weaken the country's economic control through holdings; Usually, the acquisition targets are capital-intensive or technology-intensive enterprises, which mainly occupy the domestic market and only take over the essential part of enterprises, taking advantage of the asset specialty, but leave the negative externality for the society, control the whole at a minimum cost, and mitigate risks. Thereby this would increase the burden on the government and weaken the industrial safety of enterprises. Dependence on foreign capital could be concluded by the ratio of the total amount of foreign capital utilization in one country to the number of the total investment of a country's industry, which reflects the proportion of the industry in the country on the utilization of foreign capital. In the early days when entering into the host country, foreign capital inclines to act as joint venture due to a variety of limits as well as the consideration of their own security, but after a certain period, it will seek the rights of control in the joint venture through a sole proprietorship or a variety of ways, so as to form the equity control of the host country enterprises, and then dominate the host country's industry, thereby reducing the host country's industrial safety.

5 The Evaluation System of Industrial Environment

Industrial Security is an ecosystem, and the domestic living environment is the basis for the survival of the industry. It includes the evaluation of industrial policy, environmental indicators, the evaluation of environmental indicators of industrial finance, and the evaluation of the supports indicator in industrial market.

(1) Industrial policy environment

Marketization and globalization not only have no access to surpassing the national interests, but also can not completely automatically to defend its national interests and industrial safety. The industrial policy is a set of legal or quasi-legislatively binding norms, guidance, behaviors of restriction that the government makes to achieve some particular socio-economic goals according to the main part of the

market economy. In the market economy, industrial policies correct the inherent flaws of the market mechanism, improve the market environment, streamline the resources allocation, and realize the maximum of social welfare in order to carry out the intention of the country, mainly depending on the authority of government resources and guiding role. Under the conditions of sustainable development that depends on introducing technology in a long term and the repression that the advanced countries inhibit the development of developing nations via various ways, the country should transform the structural flaws of industry and technology effectively, and this transformation could not rely on the enterprise's own efforts and the market adjustment forces, but necessitate the corresponding supports of industrial policy and technical policy from the government. It has been proved that only by strengthening the government's macro-control functions in respect of industrial development, we could promote the construction and development of the complete core of the industrial chain through the adjustment mechanism of the fiscal, monetary, tax and other benefits coordination mechanism to promote the construction and development of the complete core of the industrial chain. It could be substituted by the efficiency of the government administration (the Chinese Government Performance Indicators) can be used instead.

(2) Industry financial environment

The survival and development of the industry are inseparable from a sustainable, high-quality capital chain, and then evaluate whether the industry and the industrial and financial environment is safe, through the analysis of the level of capital efficiency of the industrial development and the scale of the capital costs.

(3) The support force of industrial market

The industrial market demand contains the demands of domestic industry market and international industry markets, industry needs. Domestic demand is the prime power of the industrial development, and the greater the demand of the domestic market is, the more beneficial to manufacturers within the industry to pursue economies of scale to reduce costs and accelerate the accumulation of capital will be. Meanwhile, the acceleration of the demand growth of domestic market will also stimulate enterprises to increase the investment and introduce new technologies to further enhance the prime power. It can be judged with the amount of domestic consumption of the year. The demand of international market is to investigate the industrial room for development in the international market. The higher the demand in the international market is, the larger the room for industrial development would be, and the greater the potential of industrial development will also be. Broadly speaking, the industrial demand of international market should refer to the integration of demands of every industrial product from different countries, but as each country has its own corresponding product supply and the competing platforms of foreign products and domestic products are often not the same, thus the industrial demand of international market should remove that part of domestic supply in the short term. Therefore, we should measure the demand of international market, using the total amount of the world's exports of the year.

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A Research on Systemic Management of Product Design

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Abstract: With the development of science and technology, China's economic structure has changed. For enterprises, the novelty and systematicness for the product design are indispensable which can help the enterprise to survive in the social economic competition environment. At present, many enterprises have used their own program to design the product, which has an important development implication for their systematic management. Therefore, system management is necessary for product design which can guarantee the smooth development for the product design.

Key words: Product design; Systemic; Management

1 Introduction

No matter what the industry is, the form of the product design and development are the same. Each enterprise will formulate the design program of the products according to their own needs. This procedure is not immutable but always changing according to the design needs. The whole process of product design specifications runs through the management function. Essentially speaking, the forming process of design specification is the implementation of management activities which has universality and effectiveness. The design planning and systemic management of the products are equivalent to the strategies and tactics in the war. The former is a holistic concept and the view from the macro point. The latter is a specific method and the view from the micro perspective. However, the two are complementary and indispensable to each other.

2 The Systemic Management in Design Process

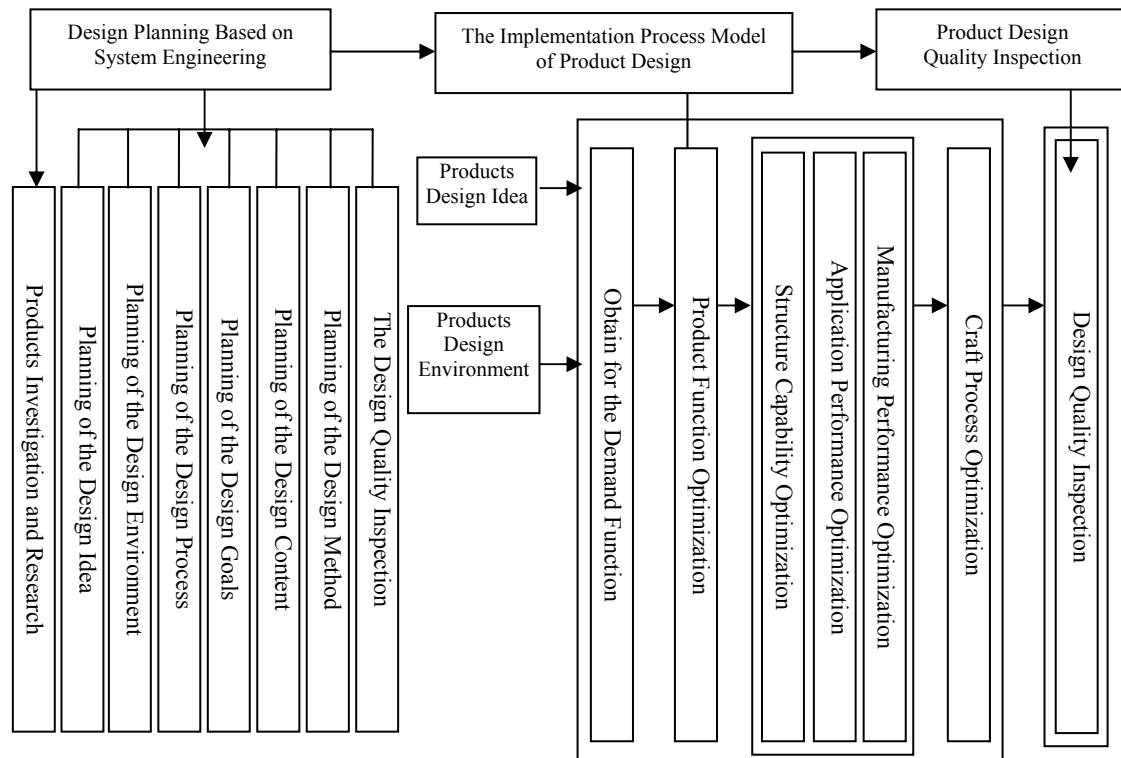


Figure 1 The Design Process Model for Products

The Figure 1 shows that compared with the traditional management method, the process management method has its unique features and regards the enterprise as a process network system

which includes product design, product production, product sale and product quality management, etc. It will optimize the product design process mainly according to the enterprise objectives. At present, with the rapid development of computer technology and network technology, many branches of science and technology have been carried out effective connection. The enterprise management mode is changing. The traditional management mode can not adapt to the development of our society, and there produce a new management mode based on the carrier of network, information, management, etc. When the process management method is applied on the product design process, it will be conducive to improve enterprise's capabilities of processing the information and controlling the situation. Therefore, it is the favor of many enterprises. The product design process on one hand is the embodiment of design specification, on the other hand is the implementation process of management activities. This systemic management runs through every stage in product design. Good results have been achieved by the design process management in practice which is the favor of the design community all over the world. Although their design theories are different, they are trying to enhance and improve all around this process.

3 The Systemic Management in Design Ideology

No matter what kind of the work is, we should have the guiding ideologies. Therefore, the product design is the same. Only by doing product design in the correct guiding ideology can we ensure the quality and performance of products. In the process of product design, insisting on the systemic integrity is the intrinsic requirement of implementing the scientific outlook on development. The systemic management of the product design ideology is mainly reflected in the following aspects: (1) whether the subjective initiative of human can be played and the creativity can be showed; (2) whether the subjective environment and objective environment are in harmony; (3) whether the treatment to the design process is reasonable and comprehensive; (4) whether the final goal is right; (5) whether the technical content is overall and concrete; (6) whether the design method is scientific; (7) whether the final technology results are right. These contents are the main contents of the systemic management in the design ideologies, which have direct relationships with the organization, coordination, and control of the design work and have indirect effects on the coordination, development, stability of product, etc. Please check the Figure 2.

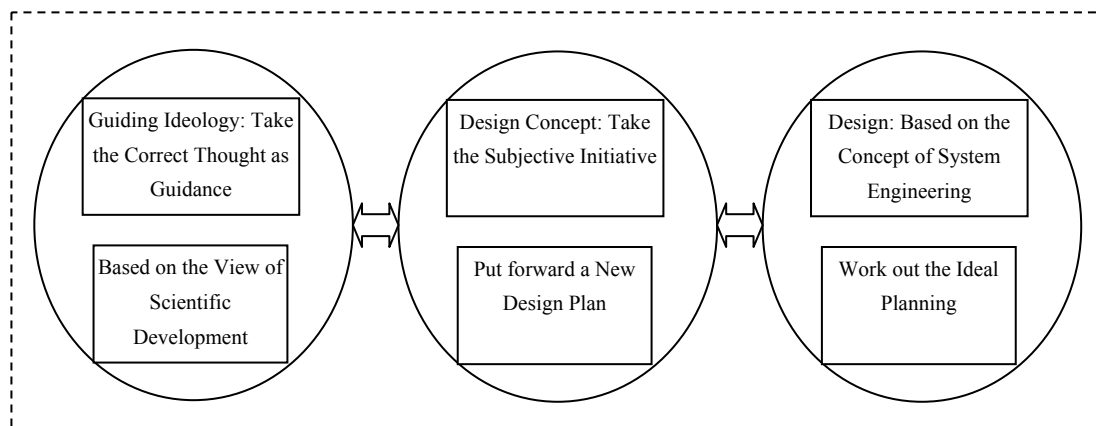


Figure 2 The Design Thought Model for Products

4 The Systemic Management in Design Environment

The thinking of the product design environment is the main inherent requirement of the guiding ideology. In the process of product design, the environment is an important resource which plays a great role in promotion, sales and other aspects of product. Therefore, in the design process of modern product, the systemic management of the environment is very important.

4.1 The social environment and management

The social environment contains a lot of contents such as the politics, economics, cultures, interpersonal laws, environment and so on. We need to focus on the aspects of politics, economics, cultures, laws and others in the systemic management. We must analyze whether the design products are in a state of harmony at home and abroad. If not at the situation, we must try to adjust the harmonious

factors.

4.2 The natural environment and management

The contents of the natural environment which mainly refers to the ecological environment are also in large numbers such as the use of resources, environmental protection etc. Therefore, we advocate the design of green products. When carrying out the natural resources systemic management, it is better for us to control effectively and mainly from the three aspects: firstly, we must make sure that the design products for environmental have no harm. Secondly, we need carry on the environmental design in the product design process. Finally, we must focus on recycling in the use of resources & recycle renewable resources and strictly controlling index in the materials research & development, innovation & use.

5 The Systemic Management in Design Goal

Designers can achieve the desired final state only through the design target which is the main goal of the design work. Therefore, the full considerations of the product design requirements include design idea, design cost, design cycle, design goal and sale service, etc. Although the product requirements are different, the design goals are different also. For the product design, it is not good when the target is too high or too low and this will have adverse effects on the ultimate benefit of the enterprise. So it is necessary for us to carry out systemic management in the product targets. The advantages of carrying on systemic management in the product design targets are mainly in the following aspects:

(1) The management in the design target can make the staff know the enterprise purpose and the enterprise development direction more clearly. The introduction of the target management method in product design process can make the product designers understand the design ideas, contents and goals more clearly so as to ensure that the design work can be carried out smoothly.

(2) The most attention of carrying out the target system management is the result which can promote and improve the planning work of the enterprise better. In the process of product design, the key point of the target management is the design goal. And the aspects of design, content, method will not be paid much attention. Therefore, it can make the product design and planning more perfect.

(3) The target deformity system management can help managers to understand their responsibilities and tasks more clearly, and ensure their functions in the correct position. All those can help them to adjust and deal with the problem in design process in time so as to ensure the design quality.

(4) Carrying out the target systemic management can make the enterprise development direction more clearly. In the design process, adhering to the target management can help us to consider the problems standing in a global perspective. Viewing every problem of design process from the macro level, it helps to ensure the products design quality and improve the market competitiveness of the product.

(5) The main objective of carrying out the systemic management is to ensure that the goal can be realized smoothly. It is conducive for the superior and the subordinate to reach a consensus. It makes the relationship between the upper and the lower more harmonious so as to further improve the working efficiency of the whole work team.

(6) Carrying out the target management can also provide performance reference for managers. On this basis, the managers can do the reasonable evaluation to the performance of the designing product so as to enhance the quality of the products.

(7) The implementation of systemic target management can keep balance between the long-term interests and the short-term profit goals of the enterprise. The target management can start from a global perspective to adjust the goal of the product design reasonable and achieve the balanced development between long-term targets and short-term goals.

6 The Systemic Management in Design Content

For the design contents of the product, we can analyze them starting from the product functions and structures. No matter how complex the product is, it mainly comprises power system, execution system and transmission system, etc. From the view point of design process, it is mainly designed for the function, planning, etc. Due to the different design goals, the design contents are not the same. In design process, we need the systemic management in the design contents which is an important measure to ensure the design safety, effective and reliable and also is the prerequisite to improve the market competitiveness.

The design planning of the product includes a lot of contents which are universal and practical, the design content of the designer. The product design contents are related to the designer, the use of

resources and the design flow, etc. So we need to focus on the management. Look at the following drawing:

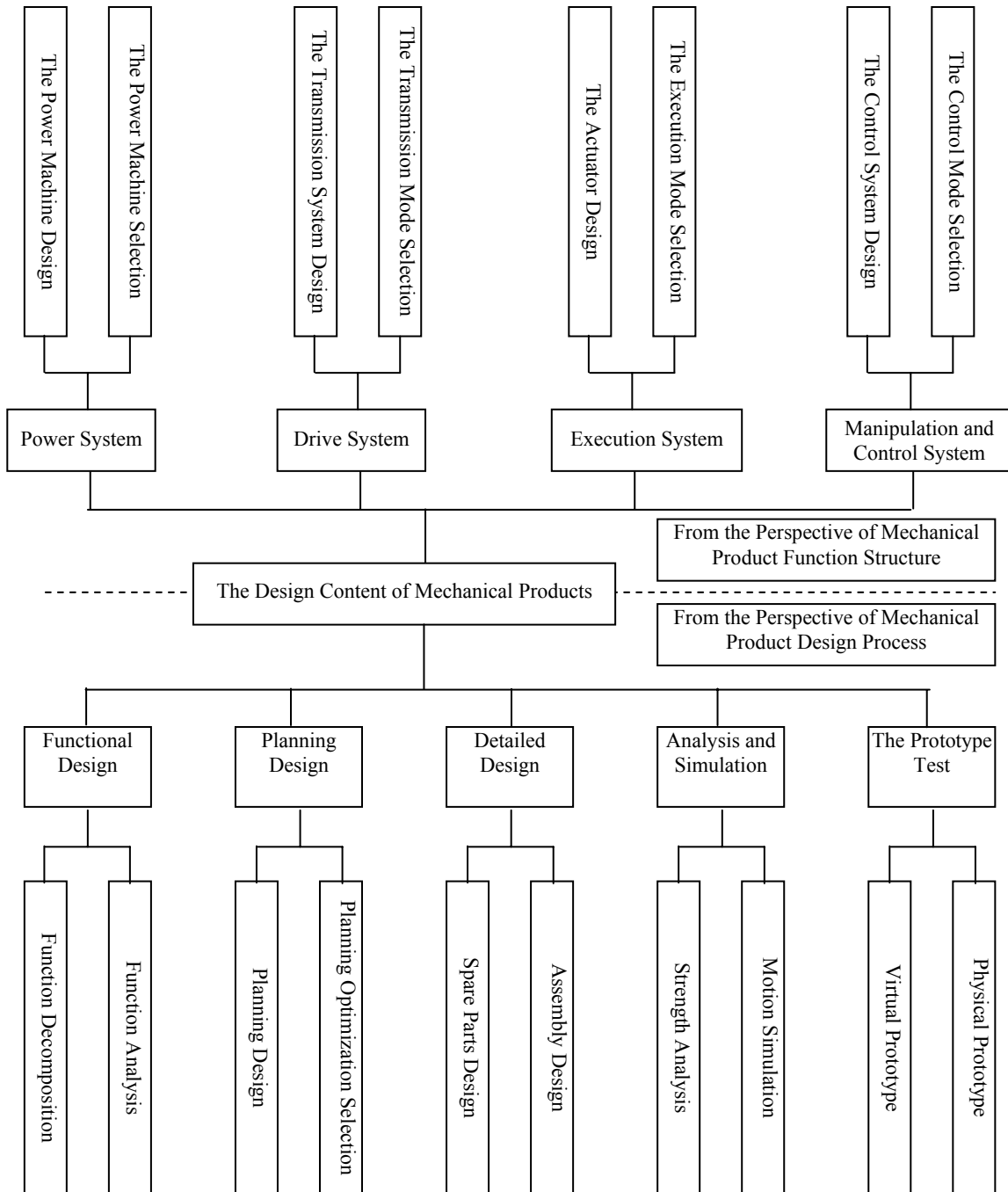


Figure 3 The Design Content Management for Products

7 The Systemic Management in Design Method

The product design not only includes the design ideas, design contents and design goals, but also contains the design methods which are very important. It is the most powerful tool for designers to complete the design work. Design methods are various, Using all the design methods in a product design is clearly impossible. Therefore, we need to select the appropriate design method according to the content and the target of product design so as to ensure that the design work will be completed in time. For the design content and the design target, design method is an important bridge and link. So it is

necessary for us to carry out the systemic management in design methods.

In numerous design methods, comprehensive design method is a method mainly aimed at the function and performance which is very suitable for mechanical equipment, in addition, it has strong adaptability for the large rotating machinery, the transport equipment and the construction machinery, etc. Therefore, in the process of product design, we focus on the comprehensive design method for the systemic management.

8 The Systemic Management in Design Quality Inspection

Quality management mainly refers to engage in some management activities in order to achieve the quality target. The quality management of product design mainly includes several aspects, such as the setting of quality objectives and policy, the quality planning and the quality control, etc.

We can not judge the quality of the products simply from the consumer point of view, but observe from the aspect of production, environmental pollution, ecological harmony and other aspects. It is not only related to the economic benefit but also to the social benefit. Therefore, when establishing the quality objectives, on one hand we consider them as technical indicators, on the other hand take them into account the need of the society. Although the technology is very advanced, the economic problems must be taken into account. Therefore, the product quality management includes many contents such as cost, price, environment and so on. Only by a comprehensive evaluation can we make the products designed reach equilibrium state.

9 Conclusion

Above all, no matter what kind of product is, the quality is the decisive factor of success or failure. The product quality is mainly depended on the product design. Therefore, we should carry out the systemic management in every stage of product design process so as to make the products have strong competitiveness. System management is a kind of quality management method which is a way to solve the interest of the related stakeholders in enterprise. It carries on the management of the ideas, objectives, contents, methods of the product design so as to ensure the quality of the product design.

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A Study on the Importance of Business Model Innovation in Strategic Emerging Industries

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Abstract: Business models innovation is the key drive force for the development of strategic emerging industries. And strategic emerging industries business model innovation has its distinct characteristics. This paper first puts forwards what a business model is on the basis of previous researches and studies the connotations and features of business models and its innovation; and then it analyses the relationship between strategic emerging industries and business models from four aspects; finally, it expounds and proves in detail that business model innovation is the key drive for strategic emerging industries, and proposes that technological breakthrough and the application of new technology are the foundation of business model innovation.

Key words: Business model innovation; Strategic emerging industries; Technological breakthrough

1 Introduction

The characteristic of the market economy is competition. Famous management guru Peter Drucker said: "The competition between enterprises today is not a competition between products, but a competition between business models."^[12] The emergence of the new economies and the ups and downs of Internet companies have greatly contributed to the deepening of people's understanding of business operation rules. Thereby the enterprise business models get more and more attention. American management expert Gary Hamel (Hamel, 2003) thinks that, in order to create new markets and wealth, managers first need to consider the whole business concept innovation. Business concept or business model is a framework for identifying how the company to be founded, how to sell products and to make profits. Pioneers do not make minor adjustments on the existing business model, but create a brand-new model in an unconventional way.^[8] Harvard University management expert Joan Margarita (Magretta, 2002) believes that a good business model for any successful organization is still an indispensable part, whether it is a new company or an old company. (Konczal, 1975^[4]; Dottore, 1977^[5]) After the rise of e-commerce, a large number of new companies have run their business by means of a way distinct from before.^[1] In order to distinguish between traditional businesses, the term business model has been widely used. Joan Magretta (Magretta, 2002) believes, the term business model was originally derived from the widely used spreadsheet software, which allows planners can easily modify parameters based on different assumptions to obtain a different scheme.^[9] Russell Thomas (2001) defined the business model. He believes that the business model is like running a profitable business which is an overall framework involving the business procedures, customers, suppliers, channels, resources and capabilities. Scholar Magritte • Du Bosen, (2002) and other scholars in University of Lausanne, Switzerland (Lausanne, Université) believe that the business model takes forms as the structure of enterprise and the network of its partners in order to create value, to market the value and offer value for enterprises. It is an asset of customer relationship to make a profit and to maintain the revenue streams. American scholar Larry Bossidy et al (2002) point that business model represents every part of gaining access to wealth, such as profit margins and cash flow; enterprise' relationship with external factors, such as market form, competitive situation and industry trends; and the strategic and organizational skills. Harvard University Assistant Professor Henry Chez Bruce and Richard Rosenblum (2002) argue that cognitive structure of the business model should be developed. They propose that the business model is a framework to reflect the business activities of value creation, Value Offering and value distribution.^[2]

2 Connotations of the Business Model and its Innovation

The business model can be summarized as a logical structure which can make profits itself while the business units are creating value to the customer. It is well exhibited in figure 1 below. Any branch or structural adjustments and changes for creating larger value for customers and expand enterprises own profit margins can be attributed to the scope of business model innovation. Since the late 1990s, the rapid development of information technology has promoted the innovation and practice of the majority of the industry's business model. The individual enterprises in many industries obtained an important

driving force for their sustainable development through making substantive breakthrough in the field of business model innovation. Business model innovation let enterprises shift gears and accelerate; business model innovation is the golden key for enterprises to open the door of “Ali Baba” to wealth; business model innovation is the other shore pursued tirelessly by every enterprise boat sailing in the business sea; business model innovation is an eternal and complex topic. Objectively speaking all enterprises in China have been striving for their business model innovation in different periods and to different extents. Just because of the above explorations and practices, industries in China can develop so rapidly, which exhibits such a lively and fascinating economic scenery.

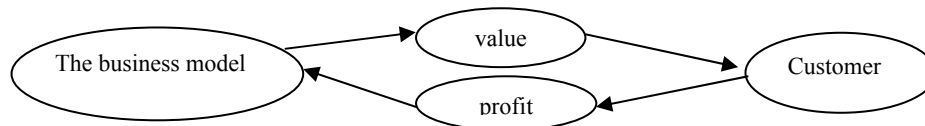


Figure 1

3 Strategic Emerging Industries and Business Models

Strategic emerging industries reflect the national strategic demands. It combines the new technology and emerging industries closely, and it is a leading industry which has broad market prospects and technological progress ability. The most prominent feature of emerging industries is innovation-driven, breakthrough and guiding. The industries widely adopt advanced production technology, which is in the most centralized area in the scientific and technological innovative production, and in a period of growth stage in the industry life cycle curve. The nature of strategic emerging industries decides it has a complementary and mutually reinforcing relationship with the business model (innovation).

First, a strategic emerging industry needs a suitable business model. The technology roadmap for strategic emerging industries can be undetermined, but the business model is a vital condition for the foundation of the industry, which can be elaborately illustrated below as figure 2 shows. In the first place, technology itself has no economic value. Only when technology is commercialized, can the industry take shape. Even for the mutual technology of emerging industries, business model is of the same importance. In the second place, there exists a severe competition in the technology of emerging industries including various technological competitions within the emerging industry and competitions between alternative technologies with other industries. The increasing research and development costs and the shortening of product life cycle mean that even a more state-of-the-art technology which achieves a satisfactory economic return also need to be commercialized. A good business model is even more important than inspiration and technology itself.

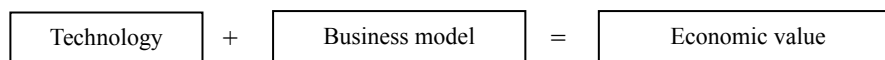


Figure 2

Second, the development of strategic emerging industries is the drive for its business model innovation, as shown in figure 3. It can cause the reconstruction of existing industries, enterprises business model. Technology innovation especially the destructive and radical innovation will inevitably bring a relatively thorough business model innovation, which is the call of the strategic emerging industry’s breakthrough. Nowadays people think commonly that the development of low-carbon industry needs a change of the overall energy industry business model from clean energy products to energy demands of the consumers. The change of this system asks for market application strategy, cheaper and safe and reliable energy products and more appropriate government policies and etc. The studies of Kodama (2004), Yovanof, Hazapis (2008) and other scholars have shown that the technology transformation of industry modulation and industry amalgamation have promoted business model innovation of enterprises in the United States, European countries and Japan, and business model innovation is conducive for enterprises achieve the benefits brought by technological changes in a greater extent [6]. For example, the IBM has implemented the “Wisdom of the Earth” strategy based on the large-data analysis techniques, and divided the strategy into six main systems like hydro, transportation, medical care, social security, safety, education smart city, and intelligent power, energy, business, railway and other areas. IBM undertook thousands of “Wisdom of the Earth” project practices, which have successfully transformed into a business model in intelligent growth.

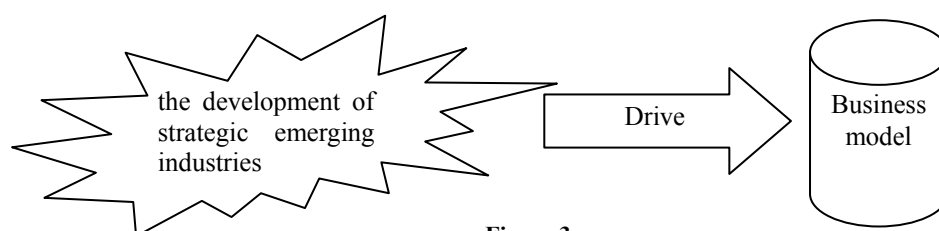


Figure 3

Third, the globalization of the strategic emerging industries requires business model innovation. A new round of worldwide emerging industry selection, entry and competition have already started after the financial crisis, which means strategic emerging industries' market and production must focus on the global. No doubt new products, new services are demanded in order to meet the needs of people from different countries, and of different living habits, which is the beginning of the business model innovation. It will also cause new changes on the global distribution of industry location, industry chain worldwide.

Fourth, the establishment of the business model is conducive to accelerate the formation of the industrial system of strategic emerging industries and to change the industrial patterns of the existing industry, even to create a new industry. The business model is the source of some strategic emerging industries innovation or itself is an innovative. Business model innovation will create new markets or new opportunities in the old market; it will cause a change on its own as well as its ancillary products and services, and may also produce some new industries, such as the new energy industry, which requires a series of changes on grids, energy services.

4 Conclusion

Strategic emerging industries are based on major technological breakthrough and of the same importance is the industrialization of new technologies to meet the needs of society and achieve their potential economic value; i.e. they must also be feasible in the business field, otherwise it means that they contribute less value to the society and enterprises, and may even be difficult to recover the initial investment in new technologies, and will not develop sustainably. For either existing businesses or new ventures, bringing new technologies to market will be materialized by means of certain business model. The business model is a bridge to connect the technology and its economic value. Technology and market are complex and diverse. They both require being combined to realize the potential economic value of the technology. In some cases, the existing business model can meet the requirements of the new technology; but in other cases, new business models are needed to be created and new technologies rely on business model innovation. A good business model is able to reshape the industrial environment, to stimulate the growth of the industry, and to achieve a win-win situation between enterprises and their industries. Strategic emerging industries business model innovation can help the industrialization of new technology, or can offset the technological disadvantage.

In conclusion, the technological breakthrough is the foundation for the development of strategic emerging industries, but technological research and development is not everything, and the development of strategic emerging industries does not only relies on technology; business model innovation is also the key driver of development of China's strategic emerging industries. A good business model, to some extent, can make up for the technological defects, especially in the case that a large number of enterprises in our country do not possess too much key technology. The importance that business model innovation has not less favorable influence than technology innovation does on the development of strategic emerging industries needs to be attached full attention.

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Research Trend of Technology Management

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Abstract: Many business organizations are eager to continually create innovation and contribute to the society. For this purpose, companies should not only pursue the leading-edge technology but also understand the nature of technology and manage their technological fundamentals to create competitive advantage. Management of Technology (MOT) is a typical research field for this issue. MOT covers many contents including administrative strategy, R&D management, manufacturing management, production control, marketing, accounting, finance, intellectual property strategy, business ethics, and others. By applying a text-mining method to the conference proceedings of IAMOT (International Association for Management of Technology), this study examines the research trends in MOT, detects a change in them that have occurred over time, and finally considers the effects of the social situation on academic research.

Key words: Text Mining; Network Analysis; Technology Management; MOT

1 Introduction

Management of Technology (MOT) is defined as the disciplines of management that enable organizations to manage their technological fundamentals to create competitive advantage. MOT should not only fulfill the management needs of a specific set of technologies within a domain and inter-domain relationship, but it should also develop the implementation strategies according to the available resources, current technologies, future markets, and socio-economic environment^[1]. Therefore, how to manage technology has become an important issue in the past few decades, and the MOT community has developed a wide range of methodologies and applications for both academic research and practical applications^[2,3]. Nowadays, MOT covers a wide range of contents including administrative strategy, R&D management, manufacturing management, production control, marketing, accounting, finance, intellectual property strategy, business ethics, and others. MOT research has been conducted at various levels for each kind of these contents. This made it difficult to understand an overall picture of the MOT research field. Finding research trends, or historically critical topics, in MOT is useful for understanding the key concepts of current MOT.

In this paper, we studied the research trends in MOT by applying a text-mining method to the conference proceedings of IAMOT (International Association for Management of Technology). We detected a change in the research stream and finally found the effects of the social situation on the research trends.

2 Research Objective

There seems to be several methods for investigating research trends in technology management. You might conceive of a method which surveys the trends in papers published in some academic journals. However, since each academic journal has its own predetermined themes, it is difficult to grasp the overall trend of MOT by just reviewing a few journals. Moreover, since research presented in academic journals is already finished, there is a time lag between research run currently and research presented in journals.

Another method to investigate the research trends is to examine the topics presented in major international conferences on MOT. Such conferences are likely to reflect research trends without the time lag found in academic journals, and their proceedings would appear to be an appropriate research target. The problem is how to investigate them. In an international conference, not all presentations are assigned to appropriate sessions, since they are constrained by time and location. In other words, the number of presentations included in a session category does not give an accurate picture of research trends. In addition, the session categories themselves change every year, reflecting the opinions of the program committee.

In light of this situation, this study focuses on the content discussed at an international MOT conference, deliberately ignoring the assigned session categories. We have analyzed the abstract texts in the proceedings of the International Association for Management of Technology (IAMOT) conferences,

in order to find how research trends have changed over time. IAMOT is a non-profit, non-governmental professional association in the USA whose purpose is to encourage high quality research and education in the field of MOT. IAMOT's first international conference was held in 1988, and its 21st conference, which was held in Taiwan in 2012, had approximately 400 participants from 34 countries around the world. The IAMOT conference is one of the most predominant international academic conferences concerning MOT.

The session categories in IAMOT 2003 were as follows.

- Knowledge Management
- Strategic Competencies for Sustainable Development
- Social Impact of Technologies Development
- MOT Education and Research/ Corporate Universities
- Innovation and New Product Development
- National Systems for Technology Development
- Small Businesses and Entrepreneurship/ Technology Incubation
- Emerging and Breakthrough Technologies
- Technology Transfer/ Technology and Security
- Technology Foresight and Forecasting
- Information and Communication Technology Management
- The Integration of Technology and Business Strategies
- R&D Management
- Project Management
- Industrial and Manufacturing Systems Technologies/ Supply Chain Management
- Virtual Organizations and Partnerships/ E-Commerce
- MOT in Developing Countries
- Managing R&D in China

By contrast, the list of the session category in IAMOT 2012 was indicated below.

- Technology-Service Convergence
- MOT in Services
- R&D Management
- Technology Strategy
- Technology Transfer
- Service Innovation
- Logistics and SCM
- Managing Energy Technology
- ICT Management
- Science and Technology Policies
- Science and Technology Incubation and Entrepreneurship
- Science, Technology and Society
- Management of Technology in Developing Country
- MOT Education and Research
- Manufacturing Servitization
- Measurement of Technology
- User Innovation and Open Innovation in East Asia

There is a large difference between the two session category lists.

This study aims to reveal the changes in the MOT research trends by performing text-mining approach on the IAMOT conference proceedings, and to consider the impact of societal changes on academic research.

3 Analysis Methods

3.1 Data used for analysis

For the data to be used in our experiment, we extracted the abstracts from the research papers included in the proceedings of the IAMOT conferences held in 2003, 2008, and 2012. Almost all papers had explicitly the abstract. However, some papers were free from boundaries between the abstract and the body text. In such cases, we determined by hand the text part corresponding to the abstract. During this process, we excluded any papers for which an abstract was clearly omitted.

3.2 Methods

First, we performed morphological analysis on the abstract texts using one of part-of-speech taggers^[4]. Then, focusing on only the nouns (general nouns and proper nouns), we calculated numerical feature values of each noun including the frequency of appearance of a word and the co-occurrence of words. Finally, we investigated the relationships between words using network analysis.

4 Results

4.1 Appearance frequency of words

The numbers of abstracts for each conference year were as follows: 369 in 2003, 236 in 2008, and 207 in 2012—making a total of 812 abstracts in all. There was some variation in the lengths of the abstracts, with the average being 246 words.

Table 1 shows the top 50 ranking words that had high appearance frequency within the 812 files (nouns and proper nouns). We ignored the words “paper,” “study,” “research,” and “result” since these are common to all academic paper abstracts, regardless of the research field. Table 1 shows that the following words that express characteristics of MOT had the highest ranking: “technology,” “process,” “development,” “innovation,” “management,” “product,” and “market.” This result is adequate but insipid, since these words are clearly and directly related to MOT.

Then, we investigated the frequency distribution of the appearance of words. The results show that several dozen words from the top in the appearance frequency recorded very high frequency, while the overwhelming majority of words appeared only a few times.

Table 1 Top 50 Words for Appearance Frequency in Total Abstracts

Ranking	Word (Noun)	Appearance Ratio	Ranking	Word (Noun)	Appearance Ratio
1	technology	51.7	26	datum	19.7
2	process	42.9	27	service	19.3
3	development	41.7	28	literature	19.2
4	innovation	37.6	29	performance	19.0
5	management	34.1	30	country	18.8
6	company	34.0	31	way	18.3
7	product	31.9	32	role	18.0
8	model	31.0	33	resource	17.6
9	industry	29.7	34	environment	17.4
10	market	29.1	35	method	17.4
11	firm	28.2	36	time	17.1
12	business	27.8	37	need	16.7
13	analysis	27.8	38	value	16.5
14	case	27.2	39	R&D	16.5
15	system	27.0	40	issue	16.1
16	strategy	26.5	41	change	16.0
17	knowledge	24.8	42	concept	15.8
18	factor	24.0	43	problem	15.8
19	information	23.2	44	sector	15.8
20	order	23.0	45	impact	15.4
21	approach	22.0	46	use	15.1
22	project	22.0	47	framework	15.1
23	activity	21.4	48	capability	15.0
24	level	21.4	49	policy	14.8
25	organization	21.2	50	effect	14.5

4.2 Co-Occurrence of words

Words can be regarded as compositional units for expressing what an author would like to state. Since the words existing in the same abstract shape together the abstract according to author's aim, such relationships between words are very important. If any two nouns appear in the same abstract, we defined the relationship of them as the co-occurrence. The strength of the co-occurrence can be represented by the number of the abstract in which the co-occurrence is observed. By using a graphical network, we expressed the state of the co-occurrence of words in each conference year. In the network, each word is depicted as a node, and co-occurrence relationships are represented by edges. The edges are drawn when the strength of the co-occurrence exceeds a certain threshold value. We calculated the various feature values of each word network in each conference year, such as the density, degree

centrality, closeness centrality, betweenness centrality, and so on. We found that the feature values are very similar between the word networks of each conference year, since the networks share a similar structure with each other. Moreover, the average distance is short, and the cluster coefficient is high, showing that the networks are small-world networks. Next, we found that the frequency distribution of node degrees (the number of nodes to which a given node is connected) is exponential, and that the networks are scale-free networks. This was observed in every conference year.

4.3 Observed research trends

In investigating changes in research trends, we focused on the betweenness centrality of the network nodes. The betweenness centrality of a node indicates the ratio of the edges between all other pairs of nodes in which that node is included. This metric is proposed based upon the notion that the more routes that pass through a point, the higher its betweenness centrality will be. In this research, the betweenness centrality of a word becomes higher when the word is co-occurrent with more other kinds of words. Table 2 shows the top 20 words for each conference year in terms of the betweenness centrality. What is interesting to note is that in 2012, the word “patent” appeared for the first time, in 8th place. We discuss this point below in greater detail.

First, as shown in Figure 1, we created the co-occurrence network of words in the case of IAMOT 2012, representing the betweenness centrality by the size of the nodes. The large node at the bottom right represents “technology,” and the large node at the top right is “innovation.” These two nodes have extremely high betweenness centrality. However, “patent” (a medium-sized node in the bottom left corner) also has a moderate degree of influence. Next, we investigated how the appearance rate of the word “patent” had changed from one conference year to another. The results showed the following increasing trend: 2.2% in 2003, 6.8% in 2008, and 14.0% in 2012.

There were 29 papers that included the word “patent” in their abstracts in 2012. The majority of these did not include “patent” in the title, and they were spread across the session categories. Moreover, the existing session categories did not have any categories that specialized patent analysis.

The reason why the MOT research that relates to patents increased can be that the progress of the ICT technology permitted enhancement of the data processing ability and development of the patent analysis tools. This might indicate a new and growing trend where people come to use more of the patent analyses in making business strategy.

Table 2 Top 20 Words for Betweenness Centrality

Ranking	in 2003 Conference		in 2008 Conference		in 2012 Conference	
1	technology	0.252	technology	0.216	technology	0.303
2	process	0.206	process	0.120	innovation	0.230
3	development	0.110	development	0.109	model	0.089
4	management	0.060	management	0.092	development	0.061
5	company	0.054	innovation	0.070	process	0.054
6	product	0.040	company	0.043	analysis	0.044
7	market	0.028	industry	0.036	firm	0.030
8	project	0.025	product	0.036	patent	0.026
9	system	0.021	knowledge	0.030	performance	0.023
10	innovation	0.014	business	0.020	management	0.018
11	model	0.014	factor	0.018	policy	0.016
12	organization	0.013	analysis	0.015	industry	0.016
13	business	0.012	approach	0.014	strategy	0.014
14	information	0.012	case	0.013	company	0.013
15	strategy	0.009	market	0.012	datum	0.013
16	chain	0.008	life	0.011	literature	0.012
17	order	0.008	strategy	0.011	case	0.010
18	firm	0.008	level	0.010	business	0.008
19	industry	0.007	project	0.009	knowledge	0.006
20	sector	0.006	firm	0.009	product	0.005

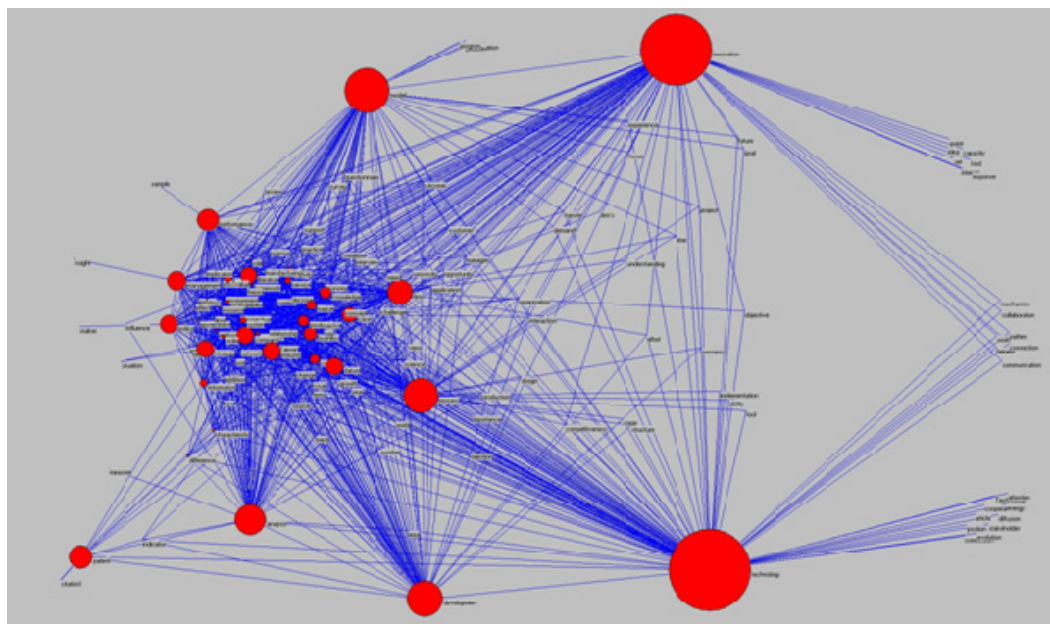


Figure 1 Co-Occurrence Network of Words in 2012 Conference

We have shown, then, that patent-related research has been increasingly presented at the IAMOT conference. We can further say that it would not have been possible to discover this phenomenon from the conference session titles alone. This demonstrates the effectiveness of the proposed method, which combines the text mining approach with the network analysis of the co-occurrence of words.

5 Related Research

5.1 Topic extraction using text mining

Research and development in the field of text mining has increased and spread since the rapid digitalization of text began in the late 1990s^[5]. One field of application for text mining involves topic extraction^[6]. This is the automatic extraction of the appropriate main topics from a group of texts after natural language processing, in order to assist with text sorting. Currently, mechanical topic extraction methods are generally based on a vector space model, in which significant clusters of words that appear in a text are conceived as the base of a feature space, and each text document is treated as a word frequency vector. This study employs concepts that are similar to topic extraction, in which a text is characterized using a vector that represents the appearance or non-appearance of words. However, this study does not select beforehand a set of words that characterizes the topic. A typical research of the topic extraction uses a training dataset where documents for training are already classified into topics before learning^[7]. That is called the supervised learning, whereas this study, by contrast, does not aim to learn the classification of a training set.

5.2 Co-Occurrence network of words

In the framework of a co-occurrence network, words that appear in a document are treated as nodes, and words that appear in proximity to each other are linked by edges. In such a network, words that have a significant degree of relatedness form solid mutual connections called cluster structures. On the other hand, the connections between words with a low degree of relatedness are sparse. Several methods have been proposed for grasping the meanings of words and for eliminating polysemy, by focusing on this characteristic of density of connections in network structure^[8]. Recently, a complex network approach has been used to express the relationships between factors, in an attempt to investigate not only the static characteristics, but also the dynamics of factors. Previous research demonstrated how well the core words of a language (the kernel lexicon) could be extracted based on the difference in the exponential distribution of the co-occurrence network of words^[9]. Another research investigated the difference in the formation of the cluster structure appeared in the co-occurrence network of words in newspaper articles^[10].

6 Conclusion

In this study, we studied the research trends in MOT by applying a text-mining method to the

conference proceedings of IAMOT. By performing the network analysis of the co-occurrence of words, we detected a change in the research stream and finally found the influence of the social situation on the research trends. We have shown that patent-related research has been increased in MOT research. This phenomenon could not be discovered only from the conference session titles.

In the future, we will study the word co-occurrence networks in detail by using new indices representing word features, so that we may find the signs of the research trends. The insights obtained will then be able to be used to create effective educational materials of MOT.

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The Complexity Vision for Online Development

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Abstract: In the perspective of complexity, this Paper is on an experience of online development for school manager, in which an interdisciplinary attitude of partnership emerges. The characteristic of this development is a more complex and systemic vision, in which the school dynamics is regarded as an alive system, liable to be self-organized, a culture in permanent construction nourished by the interpersonal relations and collective work. It values Aesthetical sensibility in development, so fundamental for the projects committed with autonomy and emancipation, despite the fact this kind of Aesthetics has not been valued, but replaced by a more technical form of development. This approach offers the opportunity to experience a historical process, as it evolves contextualized knowledge. School managers and the researcher imbricate in an intersubjective relation while an attitude of interdisciplinary partnership emerges. Interactive online resources are used during the experience in which the narratives unveil the richness of the intersubjective communication and the intrasubjective process of construction and meaning of reality. During the development of this transdisciplinary research, I could perceive the movement of construction of the school managers' own experience, and reflect on my life experience, research my own practice learning about it, while continuously experiencing the two polarities: developing school managers and being developed as such.

Key Words: Complexity; Intersubjectivity; Interdisciplinary; Online development; School management

1 Introduction

There is a big concern on the part of Headmaster or Headmistresses of governmental schools to offer development to the school teachers, so that they can perform organizational changes in the school, aiming at education quality improvement.

Not always are the complaints related to the lack of competencies on the part of the School Manager to manage bureaucracy, but on the low ability in mobilizing the team for the intentional and educative action, conflict mediation, integration between school and community, articulation of personal and collective interests, cooperative atmosphere: in short, actions that require horizontal constructive processes, through communication and intersubjectivity.

Concerning the development of managers, Lück (2000) reveals that the programs of continuous improvement promoted by central organizations of the educational system offer contest which are too abstract for the professionals in development. In addition, they tend to consider the educational issues from a general perspective, distant from the school reality. Other times, the contents, besides not being contextualized, are not stimulating as they have a normative characteristic, once the learner is regarded as someone lacking abilities and competencies.

Thus, the managers in development cannot establish relation between what they study and what they experience. They do not have reference points to connect the contents to reality and construct meaning. The knowledge acquired from personal experience, built with meaning, are not taken into consideration, neither their life stories. The common characteristic of such kind of development is the distance between thinking and doing, two polarities which are not perceived as complementary parts of the same development process.

Proposals for development of managers are expected to be based on the conception of democratic management, social – historical production and the exercise of autonomy. In other words, development recognizing school as culture in process of constant construction, that focuses in processes instead of seeking for immediate results. The emancipatory thinking includes reflection in the development process, both on individual and collective journeys, once the managers can be the protagonists of their practice and development process.

Together with the programs of development with the presence of participants, there have been solutions in the online modality. Programs of development combining both, present participation and online participation have been offered at the federal and state levels, with governmental and private universities.

In this article, a transdisciplinary experience for the development of school managers is described, according to Hessel (2009), as it filters the particular reality through the principles of complexity. The focus is on the construction process of the development attitude of partnership, valuing the process of construction of meanings of the management action, imbricated in the life stories. This attitude of partnership is considered interdisciplinary, as it is an action category, according to the conception by Ivani Fazenda (2006). In this action – development research, we had the opportunity to investigate our practice in the development action, take an intervention and come to relevant learnings.

This development was carried out at national level, by governmental institutions, with the aim to promote continuous improvement of the governmental school managers who are active, for an effective action of leadership and direction of the school community efforts, as a whole, for the achievement of the educational proposals. The project was implemented through a course, in the semi-presential modality, in 5 modules along 4 months, in a total of 100 hours.

Our participation was as a guide /developing professor of a group of 40 school managers of municipal and state schools of a state in Brazil. The action of the managers was followed through communication resources for online work, such as forums and daily narratives. The narratives showed to be an invaluable way to register the development process through intersubjective interactions. The attitude of partnership, on the part of the guide / developing professor, emerged as a way to exercise a guiding and singular action to the participants of the course. Besides containing indications of the peculiarity of each journey, the narratives of the managers conveyed the reflections and the significance of their practice.

Finally, we show the interpretation of the narratives of 3 managers, using the complex thinking references applied to school management.

2 Introduction

The expression School Management was introduced in education to replace the expression School Administration, aiming at encompassing new competencies for the school headmaster or headmistress, in the scenario of re-democratization of the governmental school. The function of the people running a school has been denominated school management to compensate the worn out terminology of administration which is associated to a technicistic interpretation, as well as to incorporate the political intentionality in the educational action. Lück (2000) explains that the difference between the terms is conceptual, once management is a new concept of educational organizations.

School management, in Brazil, is understood as a collective and participative process which runs the school encompassing the actions of decision taking, planning, execution, follow up and evaluation of the educational policy. At the practical level, the manager is expected to take over competencies for the promotion of collective work.

In this way, there will be encouragement for the participation of the subjects of his team and of the school community, assuring the construction and implementation of a pedagogical proposal, that is, a set of intentions, a collective pact.

The strengthening of democratization represents a change in the power network in the school. There is a displacement of axis: the vertical flow of centralized command gives way to more flexible horizontal relations. Power is not crystallized at the hierarchical levels, but it is distributed among the teams of work which assume responsibility for thinking and doing. Decision and action which used to be opposites in the hierarchical pyramid become complementary in the alive dynamics of the balance of polarities. The dichotomy - planning and executing - does not exist in the condition of mutual exclusion.

Protagonism of educators grows, as they share the same ideals among themselves. Their ideals are related to the change of the school reality, and they agree in assuming a common task, defined by negotiation of objectives.

Work plans are not imposed anymore, neither top down nor outside inside, but are rather constructed, implemented and evaluated by the school teams. Democratic management at school, in essence, is not a practice that can simply be established, as it is a self-organizing process, guided by the manager. At the conceptual level, the change of practice seems to make sense. However, at the level of action, the process is not mechanical, as social reality is extremely complex and the educational arena is not neutral.

In order to make this question clear, the discussion on school management will be amplified based on the conception of complex thinking by Morin (2005a, 2005b, 2005c), which encompasses the dialogic movement between linear and systemic thinking.

Linear thinking in management explains the prevalence of hierarchical control and of bureaucracy (bureaucracy). This kind of thinking, a hallmark of our time, tends to simplify reality so that it is understood and controlled. According to Mariotti (2007), it is competent for the treatment of mechanical and functional problems, but inefficient to face questions that require a systemic view. Linear thinking overuses reason, through rationalization, which is immediatistic, simplifying and reducing everything to simple causality.

The traditional model of school management, expression of the linear logic, strictly Cartesian and mechanistic, has its recent origins in the classical theory of administration. The ideas on work organization have the purpose to make business more competitive in the capitalist logic of profit generation and expansion, cost reduction and productivity.

The industrial productive process was rationalized with work division. The aim was to increase the company's efficiency through operational efficiency, that is, rational organization of work. This logic approach is also understood as mechanistic and is a consequence of the linear - binary - Cartesian thinking.

The critical thinkers of the 20th century had an important role in denouncing the alienation present in the productive processes and in the social relations of such administrative models. As a consequence of this alienation, human beings were perversely deprived from understanding the nature and product of their work, as well as from perceiving themselves as human beings, the systemic part of a nature that includes them. The human dimension as a whole was eclipsed by the excessive importance attributed to a fragment of human potentiality, the working-force.

Until nowadays, the characteristic power structure at schools has been pyramidal with fragmentation of school work. As far as school organization is concerned, work division in technical - administrative tasks and pedagogical ones is a consequence of the value given to specialization at work. Functions and assignments are delimited by means of regulations, for the maximization of efficiency and effective hierarchical control. Hessel (2004) explains that, in addition to the horizontal specialization of the position of the school manager, there is the hierarchical aspect in the nets or governmental systems of education. Vertical specialization, also known as line administration, gives the superior in hierarchy formal authority, which is regulatory. The combination of hierarchy and knowledge, putting together the structure of power to the technical or operational one, has been the characteristic of the model - pyramidal structure at governmental schools.

While linear thinking is efficient for the analysis of the parts of the whole, systemic thinking is important for the understanding of the interdependence of the parts. This kind of thinking is necessary for the manager, as it allows him to visualize school life beyond the bureaucratic routine and formal functional relations.

In Capra's view (1997), systemic thinking is a contextual kind of thinking, as this is its own essence. A system is a group of elements which are correlated. They maintain a form of organization and structure. The organization defines the identity of the system and expresses its configuration by the essential characteristics of its parts. The structure is defined by the relationship of the parts. The structure of a system changes during its existence, in continuous exchange of energy with the environment.

Work organizations can be conceived as dynamic nets, not linear ones, once the mechanistic paradigm is not enough to explain them. For Capra (2002), human organizations are like living systems. They cannot be controlled like machines, through instructions as they react to impositions. A machine can be operated with efficiency because its control is predictable. When it is broken it cannot change by itself and depends on maintenance. For example, a change projected by the administration and imposed to the organization tends to generate bureaucratic rigidity.

Considering an organization as a living being, we see the system is able to get self-organized, learn, change and naturally evolve, as its intrinsic characteristic is self-production. It is in permanent retroactive, circular movement of self-creation seeking for sustainability in the balance of two paradoxical forces: autonomy and dependence. However, it can create its own identity with its characteristic culture, understood as a set of meanings shared by the subjects in a historical dimension. That is how the emancipatory process is experienced.

Complex thinking encompasses linear thinking expressed in the bureaucratic matrix, as well as systemic thinking whose characteristic is the view of the whole. Both are dialogically opposites, that is, complementary opposites, according to the conception of complexity by Morin (2005a, 2005b, 2005c). Linear and systematic thinking are always present in the same reality. Prevalence of one over the other

may represent an attitude of simplification in reading reality, if there is excess, for example, in particularization or generalization.

School organization reflects, in its own extend, all social complexity, as it is a cell of the social hologram and expresses the dynamics of the whole of which it is part. Like society, it is also a living organism which gets self-organized. In itself, the relations are ambiguous, being complementary and antagonic. Together with the movements of change, there are conservative forces, collaboration and resistance, order and disorder. Routine and emerging situations alternate, formal and informal relations flow in parallel, conflicts and ambiguity are natural in the game of convergences and divergences. One force always operates as an answer to the simplifying character of the opposite force.

A big challenge for the school manager is to embrace the coordination of bureaucratic activities and pedagogical ones in such a way to express a relation of interdependence. In practice, there is a division of tasks: the pedagogical activities tend to be under the supervision and total responsibility of the pedagogical coordinators, whereas the bureaucratic ones take all the time of the school manager. This scission is a consequence of a fragmented, reductionist view of the school teams.

Thus, they base their actions exclusively in the assignments defined by the school regulations. What lacks is the view of the whole, perception of a systemic reality.

The pedagogic and bureaucratic tasks are imbricated in the democratic dimension and in complexity. The bureaucratic tasks are necessary to give support to the everyday life at school, as well as structure maintenance, project implementation, in others words, to vivify the purpose of the formative pedagogical process. Otherwise, it can be only linear and instrumental.

Besides the bureaucratic and routine activities, there are the planned actions. The first are predictable and remind us of rigidity, the others deal with uncertainties and the elements that emerge. According to Morin (2001), planning is a more strategic action, as it deals with unpredictability and flexibility, in opposition to a program where everything is done automatically.

Planning, in the complex and democratic dimension, is an action that depends on the participative movements. They emerge and are consolidated as the leaders and those who are leaded do not take position of excluded opposites. Management, in this case, is not exercised with authoritarianism, but rather, by gaining recognition and legitimation when there is respect and value to individuality and diversity. Balance between the polarities is maintained because the focus of changes remains in the interests and meanings. Significant disturbances act naturally in the organization, perceived as self-organizing systems, without the need of making a mechanical effort to keep them moving.

In modern organization, communication of intersubjective nature emerges in the core of the managerial practices, as there is a decrease in subordination relations and transmittion of orders and directions. Interpersonal relations based on authoritarianism, obedience, vigilance and control are evaluated again and get new meanings in the model of partnership and collaboration.

3 Online Development

For the semi-presential course for government school managers' development, in which we were in charge of the development, there were individual and groups activities for learning in action, in a reflective and shared way. The dynamics adopted was reflection on the practice, articulated with the theories related to school management.

From the beginning, the school managers were asked to mobilize their teams of educators for the elaboration of an intervention strategic plan in the specific school realities, starting from a diagnostic evaluation of the school dimension, as for example: the school environment pedagogical practice, evaluation practice, democratic management access, students permanence, etc.

The communication resources, daily narratives and forum, had an important role in the support of intersubjectivity, integrating the participants of the course, debates on theory and practice, exchange of experience, and follow up of activities. The use of daily narratives allowed us to have a reserved contact with each of the managers. This communicative privacy was assured, and the participants knew that their narratives would be read and commented only by the professor guiding the development course..

In this development, the daily narrative were projected to catch, in the written registration, the impressions of the managers in the form of reflection on the own personal evolution process, as well as participation in the course.

By using this virtual resource, we understood from the beginning that we could follow processual aspects in the development of each manager, mainly those related to their feelings, intentions and meanings. The daily narratives were perceived as instruments of intrasubjective reflection and

intersubjective exchange, in which The attitude of partnership could be developed, in the form of guided messages.

The interdisciplinary attitude of partnership experienced during the development process of the managers emerged out of the value attributed to intersubjective exchange in daily narratives, based on the respect and recognition of the manager as an autopoietic being, who is product and producer of his/her development and builds his being and doing recursively through the interaction with the others and the environment.

The concept of autopoiesis described by Maturana & Varela (1997) is the basis for this thinking. Every living creature is a living system, open and in constant exchange with the environment. He or she is paradoxically dependent and autonomous. Dependence on the environment in which one lives, as a result of the need to creatively get adapted in order to survive there, although not being determined by it. The environment only starts a series of structural changes in the living system, without directing them.

Autonomy comes with the ability the being has to get organized, in continuous cycles, that is, in cognitive interactions which are recurrent. Learning takes place so that the being can survive in the environment, changing the structure, but keeping stability in the inner pattern of organization. Thus, a living being cannot be controlled, just perturbed. Changes do not happen by imposition, but from inside out.

Our action for development was meant to grasp to context of the manager in development, understand it by means of the complex view and act in the congruence between both, the professional in charge of the development and the manager, using messages which guided for the consolidation of a democratic management practice. No formulae or immediate solutions were used from the linear thinking. The comments on the narratives of the participants were short and expressive, once we agree with Capra (2002) that they constitute 'significant forms to perturb the process'. In such cases, significant impulses are more pertinent than prescriptions of routes of instructions.

All the narratives were treated as parts of life stories and were read through the filter of complexity: moving between the whole and the parts, perceiving how the parts are related. It would make no sense to compare the narratives to make generalizations, as, according to Dominicé (1988, p.147), each narrative reflects the way the journey was understood, the development defined and the process interpreted.

We were based in Fazenda's methodology (2005, 2006), considering that each one has a particular way of doing things and has to be recognized in the singular dimension, contextualized and imbricated in a life story. And, just as Josso (2004), we understand development as a process of self-development, when the subject becomes conscious of him/herself through of intersubjective approach. When we valued the narrative as a reference bringing knowledge of the self, we recognized the singularity of the development processes which have the power to transform "[...] life programmed in a social cultural way into a master piece to be built, guided by an increase of lucidity [...]" (p.58)

We could perceive, in each narrative, the sense of a practice. As an ontological process, the narrative contains a peculiar perception of the reality, focused from a universe of belief built from experiences and values. It reveals a way of thinking and feeling the world, in which the subject perceives him/herself - a personal word. It is a means to produce meaning, as the experiences are composed of content and of a narrative artifice which shows a singular characteristic in its subtle shades. Different from speech, in which simultaneity of speech and thinking makes reflection difficult, the meaningful written registration is a secondary discourse which mobilizes thinking and rethinking of the object in question. According to Sabbag (2005), when the subject narrates facts which were experienced, he/she rebuilds his/her representation of reality bringing new meaning that can transform reality itself. Thus, one becomes conscious of the singular process of construction of identity, as people build differentiated meanings during life. This eternal self-construction and reconstruction of the being, in connection with the others, is the way to build individuality, autonomy and emancipation.

Fazenda (2003) stresses the importance of the narratives of experiences, as they are possibilities of innovation and interdisciplinary analysis, once they can generate new prospects. They are an opportunity to experience a new dialectic and contradictory movement, as they use both, registration and memory, for a new critical reading of the facts that had taken place. New meanings are constructed by the dialogic movement of the old and the new.

4 Revelations of the Narratives

We chose to use an interpretative analysis to understand each narrative in order to make explicit both, form and meaning. For this purpose, we used the universal elements to treat the realities narrated

by Bruner (2001): narratives always have a central problem; action narratives contain states of intention; the understanding of the narrative is hermeneutic; there is a structure of consigned time in the narrative; there is also historical extensibility in each narrative.

We selected three narratives considering: the willingness of the authors to write them, besides the minimum expected quantity of narratives, that is, at the end of each of the 5 modules; and the willingness of the authors to register their reflections. To identify them we used fictitious names: Leila, Celia and Selma

Leila's narratives reveal her efforts to overcome the linear vision in the school reality. All her narratives are permeated by a strong feeling of fear in relation to the course, to the technology adopted, to the modality – semi-presential, and to the demands of work to be implemented in the school.

The conducting line or the central problem in all the narratives is the lack of confidence that makes her dependent to take any decisions. There is a belief that the difficulties found are because of material restrictions and people's lack of availability.

The narrative shows that Leila does not regard the school as a culture in construction, in which interests are shared, as well as latent meanings and history.

There are no indications of collective work based on communication and intersubjectivity. She lacks vision for the systemic thinking and the perception that she has the power to mobilize the team for participation, co-responsibility and autonomy.

The structure of time of the narratives informs that they were produced in relevant moments, showing the change of direction in the course or in the school. At a given point, her lack of confidence was countered with sharing experiences, both virtual and presential. In the process, we guided Leila to the forums, where she can meet interlocutors willing to debate and share such problems. She feels reinvigorated, with her enthusiasm reestablished and she takes action at school and finds a way to create complicity among the members of her team.

With the knowledge she got in the course, she could implement evaluation processes, intervention actions, follow up and control, necessary to the administrative practice. However, the strategic meaning of such competencies could not be characterized as linear and mechanic, but rather, as a contextualized political action to be experienced, based in the understanding of the intersubjective nature of the participative practice.

Leila has difficulties that result from her linear view of management. There is a way to be covered by her and her team to overcome work fragmentation and adopt more participative practices. It is necessary to regularly experience processes of evaluation and become responsible for their actions. Communication channels must be opened through willingness to listen, share, exchange, etc. Relationships based on trust must emerge to sustain collective actions. Besides the technical knowledge, the social competence must be learned by the manageress.

Our partnership action helped the manageress give the first steps in the new direction. Whenever possible, she was encouraged to take part of forums, in order to enjoy the sharing of experiences.

As for Celia, her narratives reveal her systemic perception of the culture. The content of all her narratives shows that there is a central axis, around which all the narrative is developed, that is, the concern to get the participation of the school community. It was possible to grasp that, while reading all her narratives. In each one, Celia develops an only story of difficulty, hope, overcoming and success. In all the parts, the plot is repeated in cycles and the manageress renews her willingness to take new actions. The parts are contained in the whole.

Celia values human relations, rather than the vision of the functional tasks of the teachers. There is commitment with the construction of the school culture in friendly and affective levels, which minimize isolation and fragmentation of the school work.

She realizes that democratic management consists on the mediation of intersubjective relations and is attentive to the participation of all the sectors.

Her narratives assume a unique identity. She establishes an affective relation with her narratives calling them: 'My dear diary!', as well as by greeting them: 'My diary, good morning!' She feels comfortable to write and can express feelings and subjectivity.

Celia has a systemic perception of the collective work. She knows how important the participation of all the segments is, in the school projects. Her practice is built by overcoming challenges. In difficult circumstances, she tries some hypothesis and, strategically, finds ways to mobilize parents and educators, to be co-responsible for the educational action. Her purpose has being the involvement of the subjects assuring more commitment. In the online development, she learned the theory on plans, and felt the

need to validate her practice and beliefs, through her narratives and affective identification with her narratives.

For this reason, our action of partnership emphasized revisiting her messages on the feedback about the way she guides her work.

As for Selma's narratives, they reveal she regards school management in a complex way. She produced 12 narratives in journalistic style. The time structure in her narratives shows that the significant elements mentioned are close to the episodes of the course development, as they were built along the course. It is only from the history of the meetings with other managers that the protagonist finds reasons to speak and reflects about her school.

There is a transversal axis in Selma's narratives. The centrality of the whole is on the principles of collaboration and sharing, and her belief is that one can only learn with the other, listening and sharing. This essence which is found in each narrative, in each part of the whole, is the point of her narratives, as well as the motivation for her practice which unfolds in partnership attitudes. That suggests that the concern with her peers, in this moment, is her biggest concern.

Selma's considerations reveal a good understanding on the self-organizing process. She emphasizes the importance of collective work and ponders about the difficulties in developing it. By experience, she knows it is fundamental and that it has to be built through the dialogic movement: giving and receiving contributions. She understands ambiguity and the paradoxes of everyday reality at school, as she is conscious that facing them is a process, and she knows that it is possible to work with plans' linearity, as well as with the emerging elements from uncertainties. She understands herself and the others as autopoietic beings, able of learning in all the circumstances of life, both in professional practice and development periods.

Selma shows mastery in the conceptions on democratic management which seems to come from theoretical and practical reflections. She values collaborative learning and always comments on the importance of the moments of intersubjective sharing. In the narratives, she reveals the work dynamics of the school where she works, that is, the involvement of all the segments in the actions diagnosed and in action plans. Mobilization, co-responsibility and commitment on the part of the school team are indications that the experience on democratic practice is a reality, and that decision and action are imbricated in the field of collective work.

Our messages to Selma were invitations to play the role of an advanced peer and bring her contributions in the forums, with her experience and suggestions, once she enriched the course, when she shared her ideas on collaborative learning.

5 Conclusions

The transdisciplinary treatment of the reality in this research made it possible to reveal the procedural imbrication of the actors of the formative context.

The attitudes of partnership and respect to the formative journey of the school managers emerged with intention in the narratives, in the interlocution between the professor in charge of the development and the people in development. As we felt identified with the managers in development, we tried to establish, in a subtle way, the attitude of listening, friendship, without showing absolute truth, nor privileged knowledge.

In the basis of this intentional action, stands the belief that the manager must reflect on his/her doing for new meaning and construction of the organization action, articulation and mobilization in the political context of the school, in connection with the community. It is a creative process, taking the environment into consideration, which encompasses *in Moraes' words (2004, p.141) 'cooperation process, eco-construction and coevolution'*.

The attitude of partnership flows in the context, and that is why there is no fixed route in the dialogue between people of different journeys. There is a creative movement which is established in the congruence between the professor in charge of the development and the manager in development, which is revealed in the action based on respect and the ability to wait, as according to Fazenda (2003) it is by waiting that we can find the best moment for an intervention – an interdisciplinary principle.

It is an action whose movement is not reduced to the linear relation of cause and effect. It has a constructive character through interactions welcoming sharing. It is fed by retroactions, which act in return to the process which produced them.

The role of such retroactions is fundamental, as it may determine, inhibit, accentuates, change and transform the actions and interactions (MORIN, 2005a).

The interpretation of the narratives of the 3 school managers revealed the different moments experienced by each author, as well as our interdisciplinary attitude of partnership. We tried to reduce the feeling of lack of confidence and sensation of isolation experienced by Leila. As for Celia, we used massages of guidance, with the intention to help her understand her practice. The attitude adopted with Selma was that to try and consolidate her posture of partnership with the other managers.

The formative potential of the narratives, which initially showed as a tool adequate for intrasubjective reflection and intersubjective exchange, gained relevance as it allowed following the development process online. By following each manager, we could identify the way of their journeys, their strengths, needs, fears, the reflexive processes of re-elaboration of the experience.

In the interpretation of each narrative, we observed that they reveal, besides the different journeys, the essence of their authors. There is truly sense in all the doing, which is not at random, but built along life. By encouraging the written registration in the narratives, the professor in charge of the development can help the subject in development be conscious of his/her doing, rethink action and change posture, using the references and conceptions on management. In the online development, the written registration of the personal narratives has to be valued in the proposals for change of praxis, as it represents the possibility of taking care of an ethical and aesthetic knowledge, that is, of the soul of the technical knowledge.

A manager's development cannot lose sight of the manager as the subject of the development, his/her practice, vision of school reality and conceptions on management. At work, he feels challenged to mobilize the team to experience the democratic process, once the prevailing thinking at school is for reduction ideas, which fragment reality. In such conditions, power relations are kept hierarchical and bureaucratic aspects prevail on a more systemic view in which school is regarded as a living and self-organizing system fed by interpersonal relations. To deal with the contradictions of everyday life, it is necessary to have the view of complexity on the school organization, as management has to deal with predictability and uncertainty, too. Complexity encompasses the dialogic game of linear and systemic thinking.

We believe this research may contribute for the public institutions to reconsider their development models, which often follow the instrumental development model, in detriment of the Ethic Aesthetic development.

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Design-To-Cost Framework in Product design Using Inventive Problem Solving Technique (TRIZ)

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Abstract: The research carried out to identify ways in which tools and methodologies from Theory of Inventive Problem-Solving (TRIZ) to solving gaps within the Design-To-Cost (DTC) strategy in product concept development. The aim was to develop an implementation framework for DTC improving product cost and at the same time increase the product innovation. The research paper reviews TRIZ methodology that has potential to be applied for cost reduction initiatives, followed by a discussion of the DTC strategies that commonly practiced in the various industries. The proposed new DTC implementation framework with TRIZ tools is developed and the research paper concludes with a case study using the new DTC Framework.

Key words: Design-to-Cost, Cost Reduction Strategy; Inventive Problem Solving Technique; TRIZ Tools

1 Introduction

Market liberalization and global competition push companies to change the way they run the business. Automotive companies have to juggle between meeting the customer requirement, time-to-market and most importantly the investment cost, the main risk in product development project^{[1],[2]}.

Some firms adopting DTC strategy to provide solutions to these challenges. The DTC strategy always has been combining with target costing as the foundation of cost management in product development project. The DTC provide opportunity of early involvement for engineers or designers to create product that meet the target cost which have been derived from target selling price and target profit. DTC is a method of 'Management by Objective', step by step design uses the information of difference^[3]. However, in real situation, a lot of product development projects have been dragged backward or delaying the time-to-market, resulting in huge negative impact to the organization goals. Some DTC ideas have contradiction parameters between low-cost product design and quality performances, conveniently trade-off has been used on conflicting requirements and accepted as the solution to the design. The trade-off analysis will provide solution that needs an amount of sacrifice in customer satisfaction to achieve a certain amount of cost saving, this will negatively impact the product competitive performance and hence product innovation.

The analysis on DTC framework done by Williamson^[4] pointed out that to apply the strategy without strong justification brings failure to the cost reduction effort. Trade-off in design constraints, will hinder the effort to explore the ideas towards more cost reduction and halt the product innovation growth. Trade-off in DTC may change the direction of product development^[5], thus drastically affect the project goals.

This paper presents the application of TRIZ tools in DTC implementation to resolve conflicting parameters in product concept design and development without any trade-off.

2 Literature Review

2.1 Design-to-cost implementation

In facing today's turbulent market environment, companies are compelled to integrate and synchronize product design, process planning and cost estimating activities rather than following sequential planning procedures. Product and process modifications are more expensive at the later stage of product development cycle. The objective of concurrent cost information is to optimize the product design with respect to balancing the trades-off between cost and performance requirements before the prototype is built. The identification of cost and performance sensitive parameters to forecast the system's competitiveness is still being developed.

DTC methodology evaluates the cost and performance of a design solution in a top down approach, i.e. the evaluation of a system design instead of a single component design. New technologies can alter the component manufacturing as well as its assembly methods without changing the entire system.

Taking this into account, competing system designs have to be compared at the system level. As a result, the cost model has to evaluate and aggregate costs from lower to upper system levels. One way that companies can regain control over their costs is through systematically classify and identify product costs. Using a systematic approach to perform cost reduction not only yields cost improvement but provides decision-makers with the trades-off involved in achieving these reductions [5].

The strength of DTC is the capability to define a measurable design parameters against performance, to bridge the communication gap between designers and others in product cost reduction, the capability to improve total cost including product and the processes and focusing on idea generation to reduce product cost. DTC also poses some weaknesses, such as resorting to trades-off to quickly solve any issue of unmet target cost, low innovation in product design, not improving deficiencies in critical areas or any harmful functions, indirect implication such as delaying the project time-to-market and impact the development cost [6].

DTC concept has a long history of use in the U.S. Department of Defence for evaluating new weapons system. This directive defines DTC as “a management concept when vigorous cost goals are established during development, and the control of systems costs (acquisition, operating and support). Practical trade-offs are often made between operational capability, performance, cost, and schedule. Non-defense related industries also apply this concept to their major procurement decisions. However, often in both defence and private sectors the cost goals are not achieved due to lack of proper planning and control of management tasks at different stages of the product life-cycle.

Table 1 Literatures on DTC applications in the Industries

Research focus & Author (year)
Aerospace and aeronautic engineering
[3] Esaki & Yamaguchi (1979), [7] Kaufmann (2008), [8] Valerdi (2005), [9] Boyd (1982), [10] Dean (1990), [6] Tyson et.al (1989), [11] Schwint (1975), [21] Dean & Unal (1991), [25] Gosselin (1999)
Automotive and vehicle
[12] Sippel & Schelkle (2009), [13] Monden, Lee (1993), [29] Monde, Hamada (1991), [20] Tani et al. (1996), Taylor (1997), [14] Carr & Ng (1995), [22] Rösler (1996), [15] Lee & Monden (1996), [16] Hurley & Scyder (1987), [17] Favato & Mills (2007) Tereko (2002), [18] Feil et al. (2004)
Electronic, Software engineering and Others
[4]Williamson (1994), [31]Woods et al. (2012), [19] Wichita (1979), [20]Esaki (1991), [5] Cleark (1988), [22] Geiger & Dilts (1996), [30] Gilb (2011)

Table 1 show that the application of DTC started in the military and aviation sector later expand to non military industries. It also shows that the more case studies using target costing and design to cost is the automotive industries. Adopting DTC and target costing is significant to the automotive industry due to the level of product complexity that needs to be managed, similarly with the aeronautic and aviation industries. Free Trades Agreement create competitive environment for the manufacturer to increase their market sales and generating higher profit by producing low product cost with better quality [20][23].

In a manufacturing environment, the tools used in DTC strategy to generate ideas and in problem solving process are limited and not systematically structured [11].

2.2 Current knowledge of DTC framework

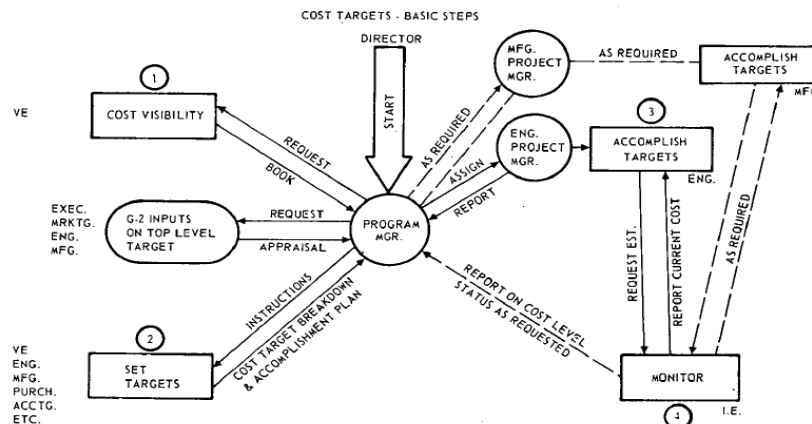


Figure 1 DTC Implementation Framework by Steinmetz [22]

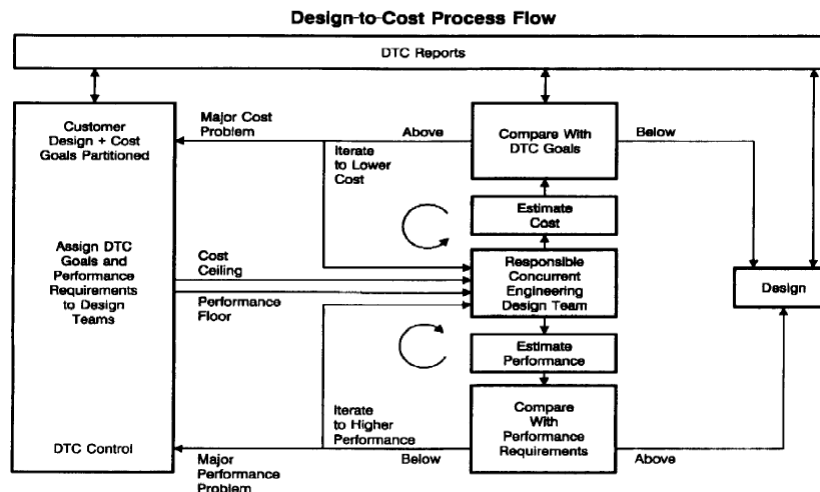


Figure 2 DTC Implementation Framework by Williamson ^[2]

Similar point highlighted by Williamson ^[4] that DTC need to start as early as possible in order to identify the opportunity to make improvement easier and maximize the cost reduction and other benefit, as shown in Figure 2.

3 Integration of Triz into DTC Strategy

TRIZ, a Russian phrase “*teorija rezhenija izobretatelskih zadach*”, means the “theory of inventive problem solving” ^[25]. It was developed by Genrich Altshuller (a Russian scientist and engineer, 1926-1998), who studied about 400,000 technology patents¹, and from them drew out certain regularities and basic patterns which governed the process of solving engineering problems, creating new ideas and innovation. This provided an understanding for the creation of a systematic process for invention of new systems and the refinement of existing ones.

Implementing the concept of DTC in the product design, is essentially decision-making exercises. Earlier analytical tools were unable to secure the issue of uncertainty in decision making process. The main issue is that the effect of decreasing one or more key factors, simultaneously increasing one or more other key factors in design projects ^[26]. The emphasis on ‘trade-off’ solutions in traditional problem solving practice often means that designers are rarely explicitly aware that conflicts exist. Therefore it can be conclude that the need of new approach is critical in decision-making activities, which eliminate the dependability of trade-off concept.

Engineering Contradiction principle in TRIZ is the need for problem solvers to actively seek out the conflicts and contradictions inherent in all systems. The following TRIZ methodology is trying to ‘eliminate’ those contradictions rather than to accept them. By solving contradiction and strive towards ‘Ideality’ without any trade-off. Therefore, TRIZ have the capability to provide the opportunity to complement the significant weakness in adopting DTC concept in product design, even though there are constraints for TRIZ tools be used in cost improvement activities ^[27]. There is also time/cost trade-off or contradiction for innovation, when development time is shortened, cost is increased. The core of innovation is to find difficult problems, such as the problems with contradictions, and to solve them quickly. TRIZ is expected to provide solutions for the restriction of innovation and technology improvement experienced in implementing DTC in product design and development, such as upgrading value of design ^[28]. Designers who adopted TRIZ will increase the speed of product development and reduce the cost at same time.

TRIZ method has begun to be integrated with a number of established and emerging problem definition and problem solving tools and strategies. This integration of TRIZ have been achieved with other concepts such as Quality Function Deployment (QFD), Failure Mode Effect Analysis (FMEA), Value Stream Mapping (VSM), Value Engineering (VE), Theory of Constraint (TOC), Taguchi, Design For Manufacturing Assembly (DFMA), Six Sigma and other established new integration concept ^[29].

Based from the summary in Table 2, the main TRIZ tools that are suitable for DTC are product & component analysis, function analysis and trimming. Then from the trimming activity, a problem is normally created to solve function problem or contradiction problems between parameters. The DTC

ideas that are generated from TRIZ tools need to be reviewed and evaluated. In evaluation phase, the idea will be rated based on two contradicted criteria, ‘Ease of implementation’ and ‘High potential cost saving’. Using the Contradiction Matrix, both parameters associated with the criteria provide general solution to solve those contradictions.

Table 2 Literatures on DTC-TRIZ Integration & Applications

No	Authors & Year of publication	DTC gaps	Cost reduction using TRIZ	Integration of TRIZ
1	[31] Ikovenko & Bradley, 2004	Customer focus	Trimming	Integration Success
2	[32] Mann & Domb, 2007	Trade-off	Contradiction	Harmful factor
3	[45] Sawaguchi, 2002	Brainstorming	Automotive	High value idea
4	[33] Stratton et al., 2007	-	Trimming	Engineering Needs
5	[34] Domb & Kling, 2006	Challenges	-	-
6	[35] Domb, 2005	-	Potential	Manufacturing success
7	[36] Isaka, 2012	Design competitive	Trimming	Simplification
8	[37] Mann, 2004	-	Cost Matrix	-
9	[46] Martin, 2010	Complement	Waste reduction	Lean and TOC
10	[32] Mann & Domb, 2007	-	Function mapping	Customization
11	[38] Cho et al., 2004	-	Trimming	-

In summary, the gap in the research is lacking in the innovative solution for DTC Strategy, this can be solved by integrating TRIZ tools in the implementation framework that is able to provide better results not just in reducing cost but also improve product innovation.

4 Implementation Framework of DTC for Product Concept Design Stage Using Triz Tools

The proposed framework as shown below is a part of product design and development process. The DTC implementation process is conducted in main four phases, prioritization of DTC system, idea generation, idea evaluation and the implementation ideas and off-line idea exploration.

Figure 3 shows the proposed implementation framework of DTC phases consist of main activities and TRIZ tools that need to be used in the processes. The most important data established initially is the target cost, and this will be the foundation of overall DTC deliverables and goals. Starting with the first phase, the product concept designs are analyzed through product analysis and components analysis.

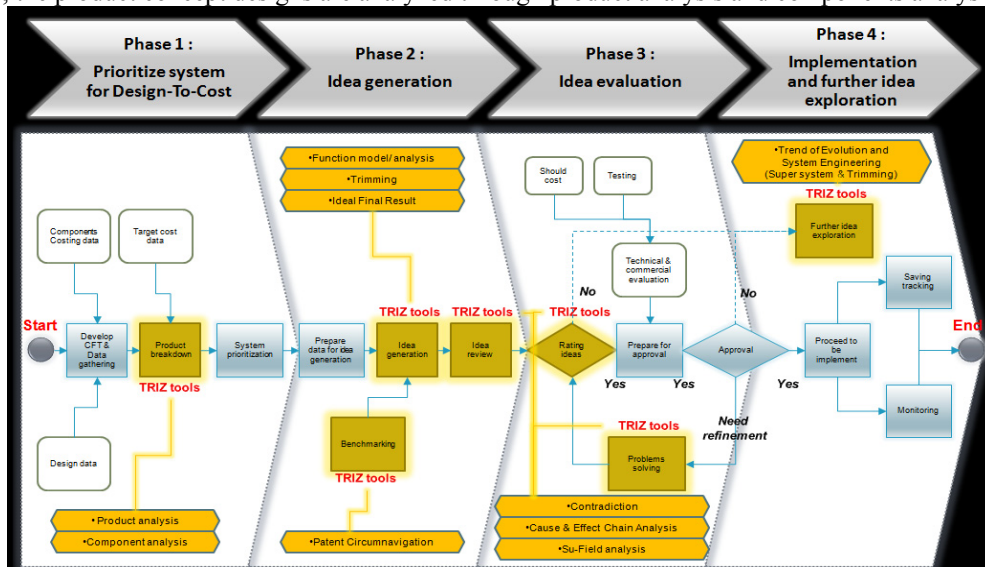


Figure 3 Conceptual DTC Strategy with TRIZ

Figure 4 shows the breakdown of the product analysis and components analysis. It provide clear identification of system that hold the biggest cost of a product. Each breakdown level are analyzed using

Pareto analysis. Those components that carry high cost are the primary focus to DTC idea generation. In the second phase, the focus on sub-system for DTC which needs to go through function analysis whereby the function model is created. As the establishment of function model, the components, object and functions provide clear pictures to carry out trimming activity.

Trimming have three types of approaches, the first approach is that function carrier can be trimmed if we remove the object of its useful function [39]. Approach stated that the function carrier can be trimmed if the object of function performs the useful function itself. This approach provides ideal solution to DTC, where the object can provide function itself using available resources of the system, surrounding environment and free or inexpensive resources. The final approach said that the function carrier can be trimmed if another component performs its useful function.

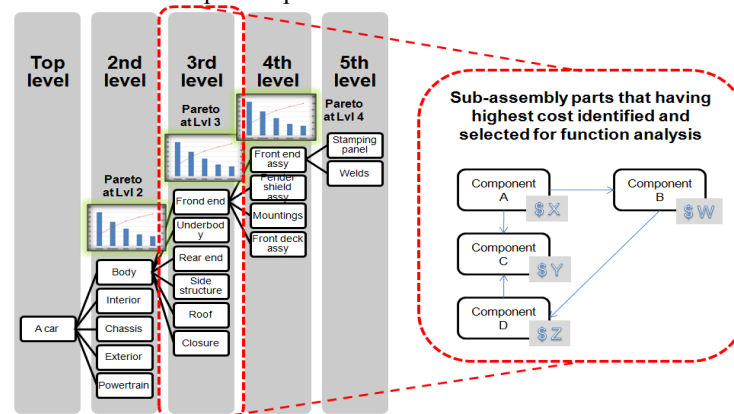


Figure 4 Product Analysis and Function Analysis

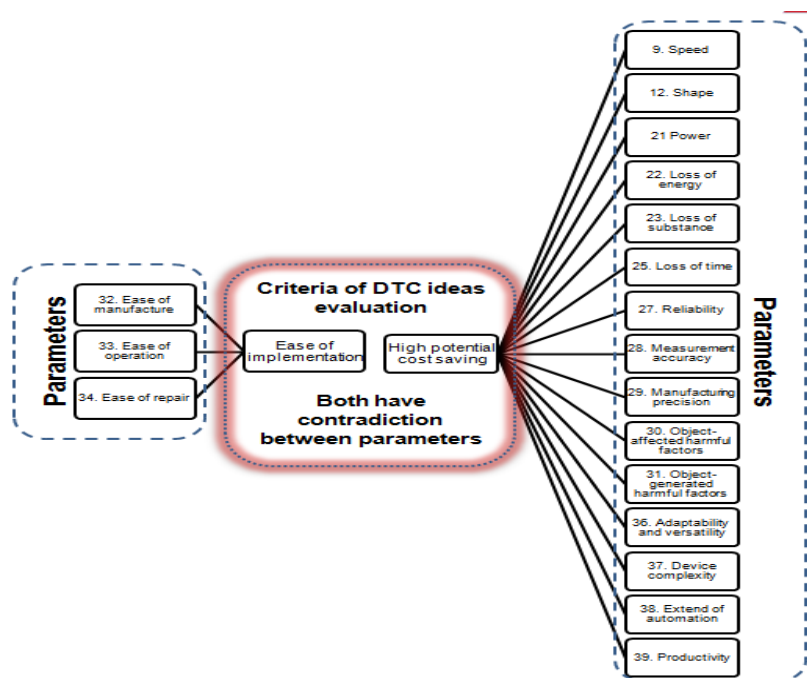


Figure 5 Criteria of DTC Idea Evaluation Parameters

In phase three, the ideas generated are rated on two criteria, ‘ease to implement’ and ‘high potential of cost saving’, as shows in Figure 5. Both play an important role to make sure the idea reduce part cost and feasible to be implemented on the product without affecting the project time line, this able to synergize the design and manufacturing [40]. Both criteria have their own parameters that are conflicting to each other, therefore the need of contradiction matrix and inventive principals’ helps to solve the problem. In this phase, the evaluations also include feedback from the testing activity. The testing activity sometime highlight problems with undiscovered root cause, therefore the use of cause-effect

chain analysis is required to investigate the root cause of problems that need to be solved. Later the ideas will go through final approval to proceed to the next phase.

In the final phase, the approved ideas will be implemented into the final design and the cost saving will be include in the financial monitoring system. Furthermore, the ideas that are not selected will be analyzed to increase the value of cost saving with TRIZ tools called Trend of Engineering System Evolution, as shows in Figure 6. The two type of trend focusing on the increase of cost saving value are Trend of Transition to the Super-system and Trend of increasing the degree of Trimming.

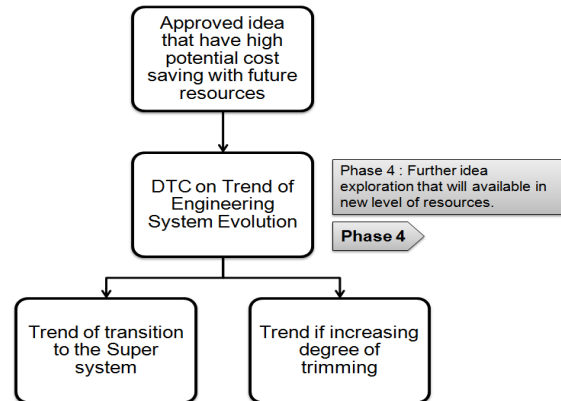


Figure 6 DTC- with Trend of Engineering System Evolution

Framework validation is important to confirm whether it is fit to a purpose. The most important thing in carry out validation is the context of validation process is carried out. The contextual factors that likely to impact the validation process are time, cost and geographical condition. The framework validations have several methods and approaches.

The approach includes reviewing research literature on related DTC and TRIZ tools application, seeking input from expert panel, undertaking empirical research, under taking survey research, conducting pilot projects and conducting case studies. In this study, the validation approach used is conducting on case studies.

The case studies approach is used in implementing DTC practices in Vehicle Cost Reduction program in an automotive company. The project has been closed contact with the DTC activity in product design and development project for new model. The intention of these case studies is to get a firmer idea of the importance of various implementation practices and the usability of framework.

5 Research Method

Literature review was performed to understand the current state with respect to Design-to-Cost and the application of TRIZ in automotive industries. Applications of strategy and tools in relevant industries we also studied. There is still research gap in applying Design-to-Cost with TRIZ methods in automotive industries. This study explores the implementation of Design-to-Cost and TRIZ in product design and concept development without using trade-off. The next step is developing the framework that represents the building block of the TRIZ-DTC components based on the researcher experience and knowledge. The framework components are organized to ensure that they are based on sound theory. Later, the TRIZ-VCR (Vehicle Cost Reduction) methodology is developed, consist of activities, principles, tools and important component that can be used to implement Design-to-Cost with TRIZ.

The Case Studies technique adopted demonstrates that the proposed framework results in cost reduction thus giving a positive impact to the organization. Several case studies were conducted in the VCR department of an automotive firm to demonstrate the usefulness and correctness of the Design-to-Cost with TRIZ framework. Lastly, the researcher developed recommendation for immediate future research that can help advance the theory and application of Design-to-Cost and TRIZ in other industries.

6 Case Study

The extensive utilization of TRIZ tools and solutions in Korean automotive manufacturing showed outstanding performance in product design and market share worldwide ^[41]. Using TRIZ tools and solutions in Design-To-Cost (DTC) expect to produce better product design by solving contradiction and generated innovative solution. This provides opportunities to achieved better product cost and thus

enhancing survival in automotive globalization market through innovation.

In the automotive industries, material usage is critical to the product design. The product design will determine the sufficient amount of material required. In this study sheet metal is selected as the focus for the DTC project. This selection is based on the material cost and the quantity of usage to manufacture a component based from metal sheet. The process of producing component from sheet metal requires a lot of energy and resources such as large stamping machine and high logistic activities from process to another with more than 200 metal parts with various types of sizes and weights and also many levels of assemblies processes.

DTC exists to improve the productivity by maximizing the utilization of sheet metal to produce stamping parts. This approach highlighted the engineering contradiction parameters between 'Productivity' and 'Area of stationary object'. The idea generation activity utilized contradiction matrix to generate a solution for this DTC activity. There are four solutions that can be extracted from the TRIZ contradiction matrix, i.e. #7- Nesting, #10-Prior Action, #15-Dynamicity/Optimization & #17- Moving to a new dimension.

Assessing on engineering perspective, the current design of blank sheet metal of "pane side outer", there is a possibility that the concept of #7-Nesting is applicable for this DTC activity. Figure 7 shows that blank sheet design that can incorporate other blanking sheet for other parts.

Based on types of material and sizes of the blank sheet metal, the engineering principles found that there are similar components that have used the same type of material or lower grade but most importantly the components must have the same material thickness, as shown in Figure 7. It is feasible to implement this in the concept design of panel side outer blanking sheet metal, and hence this provides an opportunity for engineers to expedite the concept into the product design.

One of the cost strategies of DTC is to look into the feasibility of component cost impact on product cost. The parameters of cost improvement are productivity, material usage, energy consumption, logistic cost, and manpower cost against the investment cost in providing tooling to the engineers to implement the proposed ideas. From the cost analysis done by the procurement engineers, the return of investment is positive, the estimated data highlighted that the return of investment is within two months subjected to the stability in production volume.

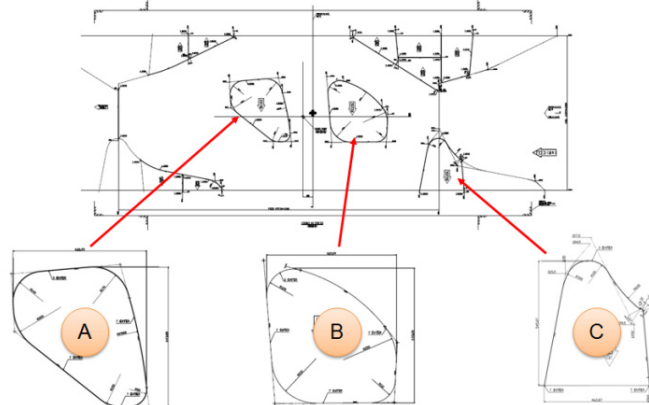


Figure 7 Feasibility Study of TRIZ Solution into Blank Sheet Metal of Side Panel Outer Structure.

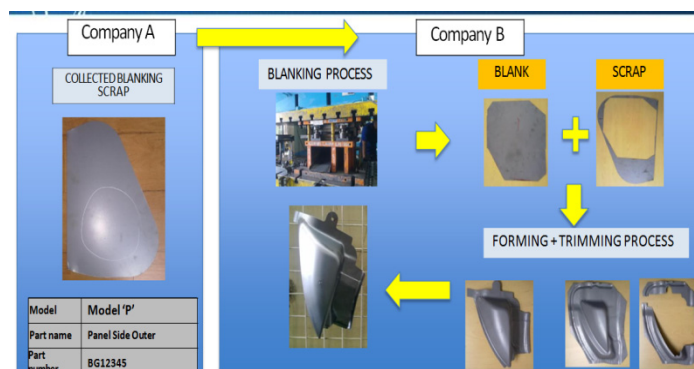


Figure 8 The Utilization of "Un-Used" Sheet Metal (Scrap) for Other Components.

Based on both analysis of engineering and costing, the idea is feasible and proceed for implementation. The un-used sheet metal from the stamping process of panel side outer, owned by company A, will be sent to company B, C and D who will invest in tooling of stamping die to process other smaller stamping components, as shown in Figure 8.

The outcomes of this DTC project saves huge raw material, energy and resource consumptions in producing the same components. There are also indirect benefits, like cost saving on logistic. The ultimate goal is also achieved through productivity improvement of more than 15%.

7 Conclusion

The aim of this study was to demonstrate a proposed framework of DTC implementation with TRIZ tools application. A case study method was used to find out whether the DTC implementation with TRIZ tools could provide successful cost reduction in product costing. With a case study presented above, the results were positive. One of the main contributions is by introducing TRIZ tools in DTC, the idea generated have managed to solve contradiction parameters that constraint the exploration of potential cost saving in a product design and development. The most critical TRIZ tools that are able to enhance the potential of cost reduction in product design are 1) function analysis and 2) trimming. The researchers believe that the cost reduction can be achieved and this case study also contributes to higher level of innovation in product development.

The TRIZ applications, using contradiction matrix, in this stamping DTC case study suit the problems. The established solutions provide guidelines for future product development and concept design, and it shows that the DTC become more effective and introduce higher product innovation. Therefore, in future research, the proposed framework could be tested and applied in other automotive products or even other types of industries in order to further refine and eliminate any weakness that the framework might still have.

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Trends in Industrial R&D in India from 1996-2011: An Analysis

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Abstract: Indian industry has traditionally been a low spender on R&D, but some industries are showing promise of higher investments in R&D. The three key industries show a trend of higher investment in R&D. This paper analyzed the number of firms conducting R&D, their expenditures on R&D, sales, and technical fees, and presented the analysis of the companies in foreign private sector, Indian private sector, central government, state government, and top 50 business houses in addition to the overall aggregate analysis. Furthermore, the paper identified industries/industry groups with high average research and development intensity over the 16 years. The results showed that the government definitely plays a role to increase the number of companies investing in R&D, either through incentives or advocacy. The models developed to find the relationship between sales and R&D investment are baseline models and need greater refinement.

Key words: R&D; Expenditures on R&D; Sales; Technical fees

1 Introduction

The contemporary wisdom and consensus amongst economists and policy makers is that investment in research and development is a way of ensuring competitive advantage of a nation. Recent studies indicate that human capital and technological progress (and innovations thereof) should be given utmost importance to ensure long term economic growth and prosperity. The experience¹ of Japan, Taiwan and other East Asian economies, particularly South Korea and Singapore show that given the right interventions and availability of a suitable eco system, developing countries can catch up on technology and innovation and in turn use the newly acquired edge in these fields to gain competitive advantage. While this is well known, and many developing countries are indeed investing heavily in technological progress in a bid to grow and develop faster, in India, this understanding is slowing gaining acceptance. The country still relies heavily on government funded research and the share of industrial R&D in total R&D expenditure of the country is quite low even in comparison to similar other economies. However, recent trends indicate that in some sectors at least like transport (auto), drugs and pharmaceuticals, non-electrical machinery and electronics, the Indian industry is beginning to invest substantially in R&D. The present paper is therefore a modest attempt at analyzing broad trends in industrial R&D industry spending in the last 16 years (1995-96 to 2010-11) so that the insights can translate into actual policy measures. Many studies have been carried out on India's industrial R&D and its impact on the economy (Desai, 1980; Rao, 2008; Mashelkar, 2008; Narasimha, 2008; Banerjee, 2012; Bhattacharya, 2007; Bagchi, 2011).

2 Methodology

We have analyzed the number of firms conducting R&D, their expenditures on R&D, Sales, Technical Fees (acquisition cost of technical know-how, technology transfer fees), Royalty, Import of Capital Goods and High Technology Exports in different sectors as well as in aggregate. In analyzing the overall aggregate scenario of R&D spending and related factors in Indian industry, we have also presented the analysis of the companies in Foreign private sector, Indian private sector, Central Government, State Government, and Top 50 Business Houses in addition to the overall aggregate analysis.

Data on Indian companies investing in R&D was first collected from 1996 to 2011. This data was the segregated into industry groups/industries (by 5 digit NIC classification). An analysis of these

¹ The experience of Japan (Johnson, 1982), Taiwan and other East Asian economies, particularly South Korea and Singapore (Kim, 1980, 1997) show that given the right interventions and availability of a suitable eco system, developing countries can catch up on technology and innovation and in turn use the newly acquired edge in these fields to gain competitive advantage. Kim (1997) after analyzing the South Korean experience posited that technological progress and the innovation thereof was a moving target and a country needs to continuously keep up efforts to remain at the cutting edge and that technological capability is not attained just by achieving an edge in R&D but in the application of R&D and its commercial exploitation.

different industries was then performed to identify industries/industry groups with high average Research and Development Intensity (RDI) over the 16 years. The industries that report high RDI indicate that they have a culture of investing in R&D. These high RDI industries are analyzed further and OLS regression conducted on their Sales (Industrial Sales) and R&D Investment (Sum of R&D Capital and R&D Current). The industries are then put in a framework and insights for policy makers can be derived from this.

2.1 Data source

The data (unless otherwise stated explicitly as a source in any table) has been collected from Prowess¹ database of Centre for Monitoring Indian Economy (CMIE) which is a standard source of information on financial performance of Indian companies (both listed and unlisted) and contains time-series data from 1989-90 till date. The Annual Reports of individual companies is the main source from which the Prowess database collects information and for listed companies the database also collects data from the stock exchanges.

3 Results and Discussion

The aggregate scenario of R&D spending in Indian industry is presented in this section. The number of firms spending any money on R&D is analyzed first, followed by the analysis of R&D manpower in Indian industry (data for which have been collected from IMD Competitiveness Online). Thereafter, the total R&D investment (which is a sum of the current R&D investment and the capital R&D investment) and the total sales of firms are analyzed. This is followed by an analysis of the technical know-how fees.

The number of companies with any R&D expenditure has not grown by a desired rate in the last 16 years. The number of firms with any R&D spending remained same from 1996 to 2000-01 and following an increase in the year 2001-02 has remained at the same value up to 2009-10 **showing a step like pattern**. The analysis of data for the last 16 years (i.e from 1995-96 to 2010-11) and also for the year 2011-12 shows that there has been a rapid increase in R&D spending by Indian Industry. Two distinct phases are evident from 1995-96 to 1999-2000 wherein the R&D expenditure by Indian Industry was choppy with a random up and down pattern, going up one year and then coming down the next (i.e. no distinct pattern was discernible). However, from 1999-2000 till date the R&D expenditure of Indian industry has grown every year and the value stood at 177216.2 in 2010-11. This value is an increase of 11.1 times over the 1995-96 value, even though the number of firms investing in R&D has reduced from 1995-96. The sales in the corresponding period has grown by 7.68 times only, which indicates that relatively firms are now spending more on R&D than earlier with respect to their sales. **The data also shows that the trend of rapid spending on R&D by domestic industry has not been affected by the recent global financial crisis.**

In terms of overall analysis we have prepared some ratio analysis² of R&D expenditure and related

¹ The database is the largest and most comprehensive database on Indian business entities. The total income of all companies in the Prowess database is about 74 per cent of India's GDP. As of 31 March 2010 there were 8,35,860 companies registered with the Registrar of Companies, (which is an administrative arm of the Ministry of Company Affairs) of which 82,822 were public limited companies and 7,53,038 were private limited companies. The profit and loss statement for the 7.5 lakh private limited companies is generally not available in the public domain and hence is not available in the Prowess database.

² The ratios are defined below:

1. Number of Firms spending on R&D / Total Firms – this ratio shows the penetration of the idea that R&D is beneficial for competitive advantage in Indian industry. Since the number of firms with R&D is such a small percentage of the total firms, we shall use only the number of firms with R&D as a proxy variable to indicate the above.
2. R&D Intensity = (R&D Expenditure/Sales) X 100 – this ratio shows the quantum of money that industry is willing to spend on own R&D to gain advantage over others, as a ratio of its sales. This indicates that the industries that are spending on R&D have realized its importance and are now allocating money in a judicious manner to increase profits through such investments in R&D. **This ratio shows the propensity of industry to create intellectual property through in-house R&D in ratio of its turnover size.**
3. Royalty Intensity = Royalty expenditure / Sales – this shows the intensity of royalty spending as a ratio of sales. This ratio indicates the money spend by industry as a ratio of sales to acquire a resource that it cannot generate in-house. The resource may be technology/intellectual property or any physical resource. **This ratio shows the propensity of industry to acquire resource (intellectual or otherwise) in ratio of its turnover size instead of creating them in-house.**

expenditures to arrive at some conclusions.

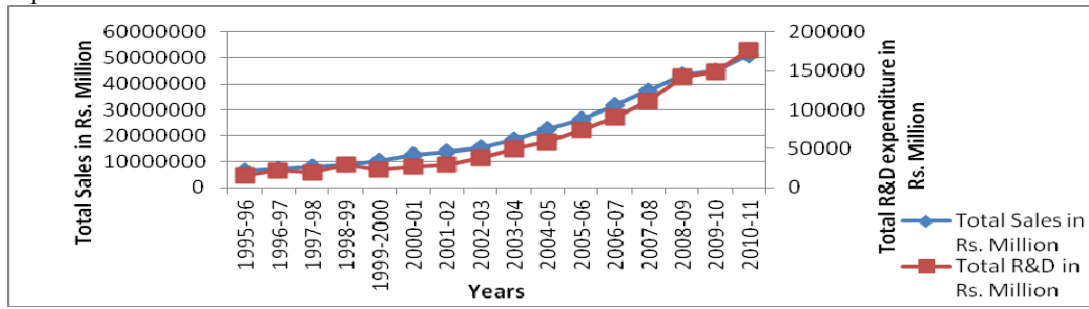


Figure 1 Sales and R&D Expenditure in Rs. Million 1995-2011

R&D Intensity shows an increasing trend and has increased from 0.24 in 1995-96 to 0.37% in 2010-11. This shows that Indian industry is spending more on R&D in proportion to their sales now than they used to in 1995-96. The pattern of expenditure on technical know-how fees is shown in fig. 2. The value of such technical fees is very small in comparison to the R&D expenditure or royalty expenditure of Indian industry. The overall trend is upward but some inflexion points are visible in 2003-04 and again in 2006-07. However, since then there is an upward trend.

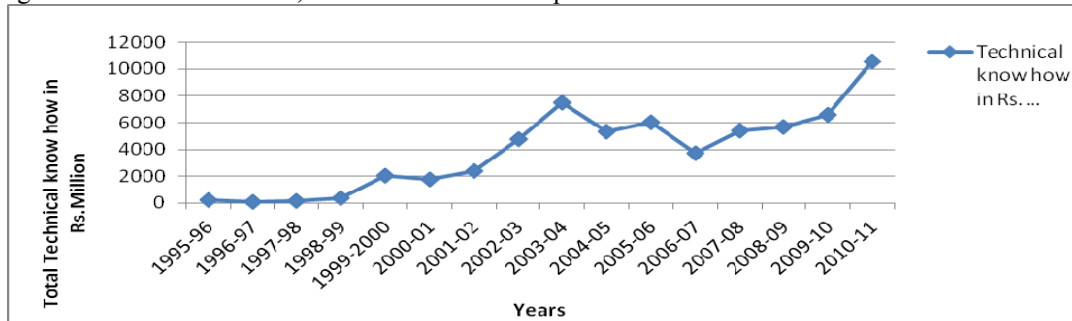


Figure 2 Technical Know-How in Rs. Million 1995-2011

In terms of overall analysis we have prepared some ratio analysis of R&D expenditure and related expenditures to arrive at some conclusions. Figure 3 and 4 show the pattern of such ratios over time.

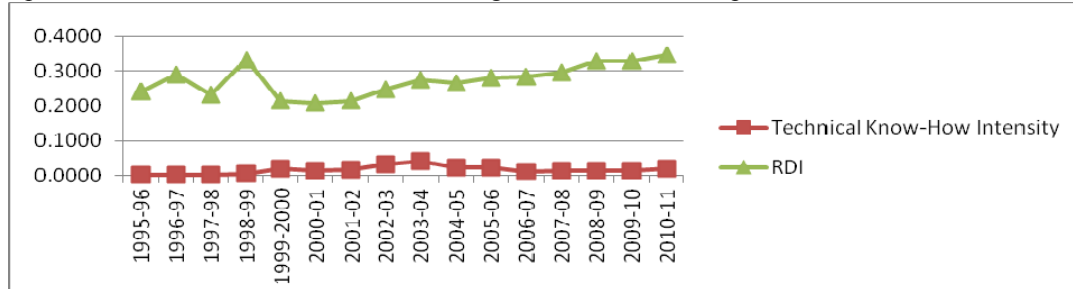


Figure 3 Pattern of RDI, Royalty Intensity and Tech Know-How Intensity from 1995-96 to 2010-11

4. Technical Know-How Intensity = Technical Know-How expenditure / Sales – this shows the quantum of money spend by industry on technology acquisition as a ratio of sales. **This ratio shows the propensity of industry to acquire technology resource in ratio of its turnover size instead of creating them in-house.**
5. External –Internal R&D Ratio = (Royalty+Technical Know-How Fees)/R&D Expenditure – this ratio indicates the **confidence of industry in its own R&D vis-à-vis in acquiring intellectual property from external sources** (which may be foreign also).
6. Pure Technical Acquisition Ratio = (Technical Know-How Fees)/R&D Expenditure +Royalty – this ratio shows the **propensity of industry to buy technology rather than make it.**
7. Total Export Translation Ratio = (High Technology Exports)/(R&D Expenditure + Royalty +Technical Know-How Fees +Import of Capital Goods) – this ratio gives the **ultimate benefit that accrues to the country in terms of foreign exchange income as a ratio of all spending in acquiring IPR.**
8. Own R&D Export Translation Ratio = High Technology Exports / R&D expenditure – **this shows the benefit of industry and country as a whole due to own R&D of industry.**

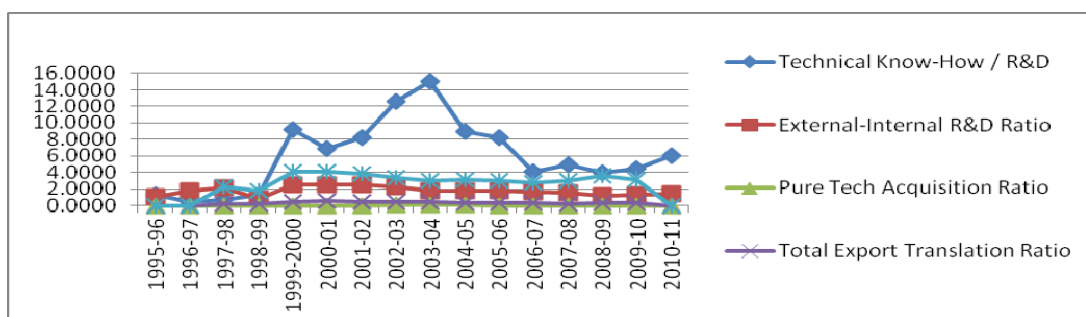


Figure 4 Pattern of Different Ratios from 1995-96 to 2010-11

An analysis of Research and Development Intensity of all the companies (segregated into industry groups) registered in India yielded the following:

Industry	RDI
Drugs	3.96
Transport	1.242
Electronics	0.957
Non Electrical Machinery	0.875
Chemical	0.397
Diversified Manufacturing	0.293
Energy	0.288
Electrical Machinery	0.274
Non Metallic Products	0.256
Services	0.205
Plastics	0.171
Food and Beverages	0.136
Misc Manufacturing	0.109
Mineral Products	0.093
Textiles	0.088
Paper	0.085
Base Metals	0.082
Leather	0.079
Construction	0.067
Wood	0.065
Agriculture	0.027

Evidently, there is a huge disparity in RDI among different industries.

The number of companies with any R&D investment has not grown by a desired rate in the last 16 years. In fact, fig. 5, shows a dip in the number of firms with any R&D spending for the year 2010-11. This dip is primarily due to a dip in the number of such companies in the drugs industry. The number of firms with any R&D spending remained same from 1996 to 2000-01 and following an increase in the year 2001-02 has remained at the same value up to 2009-10.

Table 2 - Shows the distribution of firms by turnover. Total number of firms in a turnover range and firms with any R&D spending in such turnover range are shown in four different years. The data has been captured for calendar years and not for financial years. The pattern that emerges is interesting to note.

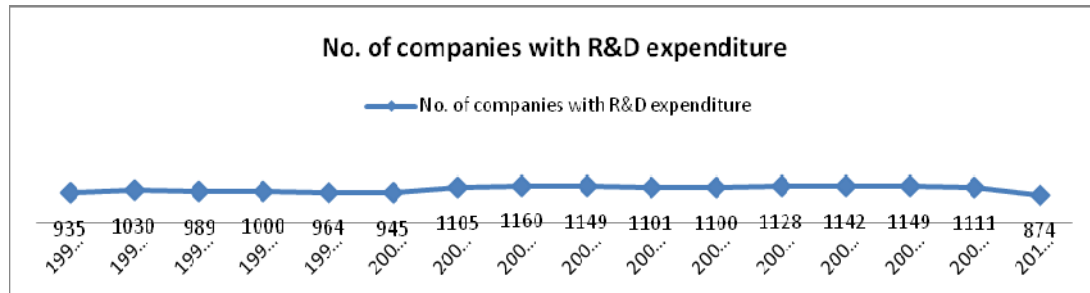


Figure 5 No. of Firms with R&D Investment 1995-2011

Table 2 clearly shows that over the years, firms in low turnover ranges from below Rs. Million 10 to Rs. Million 50-100 are showing a drastic dip in number of firms spending on any R&D even though by and large the total number of firms in such turnover range is increasing rapidly. Over the years the trend of number of firms spending on R&D is sharply downward in this turnover range. Similarly the pattern of number of firms in the turnover range Rs. Million 100 to Rs. Million 2000 with any R&D spending shows a sharp dip from 2005 to 2010. In the Rs. Million 2000 to 4000 range the number of firms with R&D spending has remained stable and in the range Rs. Million 4000 and above, there has been a sharp increase in the number of firms spending on R&D. This shows that the firms that have the means to spend on R&D are now beginning to spend on R&D, even though in percentage terms, this is still below the 50% mark. Hence, more needs to be done on the advocacy front to impress upon the companies in various turnover ranges the need to spend on R&D. This can be handled with a policy measure that advocates higher R&D investment in industry in such turnover categories.

Table 1 Distribution of Firms with R&D and Total Firms on the Basis of Turnover in the Calendar Years (annualized) 1996, 2000, 2005, 2010

Turnover (Rs. million)	1996		2000		2005		2010	
	Total Number of Firms	Firms that spend on R&D	Total Number of Firms	Firms that spend on R&D	Total Number of Firms	Firms that spend on R&D	Total Number of Firms	Firms that spend on R&D
<10	484	6	797	1	2031	1	2129	0
10-20	258	7	335	6	586	2	474	0
20-30	207	7	260	5	407	7	318	3
30-40	197	8	187	5	315	4	240	3
40-50	173	12	175	6	264	5	179	2
50-100	583	44	683	39	895	29	698	16
100-200	729	64	811	62	1082	60	638	28
200-300	505	89	623	66	738	72	619	33
300-400	287	43	433	61	508	54	432	22
400-500	250	57	305	52	374	38	328	23
500-1000	625	176	845	151	1102	163	1067	112
1000-2000	471	197	621	157	949	182	971	144
2000-3000	180	94	276	92	389	94	462	90
3000-4000	72	42	131	59	232	72	284	66
4000-5000	54	26	74	20	156	54	202	52
5000-10000	112	71	162	80	326	133	543	173
10000-50000	89	52	143	67	277	116	566	208
50000>	17	14	29	22	70	38	144	78

The analysis of data for the last 16 years shows that there has been a rapid increase in R&D spending by Indian Industry. Two distinct phases are evident from 1995-96 to 1999-2000 wherein the R&D investment by Indian Industry was choppy with a random up and down pattern, going up one year and then coming down the next. However, from 1999-2000 till date the R&D investment of Indian

industry has grown every year and the value of such investment has increased by 11.1 times over the 1995-96 value (without discounting for inflation etc.), even though the number of firms investing in R&D has reduced from 1995-96. The sales in the corresponding period has grown by 7.68 times only, which indicates that relatively firms are now spending more on R&D than earlier with respect to their sales. The data also shows that the trend of rapid spending on R&D by domestic industry has not been affected by the recent global financial crisis.

Indian Private Sector firms shows a period of rather slow growth from 95-96 to 1997-98 followed by a jump & dip pattern which is followed by a period of steady growth culminating in a jump in R&D expenditure in 2002-03 which is followed by a period of very rapid growth till 2010-11. The R&D expenditure by Indian Private Sector companies in 2010-11 represents 58.59% of the total industrial R&D expenditure in 2010-11. The corresponding share of Indian Private Sector R&D expenditure in 1995-96 was 58.33%. Foreign Private Sector R&D has also grown in the last 16 yrs. However, there have been different phases. 1995-96 to 1998-99 can be deemed as a phase of rather choppy investments by such companies with a jump-dip-pattern. 1999-2000 to 2001-02 shows a static period in which R&D investment was flat. 2002-03 to 2005-06 there was rapid growth which is followed by a dip in 2006-07 and a jump in the next 2 years followed by a dip in 2009-10 and a jump in 2010-11. The 2010-11 value of R&D expenditure in such companies was 8.23 times the value of R&D expenditure of the same category of companies in 1995-96. It must be noted that there has been an impact of the global financial crises on investments in R&D in such companies. The 2010-11 R&D expenditure of this category of companies' represents 15.43 % of the total industrial R&D expenditure which is down from the 20.81% share which such companies had in 1995-96. It will be interesting to note that there seems to be very little or no impact of the global financial crisis and consequent economic slowdown on Central Govt R&D expenditure. The top 50 business house also shows a pattern starting with jump-dip jump from 1995-96 to 97-98 followed by a period of flat growth culminating in a period of rapid growth till 2008-9 following which there has been dip and also a revival in 2010-11 .The R&D expenditure for such companies in the year 2010-11 was 8.56 times the value of 1995-96. The 2010-11 value of R&D expenditure of such companies represents 23.96% of total Industrial R&D which is down from 31.06% for the year 95-96.

The three key industries that show promise are analysed below:

4 Automobiles and Transport

One of the industries which have regularly shown high R&D intensity is the automobiles and transport industry which includes industries in automobiles, aeronautical and other related industries. The R&D intensity of this industry in 1995-96 was at 0.58 which has steadily increased and in 2010-11 was at 1.45. The R&D investment also has grown in last 16 years from Rs 2201.5 millions to Rs 45881.1 millions which is an increase of 20.84 times and which indicates that the industry is spending heavily on R&D. The trend also shows two distinct phases in 16 years. The phase of 1995-96 to 2000-01 shows R&D investment in this industry group having a very modest growth and the second phase 2001-10 which shows a pattern of exponential growth in R&D investment. The reason for this spurt in R&D investment in the sector seems to be of tendency of several big companies to invest in R&D along with Tata Motors. Other auto companies that have started to heavily invest in R&D includes Ashok Leyland, Bosch, Maruti, and HAL. R&D investment in the transport sector represented about 25.89% of the total industrial R&D investment of the country in 2010-11 which is up from the 13.79% share of R&D investment that the sector had in 1995-96. The number of companies investing in R&D has also gone up and the royalty and technical fees paid by the firms has also gone up from 95-96.

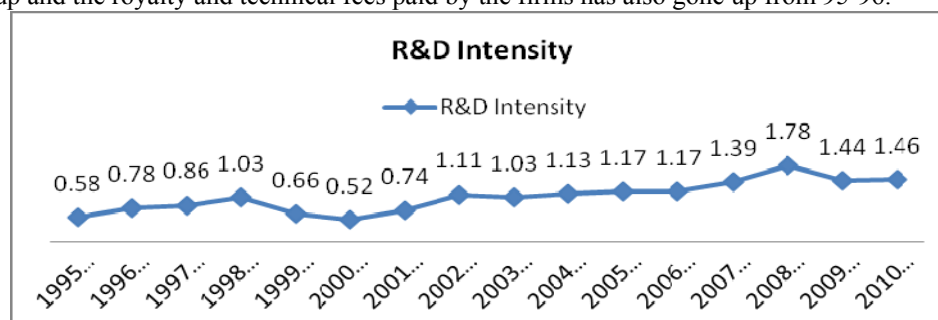


Figure 6 Pattern of RDI from 1995-96 to 2010-11 in Auto and Transport Industry

A simple relationship between Sales and R&D investment in this industry has been developed by an OLS model. An OLS of the log of Sales (in Rs. Million) and log of R&D Investment (in Rs. Million) yields the following result:

Dependent variable: $\ln_Sales_in_Rs_Million$

	coefficient	std. error	p-value
const	7.30044	0.298355	2.94e-012 ***
Dum1	0.351977	0.130365	0.0182 **
$\ln_R_D_Expenditur\sim$	0.705734	0.0319425	1.08e-011 ***

R-squared	0.974781	Adjusted R-squared	0.970901
Durbin-Watson	2.250033		

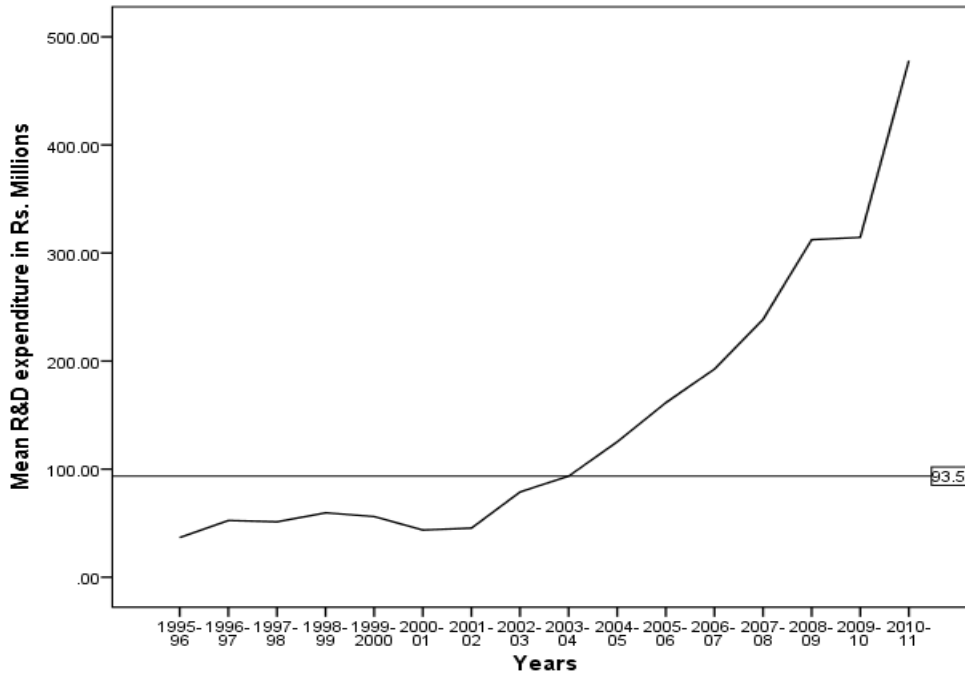


Figure 7 - Average R&D Investment Per Firm the Auto and Transport Industry from 1995-96 to 2010-11

As is evident from figure 7, the average investment per firm has seen a very sharp increase from 2002—03 onwards and barring one bad year, the trend is secular.

4.1 Electronics

The firms in the electronics industry also show high R&D investment. In 1995-96 the R&D intensity of firms in this set of industries was 0.66, which has increased to 1.04 in 2010-11. The R&D investment is steady barring a couple of years. However the number of firms investing in R&D has gone down. In 2010-11 firms in this sector reported R&D investment of Rs 5288.70 millions which is 6.86 times the corresponding value of 1995-96 and which represents 3% of the total industrial R&D investment in the country in 2010-11. Share of Electronic firms in total industrial R&D in 1995-96 was 4.8%. The royalty paid by Electronic firms show a phase of almost very low growth from 1996-2004 after which there is a rapid increase till date. A simple OLS model developed with the time series data is given below:

Dependent variable: $\ln_Sales_in_Rs_Million$

	coefficient	std. error	p-value
const	5.81699	0.580206	9.05e-08 ***
$\ln_R_D_Expenditur\sim$	0.852347	0.0743972	1.69e-08 ***

R-squared	0.903618	Adjusted R-squared	0.896734
Durbin-Watson	1.756082		

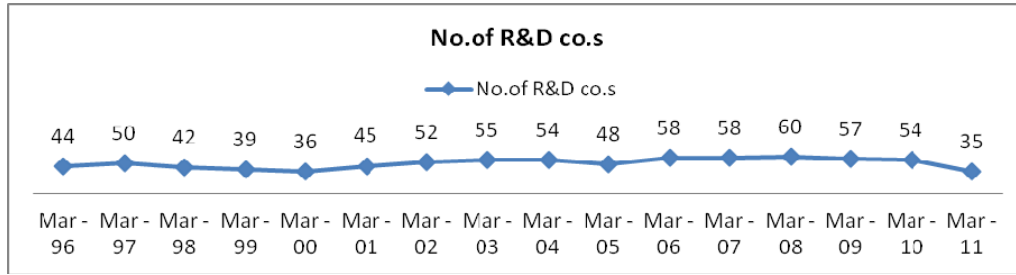


Figure 8 Number of Firms 1995-96-2010-11

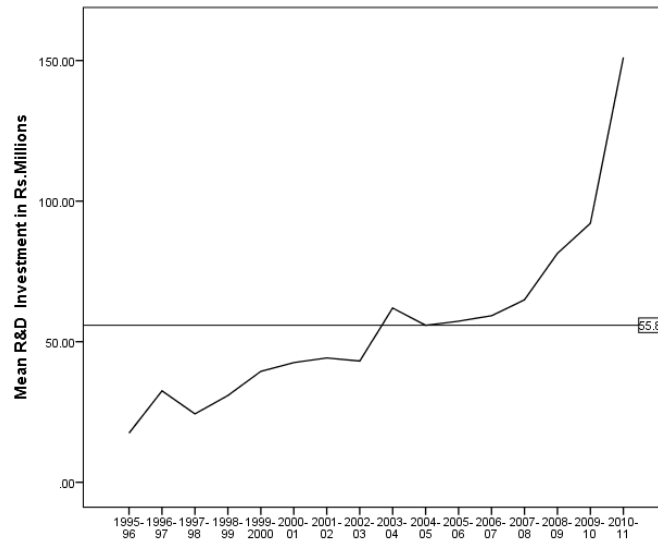


Figure 9 Average R&D Investment Per Firm 1995-96-2010-11

As evident from figure 9, the R&D spending per firm has grown exponentially since 2006-07 till date. There seems to be no impact of the financial crisis on R&D investment in this industry. Of course the top companies here are from the public sector enterprises.

4.2 Drugs

The Indian drugs and pharmaceutical industry is highly fragmented with over 20,000 registered companies. The number of active companies is about 6,000. The largest company in Indian market controls only 7 % market share and the top ten accounts for 30 % market share. The top 250 companies in the organized sector account for 75 % of the sales. The MSMEs fulfill a large part of the market. Drugs and pharmaceuticals industry has reported the highest R&D intensity in 1995-96 and also subsequently in each passing year till 2010-11. R&D intensity of firms in this industry was 1.45 in 1995-96, which has increased to 4.97 in 2010-11. In 2010-11 firms in this industry have spent Rs 43958.20 millions on R&D which is 21.54 times the corresponding value in 1995-96. In 2010-11 the share of R&D spending in this sector in total Indian industrial R&D was 24.80% which is up from 12.78% in 1995-96. However, the worrying trend for the sector is that there has been a sharp fall in the number of companies investing in R&D in the last couple of years. From the high of 127 firms it is now down to 94 firms. The R&D Investment by the firms in this sector can be categorized in to 3 phases of low growth, moderate growth, and high growth. 1956-96 to 1999-2000 represents a phase of low growth, 2000-03 is period of high growth and 2003-to ill date is a period of rapid growth. A simple OLS model for sales and R&D investment in this industry has been developed, which is as given below:

Dependent variable: l_Sales_in_Rs_Million

	coefficient	std. error	p-value
const	7.91839	0.244888	1.48e-014 ***
l_R_D_Expenditur~	0.527194	0.0263056	1.05e-011 ***
R-squared	0.966318	Adjusted R-squared	0.963912

DW is low for this model, and a better model is possible, which will be explored at a later date.

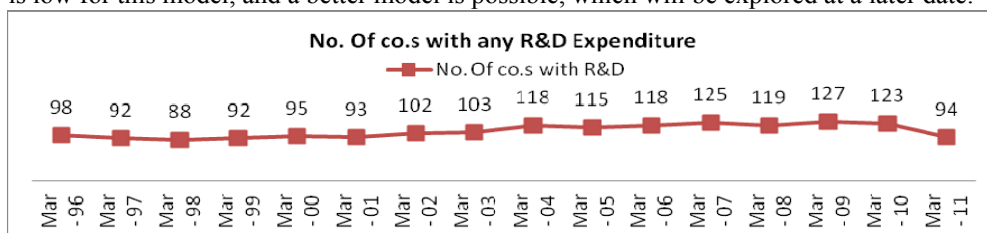


Figure 10 Number of Companies with any R&D investment in Drugs industry Between 1995-96 to 2010-11

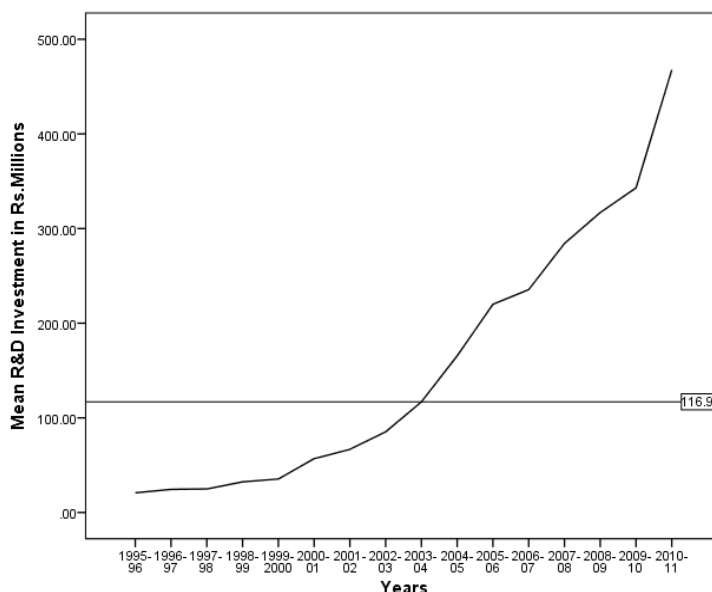


Figure 11 Average R&D Investment for Drugs Sector 1995-2011 Ref

The figure 11 shows that in the recent past, the average investment on R&D in this industry has increased exponentially. It must be pointed out that there has been a major structural change in this industry in 2005, when India changes from a process patent regime to a product. To comply with TRIPS, India reintroduced product patent protection in drugs and pharmaceuticals from 1st Jan 2005, and hence the industry was forced to invest heavily in R&D to survive. The Indian pharmaceutical industry is building up world-scale capabilities in pharmaceutical manufacturing. Indian capabilities in manufacturing stem from a strong knowledge base in synthetic chemistry, process innovation, low-cost manufacturing and a deep understanding of the patents. In other stages of the pharmaceutical value-chain, namely discovery, development and marketing the industry is slowly building competencies. The analysis also shows that there is a lot of churn in the industry with regard to R&D investment and sales and that all the top companies are from the private sector.

5 Conclusion

Indian industry has traditionally been a low spender on R&D, but some industries are showing promise of higher investments in R&D. The three key industries show a trend of higher investment in R&D. However, Firms in low turnover ranges from below Rs. Million 10 to Rs. Million 50-100 are showing a drastic dip in number of firms spending on any R&D even though by and large the total number of firms in such turnover range is increasing rapidly. Therefore a special package of government support and advocacy for R&D investment for SMEs is required. Also, over the years the trend of number of firms spending on R&D is sharply downward in this turnover range. The pattern of number of firms in the turnover range Rs. Million 100 to Rs. Million 2000 with any R&D spending shows a sharp dip from 2005 to 2010. This calls for a special package and government intervention. In the Rs. Million 2000 to 4000 range the number of firms with R&D spending has remained stable and in the range Rs. Million 4000 and above, there has been a sharp increase in the number of firms spending on R&D. This shows that the firms that have the means to spend on R&D are now beginning to spend on

R&D, even though in percentage terms, this is still below the 50% mark. A PPP system of engaging with the private sector will work for companies in this turnover range.

The three key industries also exhibit a take-off in terms of higher average per firm R&D investment since 2004-05 onwards, which is a good sign and shows that slowly some Indian industries are taking R&D seriously as a tool for attaining competitive advantage. The incredible churn happening in each industry is also an indicator of change taking place in each industry. In many cases the predominant role of the public sector organizations is giving way to more flexible private sector companies who have taken to R&D as a means to gain greater competitiveness. However, the worrying trend is that of reducing number of companies investing in R&D in almost each of the three industries. The government definitely has a role to play here to increase the number of companies investing in R&D, either through incentives or advocacy. The models developed to find the relationship between sales and R&D investment are baseline models and need greater refinement, which will be taken up later.

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Functions of Design Management on Promoting Animation Industry in China

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Abstract: The rapid development of China's design industry, as well as the diversified development trend of the enterprises' management has promoted and given rise to the formation of the design management industry. Design management, as a cross product of two important disciplines, has a very important practical significance in the operating strategy of enterprises, especially those in the art industry. The animation industry is a sunrise industry generally recognized by today's society. But, it is undeniable that the current domestic animation industry is struggling with great difficulties under the strong impact of the United States, Japan and other animation powerhouses. Relying on China's animation industry, this paper analyzes the current situation of China's animation industry and mainly discusses the positive significance of design management in promoting China's animation industry

Key words: Design Management; China's Animation Industry; Animation Industry Chain; Chinese Elements

1 Introduction

Currently, design is an essential part whether in a company or an enterprise's operating activities. However, from the perspective of macro significance, it is just a composition of the entire operating strategy. Therefore, the design should be managed as effectively and systematically as other operating activities, otherwise, the design may just be in vain. According to the users' needs, design management is to conduct research, exploitation and management activities in a systematic and organized way. It is the management on a series of design strategies and design activities conducted to mobilize the designers' creative thinking effectively and actively, to convert the market and the consumers' awareness into the new products, to influence and change people's lives in a new, more rational and more scientific way, and to maximize the enterprises' profits.

The animation industry is a sunrise industry generally recognized by today's society. But, it is undeniable that the current domestic animation industry is struggling with great difficulties under the strong impact of the United States, Japan and other animation powerhouses. This paper analyzes the reason of weakness in the domestic animation industry, and proposes to blend design management in the domestic animation industry. The integration of the rational design concept into casual design is an extremely effective way to quickly upgrade the domestic animation industry.

2 Analysis on Current Situation of Chinese Animation Industry

The animation industry which views providing spiritual products as its basic content, has distinctive differences but also the common property with the general industry. Therefore, animation products must also conform to the basic law of value in the process of production, circulation and consumption. In the course of development, it is also constrained by the supply and demand mechanism, the price mechanism and the competition mechanism. Influenced by the law of value, the animation industry must also view market as the basic orientation, and adjust various resources by the market in order to gradually form and improve the animation industrial chain. Such chain is vividly called by western countries as "smile curve", which is displayed with the original R&D in the upstream, the manufacturing in the midstream and the sales distribution in the downstream. The chain conveys the value of the specific intellectual property (or copyright) in the cultural industry. Focusing on the formation development, protection, appreciation and transformation of intellectual property rights, the chain constitutes the life cycle of the animation industry, and reflects the unique value-added charm in the cultural industry. The chain is new type of industrial chain. The industrial characteristics of the cultural industry which bears as "content is king", together with the integration of information technology and cultural industries has multiplied the value-adding capacity of the content industry and has led to new changes on its industrial chain. The chain no longer takes the form of vertical type, but the performance of a mixed code combining vertical and horizontal structure.

In China, the prospect of the animation industry is huge. Just in the case of the game industry, the data shows that China's online game users has reached 65.87 million in 2009, an increase of 33.46% compared to 2008. And it is expected that the number will hit 123 million by 2014. The number of China's online game users in the recent six years is shown in Figure 1.

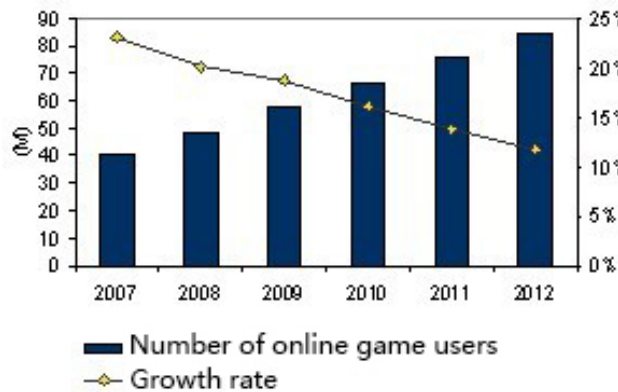


Figure 1

In 2009, China's online game market size was 27.06 billion yuan, an increase of 30.2% over last year, with the online games industry remaining the largest segment of China's Internet economy. China's online game market size in the recent 10 years is shown in Figure 2.

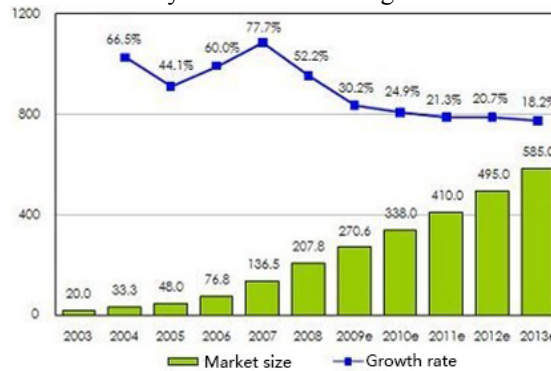


Figure 2

Although the market is huge, most of the current market is firmly occupied by the United States, Japan and other animation powerhouses. The reason of such phenomenon is the younger- age-targeted domestic animation industry which has long been criticized by the public. For example, most domestic cartoons are being created just to meet the limited audience of juveniles, and even just primary school students. It is not at all surprising to refer to such creative ideas and creative goals as “naïve”. The younger-age-targeted cartoons, of course, are indispensable since juveniles are important target consumers, but such kind of cartoon is certainly not the only prospect of cartoon creation. If an animation film really wants to get the audience recognition, as well as achieve its commercial value, to curry favor with those “big kids” in favor of the cartoons would be a more effective and direct way due to the limited influences of juveniles. However, to make “big kids” dwelling upon with great relish is clearly much more difficult than making the younger kids laughed. And this may be the most reasonable explanation of the lowering ages of the domestic cartoons.

In Japan and the United States, which are generally recognized as the animation powerhouses, watching cartoons is not only the privilege of the children, but is also many adults’ obsession. For example, Japan's “Naruto” and “Detective Conan” are sought after by many adults and college students in China. The impacts of animation industry even surges higher waves in the United States under the propelling force of Hollywood. From the classic cartoon image of Mickey Mouse, Donald Duck, to the later Wave of Shrek, Ice Age Cyclone, American cartoons have rolled up a round of tides in terms of box office in the world.

Facing the mighty animation industry in the United States and Japan, what is the fundamental problem of the shrinking domestic animation industry? The great pressure faced by people and

companies in the industry is one of the important reasons. It is difficult for the animation companies to feed themselves by their television broadcasting incomes. Different from the television chain, television broadcasting income of cartoons is very shabby compared with their production costs. Many domestic animation production staff has said that broadcasting income of domestic animations can be described just as a drop in the bucket compared to its production costs.

As is known to all, animation derivatives are extremely important parts of the income of the animation companies and animation creators. Cartoon dolls, cartoon image of the trademark, and even the famous Disneyland in the United States, have laid a solid material foundation for the entire animation industry. However, the actual condition in China where pirates is rather rampant has casted a huge shadow to the development of China's animation industry. Pressed by the survival burden, a lot of excellent animation script writers and animation creators have turned to other higher income industries, and the rest are hard to devote them in animation creation since the great living pressure. It is generally recognized that the script is the soul of animation. Yet, the creation of a good script is bound to occupy a lot of time and effort. However, when the creation of the entire animation industry are burdened by the big bundles of surviving pressure, a lot of good ideas and trials are faced with the possibility of being rejected by the actual reviewers and even the creators themselves. Nobody dares to take a risk, and nobody dares to make new attempts, and they all stay around holding their own small positions. As a consequence, the domestic animations become more mediocre and similar, with less and less breakthroughs.

3 Functions of Design Management in Animation Industry

In view of the current development of domestic animation industry, design management can play an extremely important practical role in design strategy, design process and execution.



Figure 3

The purpose of design management is to identify and exchange ideas on using which kind of method to offer ideas to realize the value of the industry. Therefore, to grasp the opportunity of design will be the first step towards this goal. In recent years, the voice of integrating the Chinese cultural elements into cartoons has been stronger and stronger. Chinese culture is extensive and profound. It is widely rooted among the people and generally recognized by people. As a cultural industry, animation industry should actively take advantage of this favorable cultural foundation in order to get the audiences' value recognition and emotional resonance. The cartoon series "Journey to the West" (Figure 3) from the classics and the animation film "Lotus Lantern" (Figure 4) from the domestic classical legend serve as very good examples in this regard. But quite a lot of animation creators have not realized it. They lack confidence in the Chinese elements, and someone pursue the US-Japan model blindly, which has led to the nondescript in the final animations. Design does not exist independently. In the management of design strategy, the integration of Chinese elements into the design contributes to win the audiences' value recognition and emotional resonance, and to enhance the animation design's impact on the wide public. For example, the two Hollywood animated films "Mulan" and "Kung Fu Panda" (Figure 5) have achieved great success in terms of box office, and their inspirations are all from China.

Designing is a strict and circular process that is full of inquiry and creativity. The design process consists of a series of methods, and the combining of these methods can deal with the design project and solve the design problems. The design process is developed through continuous trials and tests conducted to solve the problems, and are continuously being corrected in the process of application by the designer or design team in the customer's project.



Figure 4



Figure 5

Take the music production in the animation industry for granted, it will exert an unexpected influence on the animation industry. In the movie, the artistic feature of music lies in the unity of music and picture, and its aesthetic significance lies in the unity of audio and visual. As for animations, music plays an irreplaceable important role in emotional contagion, deepening the theme, rendering the background atmosphere, expressing the characters' inner emotions and other aspects. The episode in the animated film "The Lion King" "Can You Feel the Love Tonight" is a typical example of the perfect combination of music and animation. Hayao Miyazaki's cooperation with Japanese composer Joe Hisaishi has pushed his creations to higher peaks. In domestic cartoons, "Lotus Lantern" can be certainly listed among the best bunches in terms of music. Three most popular singers Liu Huan, Jeff Chang and Coco Lee are being invited to sing at the animation. What's more, the beautiful and popular melody has made an indelible contribution to the success of the animation. Due to the characteristics of the music itself, its playback frequency is much higher than the movie. So even if the cartoon is not replayed, the highlights of the animation still emerge in the mind of audiences whenever its music sounded. And this effect is undoubtedly the desired effects of every cartoon. With the advent of the Internet era, cartoon publicity has also undergone a huge change. Microblog and other social networks has become the main carrier of the cartoon propaganda, therefore, animation collections with theme songs have become the main propaganda pattern of animations. Wonderful music can help cartoons to get the public's attention quickly, and is critical to the success of the animation.

In the process of design, good music is often required and stressed by designers, however, is lack of sound management in the designing and implementation process. Management on design process and implementation can effectively promote the reflection of the essential design elements in the final design work, thus ensuring the quality of the design work.

3 Conclusion

The substance of the design management means managing design projects, which is far more than the simple project management. As a management method, design management has extremely important significance in the art industry. In the aspect of animation industry, design management can build a rigorous design process, to integrate the members of different professions and areas with different personalities into a high-performance design team. It can further promote technological breakthroughs

and cooperation in different fields, and to ensure that the important design elements highly recognized by designers can be reflected in the final design work. Therefore, the rational use of design management has a very important practical significance to promote China's animation industry.

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Research Overview of the Evaluation Index System on the Development Level of Public Libraries

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Abstract: Through the analysis on the researches of the evaluation on public libraries in the recent years, the papers finds out that the evaluation on development level of the public libraries at home and abroad include performance evaluation, academic evaluation as well as policy evaluation of public libraries. Although there are no systematic and detailed index evaluation systems to assess the development level of public libraries, yet relatively mature assessment methods have been figured out, including return on investment, contingent valuation method and so on. To make the national public libraries develop in a rapid and robust manner, the libraries in our nation should actively establish comprehensive evaluation index systems with good economic benefits to assess the development level of public libraries.

Key words: Evaluation system of development level; Performance evaluation; Policy evaluation; Academic evaluation

1 Introduction

Since 1960s, with the continuous upgrade and deepening of management philosophies and styles on public libraries, the circle of public libraries at home and abroad brings in the evaluation of the management on the internal working states of public libraries and ushers in the researches and practices concerning the evaluation on the performance of libraries. Meanwhile, with the continuous development of information technology and network technology, the status of public libraries as the center of community information and documents will definitely be shaken. In order to attract the attention of the general public, organizations and government institutions again, the public libraries begin to focus on their operational effects and benefits, which makes a large number of relevant researches in the circle of library science spring up.

2 Literature Review

At present, a large number of research results have been achieved by the empirical studies carried out and different evaluation methods and diversified evaluation index applied by domestic and foreign library science circle concerned with public libraries. According to the CNKI (China National Knowledge Infrastructure), the main researches in this area are provided in the Table 1.

Table 1 The Main Research of Evaluation Index System on the Development Level of Public Libraries

Research Content	results
The evaluation index systems of public libraries	53
The evaluation on the performance of public libraries	27
the academic evaluation of public libraries	3
The policy evaluation of public libraries	0

Firstly, the evaluation index systems of public libraries is the most important part in this area. With the rapid development of information technology and network technology, the importance of the digital resources of public libraries constantly improves. The researches on the evaluation index systems of the public libraries at home and abroad can be mainly divided into two categories, that is the researches on the evaluation index systems based on digital resources as well as the researches on the evaluation index systems based on services and users^[1]. According to the statistics based on current researches, the evaluation index systems of digital resources include ISO/TR 20983, ISO2789 standard appendix A, ARLE-metrics and EQUINOX^[2-5]. In 1999, Fred Health, Colleen Cook et al in Texas A&M University began to apply the tool of SERVQUAL used in company evaluation into the evaluation of libraries. Under the assistance of American Academic Research Library(ARL), the research results were named as “LibQUAL+ ®”, which is regarded as one of the projects concerning StatsQual, the evaluation collection of tools about ARL. After overall test, LibQUAL+®, as the evaluation tool

targeted at service quality, is applied in non-profit libraries to improve its service standard^[6-7].

The researches of evaluation on the public libraries in our nation was initiated in 1990s. The relatively authoritative evaluation index system is the national provincial level library evaluation standard, which is formulated by China Society for Library Science and other relevant organizations launched and organized by the Ministry of Culture in our country and is adopted to evaluate index systems of the provincial level public libraries. Since 1994 to now, it upgraded four times and the newest version is issued in 2009^[8].

Secondly, the results of the evaluation on the performance of public libraries shows that this research content is less published. From the 1960s to now at abroad, the evaluation on the performance of public libraries turned from the quantitative evaluation on the input data to the evaluation on the service contents and service effectiveness of libraries and the focus of it gradually lies in the evaluation of service results of libraries^[9]. In the 21st century, the empirical studies on evaluation on the economic values of foreign public libraries increase, for example, Thomas Lynch and Julie Harrington^[10] in Florida State University and Pearl M. Kamer^[11] in Long Island Association applied the Regional Economic Models (REMI), Input/Output Models and cost benefit analysis to evaluate the performance of public libraries. The research employed two subsystems, the direct value obtained by the users and the added value obtained by the users. The emphases of the library performance evaluations at home and abroad are quite different. The foreign researches are inclined to focus on the economic benefits created by the libraries for the communities, such as the added income and the work opportunities and so on and so forth. These libraries include Florida Library in the United States, the Public Library in Suffolk County and British Library etc. In our country, from the end of the 1980s, the scholars began to explore the library performance evaluation^[12]. The evaluation system of this type in our country mainly focuses on the evaluation on the library operation and internal performance from the angles of efficiency and benefits; however, it does not highlight the total value of the libraries and neglects the establishment of the evaluation index systems concerning the added values of the libraries. Similarly, the researches regarding the construction of index systems on the library performance, services and direct economic values are relatively in a large number, such as the Construction of the Evaluation Index Systems on the Benefits of the Libraries^[13] written by Luo Jianli, the Construction of Evaluation Index Systems on the Performance of Libraries with the Orientation of the Users' Demands^[14] written by Bai Xili and so on.

Thirdly, the academic evaluation and policy evaluation concerned about public libraries are rarely discussed. The researches on the academic value evaluation of public libraries conducted by scholars in the circle of library science at home and abroad are few and far between. In CNKI, through the searches according to the searching conditions of "title", "subject", "key words" and "abstract" by the key words of "public libraries" and "academic", 25 relevant articles are finally found out after deleting the articles appearing repeatedly. However, there are no researches regarding academic evaluation standard systems of public libraries and there are no researches concerning value evaluation of academic information obtained by other relevant social institutions (such as private enterprises, folk groups) through public libraries. Among these articles, Hu Jun, Liu Ying^[15-16] et al mainly evaluate the academic values of the public libraries in the aspects of the number of issued documents and citation frequency, download, H-value evaluation and so on in the libraries.

The researches on the policy evaluation towards relevant local libraries in the circle of the libraries in our country are weak. In CNKI, through the searches according to the key words of "public libraries", "policy evaluation" and "regulation evaluation" by the searching conditions of "title", "subject" and "key words" respectively, there are only two articles left after deleting the similar ones. Starting from the evaluation standard of public policies, Xiang Xiaodan briefly divides the policy evaluation standards into the standard of scientific outlook on development, effect standard and professional standard^[17]. He Yun further researches the evaluation index of public libraries, which are the evaluations mainly in the aspects of the construction of infrastructures of public libraries, the outlay problem as well as the services for the readers^[18]. According to the current researches on policy evaluation, at the present stage of our country, the policy evaluations of public libraries are few and far between and the evaluation index systems are relatively macroscopic without further deepening and segmentation. However, the circle of library science in our country conducts abundant researches on policies of the relevant local libraries and focuses on the relevant policies and regulations of the government. The relevant index systems they put forward lack detailed segmentation of policy research systems of public libraries. Most researches mainly start from the construction of framework. Although they put forward the general direction and the contents to evaluate the policies of public libraries, they are short of the systematic and comprehensive evaluation of the influence of relevant polices on the development of public libraries,

thus being unable to effectively conduct evaluation scientifically and systematically towards the policies issued by the government and provide the valid data to support the policies issued by the government. In the further researches, the evaluation systems should be detailed segmented to feasibly serve the government in the formulation of the policies regarding public libraries.

3 Evaluation Methods

With the increase of the researches concerned with the evaluation on the economic values of public libraries at home and abroad, the evaluation methods tend to be more and more scientific and method systems become more and more perfect. According to the current research statistics, there are several main methods applied by the circle of library science at home and abroad:

Return on Investment (ROI). ROI refers to the values should be obtained through investment. If we employ this approach into the operation of libraries, it means that the every dollar invested into the services of the library can generate the return of investment of several dollars for the society^[19].

Contingent Valuation Method(CVM). The method is put forward by Ciriacy Wantrup S. V. in 1947. In the 1990s, the American scholars Arrow K. and Solow R. propose to apply CVM to evaluate the standard frameworks^[20] on the basis of the researches conducted by the previous scholars.

Balanced Scorecard Method is to divide the library performance evaluation into five parts--the organizational vision, input and output, the services for the readers, internal business, study and growth. Through the comparisons between the spot data and future expected data of these indexes, it clarifies the strategic orientation of the development of libraries^[21].

Consumer Surplus. This method refers to that the differentials between the price the customers have paid and their expected price of the product or service in purchasing a product or service.

Time Costs Method. This method is based on this hypothesis: the advantages obtained by people when applying the libraries should at least be equal to the time cost they paid in order to gain these services.

At present, the researches about the evaluations of libraries in our country are mainly concerned with the aspects of the internal services, operation, management and so on about the libraries, which lack researches on the construction of evaluation index systems integrating the social added values.

4 Conclusion

Above all, the circle of library science in our country mainly focuses on the evaluations of the internal services of libraries and performance of libraries. In addition, the evaluation systems concerned with relevant public libraries have been established. However, they are limited to the establishment of evaluation index systems on the performance of libraries. The researches on the construction of evaluation index systems concerned with the added values and the generated economic values of the libraries are few. The current research results do not contain the evaluation index systems about the development potential of public libraries under development and the total social values they produce. The further and detailed researches on the evaluation systems on academic values and policies of public libraries are not many. There are short of value evaluation researches about the academic information obtained by other relevant social institutions(such as private companies, folk groups and so on). The researches on policy evaluation index systems have not met the standards to support the policies issued by governments and the management and operation of libraries. There are in need of comprehensive evaluation targeted at the development level of public libraries, by which the corresponding researches of evaluation systems can be constituted. Taking the national conditions and financial problems of public libraries into consideration and under the boom of the construction of the cultural undertaking in the period of the implementation of the 12th five-year plan, the libraries in our country should positively set up the evaluation index systems with comprehensiveness and economic benefits on the development level of the public libraries, which may provide the standardized, economized and systematized evaluation systems for the development and construction of public libraries and boost the further development and prosperity of the undertaking of public libraries in our country.

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A Conceptual Model of Peer Influences Towards the Adoption of Technological Innovations among Young Adult Consumers

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Abstract: The purpose of this paper is to propose a conceptual model which would provide a better understanding on how social influences through the effect of peer communication could interplay with materialism to capture the effect of young adults' adoption of technological innovation in their life. This paper provides a brief review on the theories associated with the adoption of technological innovation as well as some important empirical findings to support the model of this study. Based on a review of established studies, this paper re-examined the relationship between peer communication and the adoption of technological innovations and propose that young adults' interaction with their peers have significant positive effect on their adoption of technological innovation. However, this paper argues that the effect is not direct. This paper proposes that the relationship between peer communication and the adoption of technological innovation could be indirect, through the relative mediating effect of materialism. Next, the relationship between materialism and the adoption of technological innovation is examined, taking into account the antecedents of materialism. Finally, the paper concludes with a discussion, limitations and the possible areas of research which researchers could explore in the future.

Key Words: Young adult consumers; Peer communication; Materialism; Adoption of technological innovation.

1 Introduction

Imagine living in a world without innovation. As human beings we consider it normal that the world around us is changing and that something old is replaced by something new. Innovation is defined in different ways (Rogers, 2003) emphasis the outcome, Schilling (2008) the creativity, Trott (2008) see it as the process from idea towards new product or process.

Rogers (2003) stated the characteristics of the innovation as important. Characteristics of innovations are the relative advantage the innovation, visibility of innovation, and compatibility of the innovation. There are also individual factors involved in innovation. Rogers (2003) found that individuals show a degree of 'innovativeness'. The intention to adopt innovations is also of importance. If the intention is low, it is unlikely that the innovation is adopted. Kabbar and Crump (2006) found other individual factors such as sex, age and education to have an impact on innovation. For instance, women, elderly and low-educated are less likely to adopt innovations.

Talukder (2008) found that social factors like the influence of peers and social network were important in adoption of innovations. Specifically, peers influence the adoption by encouraging to use or not to use the innovation. Given that peer exert a certain degree of influence on the adoption of innovation, this paper is an attempt to provide an insight into how peer influences, in particular peer communication, exert its influence on the adoption of technological innovations among young adult consumers. Behavioural sciences and individual psychology, suggest that social influences and personal traits such as individual innovativeness are potentially important determinants of adoption, and may be an important element in potential adopters' decisions (Lu et al. 2005).

While there exist a large body of studies examining the effects of social influences on the adoption of innovation. To date however, models developed to study the adoption of technological innovation have not given due considerations to variables, such as materialism, which could have an interplaying role in explaining consumers' adoption of technological innovation. In this article, materialism is highlighted a possible mediator in explaining the effect of peer communication on young adults' adoption of technological innovations.

As such, the main purpose of this paper is to propose a conceptual model to establish the relationship between peer influences towards the adoption of technological innovations in general. Specifically, the objectives of this study are:

(1) To examine the influence of peer communication on the adoption of technological innovations among young adult consumers

(2) To examine the influence of peer communication on materialism among young adult consumers.

(3) To examine the influence of materialism on the adoption of technological innovations among young adult consumers

(4) To establish materialism as a mediator in the relationship between peer influence and on the adoption of technological innovations among young adult consumers

Past studies have empirically tested the relationship between peer influences, particularly peer interaction on the adoption of technological innovations among consumers. Studies have also established the link between peer communication and materialism. This study is an attempt to provide a conceptual model which incorporates materialism as a mediator in the relationship between peer communication and the adoption of technological innovations, thus, fulfilling a research gap in the literature. By so doing, this paper will hopefully provide some further insight into understanding how consumers adopt technological innovations into their life.

2 Review of Literature

The following section lay down the theoretical background of the study, before proceeding to the development of the conceptual model to explain the influence of peer communication on young adults' adoption of technological innovations. Based on both theoretical and empirical evidence, several propositions are made. Figure 1.1 presents the conceptual model of this paper.

2.1 Adult socialization

According to Goodwin and Sewall (1992), socialization can be studied from several perspectives. Psychologists tend to focus on individual learning processes. Anthropologists focus on becoming part of a culture. Sociologists, on the other hand, often view socialization in terms of role acquisition.

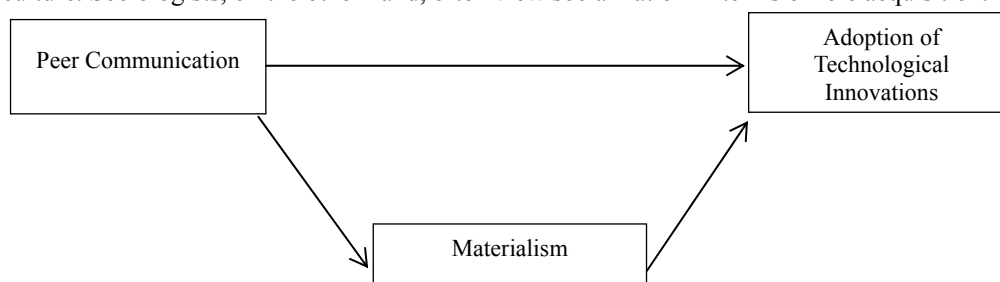


Figure 1 Proposed Conceptual Model

When compared to research on childhood and adolescent, adult socialization has been relatively neglected. Brim (1966, 1968) identifies a number of differences between childhood adult socialization. First, Brim suggested that socialization consists of learning the role demands of society. For children, the reference group which prescribes role demands is composed of parents and peers; in contrast, adults refer to earlier friends, great figures in history, spirits.

Second, adult socialization necessarily builds on the foundations of childhood socialization. Berger and Luckmann (1966) suggest that this “secondary” socialization occurs on a shallower level. People may experience an inability to take on values and behavior which contradict earlier learning (Brim, 1966), also described as “resocialization” (Campbell, 1975).

Finally, as people move through the life cycle, “the emphasis in socialization moves from motivation to ability and knowledge, and from a concern with values to a concern with behaviour” (Brim 1966, p. 26). Childhood socialization develops primary motives, while adult socialization focuses on secondary motivations. The motivation adults bring to a new environment will influence their socialization because, unlike children, adults select their socialization experiences (Brim 1968).

2.2 Adoption of technological innovations

This study is interested in the adoption of new technologies in general and does not focus on a particular category of adopters as proposed by Rogers (1983). Adoption refers only to the initial acceptance of an object. Rogers (1983) classified adopters of innovations into five categories: innovators, early adopters, early majority, late majority, and laggards. For initial and early adoption, decision-making is exposed to variables other than those incurred by the technology itself and is more

possibly influenced by those variables (e.g. Ajzen and Fishbein, 1980; Karahanna and Straub, 1999; Rogers, 1983).

When examining the history of technology adoption research, many scholars in the social sciences have concentrated on the relationship between personal attitudes towards a new technology and the actual behaviour that derives from these attitudes. They often employed the Technology Acceptance Model or 'TAM' (Davis, 1989), which builds upon the theories of reasoned action and planned behaviour, both of which argue that an individual's attitude towards a certain behaviour and perceptions about the individual's own performance will determine the actual execution of this behaviour (e.g., Fishbein, and Ajzen, 1975; Ajzen, 1985).

TAM posits that the intention to use a new technology and its actual acceptance depend upon the manner in which people perceive a technology to be useful and easy to adopt. The model suggests that intention to use a technology is equivalent to actual usage acceptance.

2.3 The influence of peer communication on adoption of technological innovations

Another important insight is that although impersonal marketing methods like advertising and media stories may spread information about new innovations, but it's conversations that spread adoption (Robinson, 2009). According to Robinson (2009) because the adoption of new products or behaviours involves the management of risk and uncertainty. It's usually only people that an individual personally know and trust – and who have successfully adopted the innovation themselves – who can provide credible reassurances that change and adoption won't result in negative consequences such as embarrassment, humiliation, financial loss or wasted time.

They are on the lookout for advantages and tend to see the risks as low because they are financially more secure, more personally confident, and better informed about the particular product or behaviour. Often they will grasp at innovations on the basis of no more than a well worded news article. The rest of the population, however, see higher risks in change, and therefore require assurance from trusted peers that an innovation is do-able and provides genuine benefits.

As an innovation spreads from early adopters to majority audiences, face-to-face communication becomes essential in the decision to adopt. As suggested by Rogers (2003) this principle is embodied in the Bass Forecasting Model, which illustrates how face-to-face communication becomes influential over time. Many diffusion-style campaigns now consciously attempt to utilise Opinion Leader techniques or various "viral marketing" methods. These methods – which are becoming increasingly popular – aim to recruit well-connected individuals to spread new ideas through their own social networks.

Both Rogers (1995) and Valente (1995) noted the importance and influence of interpersonal networks on the adoption of innovations by individuals. Rogers has discussed the concepts of homophily and heterophily in communication networks. "Homophily is the degree to which a pair of individuals who communicate are similar" (Rogers, 1995, p. 286). The common beliefs and understandings between the individuals increase the likelihood that communication will be effective. It is noted that homophilous communication can limit the spread of an innovation to the individuals within the same network.

This finding is validated in a study by Durrington et al. (2000) where a group of university faculty's adoption of technology use was hindered due to lack of communication between friendship networks. In contrast, heterophilous communication is not as easy as homophilous communication due to differing beliefs, but is crucial in diffusion in connecting dissimilar individuals. Valente (1995) approaches the studying of diffusion of innovations from the standpoint of examining the social network of individuals. He posits "diffusion is a communication process in which adopters persuade those who have not yet adopted to adopt" (p. 2)

According to Valente (1995), contagion is a term referring to an interpersonal process of "how individuals monitor others and imitate their behaviour to adopt or not adopt innovations" (p. 12). The processes of cohesion, popularity, or system-wide occurrence define the individuals in the network who influence others. Valente's relational diffusion networks reflect the idea that "direct contacts between individuals influence the spread of an innovation" (1995, p. 31). Rogers suggests "we must understand the nature of networks if we are to understand fully the diffusion of innovations" (1995, p. 304).

Based on a review of the literature above, it is proposed that peer communication will have an effect on young adult adoption of technological innovations:

P1: Young adult consumers who communicate more frequently with their peers tend to adopt technological innovation earlier as compared to those who communicate less frequently with their peers.

2.4 The influence of peer communication on materialism

Pioneering studies in the domain of consumer socialization suggested that, as a socializing agent, peers are more important than family for adolescents while young teenagers are more sensitive to the social meaning of consumption because of their strong self-expressive orientation (Moschis and Churchill, 1978; Moschis and Moore, 1979a; Moschis and Mitchell, 1986). Moschis et al. (2009) have developed the 'life course' approach is a recent interdisciplinary movement in consumer behaviour research that operated as an important overarching framework to study the development of materialism in Malaysia. In their study, a survey of young Malaysian adults (18 to 22 years) was undertaken to test hypotheses derived from the life course literature. Consistent with previous research findings, television viewing and peer communication during adolescent years had a significant association with materialistic values held by young Malaysian adults.

Santos and Fernandes (2011) explained that experiences in adolescence are of major importance in building patterns of behaviour, including in the adult phase. Drawing from socialization theory and studies on materialism, their study aimed to investigate the formation of materialistic behaviour among adolescents, researching the antecedent variables of this behaviour. A theoretical framework, based on two important research streams - socialization theory and socio-familiar structure - was developed and tested through two surveys, the first one with 460 adolescents and the second with 190 just-adults. Specifically the result of the study indicated that adolescents' level of contact with their peers indicated higher degree of materialism.

Another recent study by Bindah and Othman (2012) among young adult consumers in Malaysia has found significant differences between peer communication and materialism. The more frequently young adults interacted with their peers, the more likely they tended to be more materialistic.

Based on the empirical evidence derived from a review of literature on the effect of peer communication and materialism, the following proposition is made:

P2: Young adults who communicate more frequently with their peers tend to be more materialistic in comparison to those who communicate less frequently with their peers.

2.5 The relationship between materialism and adoption of technological innovations

In an enlightening study by Donthu, and Cherian (1995) on ethnic population, materialism was used to explain the hypothesized differences in the coefficient of innovation and the coefficient of imitation in the sub-groups. In their study, materialism was operationalized as valuing of relationships with money and material over relationships with people (Belk, 1985). The basic proposition was that those with higher materialism scores would be more likely to adopt innovations, implying higher coefficients of innovation. Conversely, those who had lower materialism scores should have lower coefficients of innovation. In their study, materialism was measured by a six-item five-point Likert scale, and had a Cronbach alpha of 0.88. Their findings confirmed that those with low materialism scores have lower coefficients of innovation.

Based on the empirical evidence derived from the review of literature on the effect of materialism on adoption of innovation, the following proposition is made:

P3: Young Adults who are more materialistic will tend to be early adopter of technological innovation, in comparison to those who are less materialistic.

3 Justification of Materialism As a Mediating Variable

Past studies have examined materialism as a dependent variable. Factors which were found to be correlated with materialism can be categorized as personal, social and behavioural and demographics. Past studies have treated these factors as antecedents of materialism. For instance, social utility, vicarious consumption reasons for viewing commercials, and amount of money available were predictive of materialism. Social utility reasons for watching TV shows, social utility reasons for watching TV ads, peer communication and gender were all predictive of materialism.

Other studies have examined materialism as an independent variable. Past studies have been conducted to identify factors which were correlated with materialism. These factors were treated as consequences and include happiness, life satisfaction, conformity behaviour, antisocial behaviour, conspicuous consumption, compulsive consumption and impulsive consumption (for e.g., Dawson, 2011; Podoshen et al. 2011; Chavosh et al. 2011).

Recently, Bindah and Othman (2012) have examined the influence of socialization agents on the compulsive buying among young adult consumers, and the study has proposed materialism as a mediating variable in the relationship between family communication, television viewing and peer communication on the development of compulsive buying behaviour of young adult consumers. Another

study by Bindah and Othman (2012) which examined the effect of family communication on life satisfaction among young adult consumers have proposed materialism as a mediating variable, in the relationship between family communication and life satisfaction.

4 Conclusion

The purpose of this paper was to propose a conceptual model to provide a better understanding on how peer communication could exert its influence on young adults' adoption of technological innovations. Based on theoretical and empirical evidence, this paper first illustrated the direct effect of peer communication on young adults' adoption of technological innovation. Next, the indirect effect of peer communication on young adult's adoption of technological innovation was established by taking into account the effect of materialism as a mediator in the process. It has been proposed that young adult consumers who communicate more frequently with their peers would tend to adopt technological innovation earlier as compared to those who communicate less frequently with their peers. Secondly, young adult consumers who communicate more frequently with their peers would tend to be more materialistic in comparison to those who communicate less frequently with their peers. As a result of their high materialistic inclination, it has been proposed that young adults who are more materialistic will tend to be early adopter of technological innovation, in comparison to those who are less materialistic.

However, although this paper has attempted to provide insight on young adults' adoption of technological innovation, it has its own limitations. However, careful consideration must be made in empirical testing of this model. As a general rule, assumptions in any case 'must' and 'should' always be avoided. Assuming that peer communication will exert the same amount of influence in all the five different categories of adopters of innovation would prove wrong. It could be that peer communication exert more influence among early adopters but exert less influence among late majority of adopters of innovation, or vice-versa. For instance, it could be that early adopters are on the lookout for advantages and tend to see the risks as low because they are financially more secure, more personally confident, and better informed about the particular product or behaviour. Thus, peer communication may not have much effect on early adopters of technological innovativeness but more into other categories of adopters.

Lastly, this paper was an attempt to formulate a conceptual model with attention to a particular stage of life cycle, i.e., young adult consumers. Studies showed that those with lower materialism were significantly older (e.g., Donthu, and Cherian, 1995). Being older, also leads to lower coefficients of innovation and higher coefficients of imitation for the following two reasons: (i) older people are more resistant to change; (ii) having larger families and lower income leads to less discretionary income, which in turn leads to a lower likelihood of adopting innovations perceived as non-essentials. Future research could explore how these differences in life cycle stage would affect the adoption of technological innovation.

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The Research on Relationship Between Competency and Job Performance of Marketers*

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Abstract: Through the analysis of the 201 valid questionnaires, we prove that the marketers' competency can be divided into six dimensions, management and decision ability, market development ability, interpersonal ability, communication skill, professional knowledge and personality traits. This six competency dimensions have significantly positive correlation with job performance, and market development ability has strong effect on task performance, interpersonal skill has strong effect on relationship performance. We also find that there is positive correlation between task performance and relationship performance.

Key words: Marketers' competency; Job performance; Task performance; Relationship performance

1 Introduction

The research of the marketers' competency can help enterprises to manage the marketers more effectively, and the exploration of the relationship between marketers' competency and job performance can provide guidance for the construction of marketers' team, it can point out the behaviors that can promote job performance, and the characteristics that have less impact on job performance. It can provide a reference for the enhancement of the marketers' ability, marketers can recognize their own shortcomings, as well as the gap.

McClelland(1973) published a paper 《Testing for Competency Rather Than Intelligence》, proposed the concept of competency. Subsequent scholars supplied the concept of competency, and Spencer(1993) defined competency as individual characteristics that can distinguish the performance of employees, it contained knowledge, cognition, attitudes, values, motivation, self image, traits, behavior that can be measured. Wang and Wang(2006) divided the quality of the marketers into five, ability quality, personality characteristics, knowledge quality, personality characteristics and physical quality. Han and Zhao(2006) summarized the marketers' competency according to the knowledge, skills, social roles, self concept, characteristics, motivations, ability and so on. Song(2007) researched the factors that can influence the sales staff performance. It found that excellent sales staffs perform significantly better on the quality of influence, initiative, service consciousness, communication skill, oral communication ability, interpersonal understanding ability, information collecting ability and responsibility.

Marketers need to be able to plan and organize their work, at the same time they also need to judge according to the market situation, to determine how to do next work, and to arrange future marketing activities and so on, so marketers need to have management and decision ability. Enterprises need to constantly expand the scope of the market of their products or services, from city to country, from one city to another city, from youth to old age group, so marketers need to probe into the market, continuously improve the market share of products or services. All the activities are associated with a variety of community, may be associated with the government for the entry of market, may be associated with media for the display of products or services, also may be direct contact with consumers for the promotion of products or services, which requires marketers have interpersonal ability and communication ability. Marketers should have certain professional knowledge, and the knowledge of the products or the services in order to show better on the characteristics of the products or the services. Marketers should have patience, honesty, integrity and the sense of responsibility which can help marketers do better job. Based on the analysis above, we put forward the following hypothesis:

H1: Marketers' competency can be divided six dimensions, management and decision ability, market development ability, interpersonal ability, communication skill, professional knowledge and personality traits.

Taylor(1911) found that the difference of the employees' work performance can be due to the difference of the personal ability. Barren and Depinet(1989) pointed out the level of the intelligence test

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scores has less influence on job performance. Borman and Motowidlo(1993) put forward performance of employee was made up of task performance and relationship performance which got recognition of scholars. Task performance is prescribed by the organization activities. Relationship performance is not associated with specific goal or task, however it can improve the effective of the group. It includes cooperation and mutual assistance, the roles outside activities, the completion of task with enthusiasm and determination, and the maintenance of organizational goals. Conway(1996) researched the validity of task performance with relationship performance, supported the point that job performance can be divided into task performance and relationship performance. Wang and Li(2003), Luo and Zhu(2006) also supported the point that job performance was made up of two factors. Based on the analysis above, we put forward the following hypothesis:

H2: Marketers' job performance can be divided into two factors, task performance and relationship performance.

Zhang(2005), Chen(2006) researched the relationship between marketers' competency and job performance, found that each dimension had significantly positive correlation with job performance. Feng and Ji(2007) researched the relationship of manufacture management competency with job performance, found that each competency had promoting effect on the performance. Lin and Wang (2008) found competency could promote performance, and it was different of the influence degree of each characteristic. Huang and Zhao(2011), Ma and Qiang(2012), Chen(2012) came to a conclusion that each competency has positive correlation with job performance. Based on the analysis above, we put forward the following hypothesis:

H3: There is positive correlation between marketers' competency and job performance.

Based on the division of job performance, this hypothesis has two hypothesis:

H3a: There is positive correlation between marketers' competency and task performance.

H3b: There is positive correlation between marketers' competency and relationship performance.

2 Research Method

This research adopts questionnaire research method, the questionnaire includes two parts, the marketers' competency questionnaire and marketers' job performance questionnaire. Through the literature research, we get marketers' competency characteristics, then consult relevant human resources experts to determine the characteristics of marketers' competency. For the part of marketers' job performance questionnaire, we refer to the questionnaire of Liu(2009) to design task performance and relationship performance. We issued 400 questionnaires in Henan, Guangxi and other eight provinces of China, and got 201 valid questionnaires at last.

3 The Test and Analysis of Research Hypothesis

3.1 Marketers' competency dimension analysis

Through relevant inspection and mutual inspection of the collected data, we get KMO index 0.818, Bartlett 810.005, df 231, Sig 0.000. Marketers' competency can be divided into six dimensions by exploratory factor analysis. Management and decision ability, the rotation characteristic value is 2.952, the variance contribution rate is 13.420%. Market development ability, the rotation characteristic value is 2.673, the variance contribution rate is 12.151%. Interpersonal ability, the rotation characteristic value is 2.177, the variance contribution rate is 9.897%. Communication skill, the rotation characteristic value is 2.231, the variance contribution rate is 10.141%. Professional knowledge, the rotation characteristic value is 1.599, the variance contribution rate is 7.270%. Personality traits, the rotation characteristic value is 2.429, the variance contribution rate is 11.041%.

3.2 Marketers' job performance dimension analysis

Through the analysis of the marketers' job performance questionnaire collected data, KMO index is 0.717, Bartlett is 303.859, df is 55, Sig is less than 0.001, it is good for factor analysis. We get standardized data first, and then carry on the exploratory factor analysis. Factor 1 gets to 38.504% for the cumulative variance contribution, and factor 2 can reach 23.685%. The variance contribution rate is high, so it has good structure validity.

3.3 Correlation analysis

The correlation coefficient is as shown in table 1(v1 is management and decision ability, v2 is market development ability, v3 is interpersonal ability, v4 is communication skill, v5 is professional knowledge, v6 is personality traits, v7 is task performance, v8 is relationship performance), the Sig level is less than 0.01. It is shown that each marketers' competency dimension is positively correlated with

task performance, and each marketers' competency dimension is positively correlated with relationship performance, there is positive correlation between task performance and relationship performance.

Table 1 The Correlation Analysis of Competency with Job Performance

		V1	V2	V3	V4	V5	V6	V7	V8
V1	Pearson Correlation	1	.491**	.341**	.493**	.488**	.373**	.353**	.245**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000
V2	Pearson Correlation	.491**	1	.247**	.390**	.458**	.204**	.314**	.269**
	Sig. (2-tailed)	.000		.000	.000	.000	.004	.000	.000
V3	Pearson Correlation	.341**	.247**	1	.253**	.226**	.420**	.287**	.279**
	Sig. (2-tailed)	.000	.000		.000	.001	.000	.000	.000
V4	Pearson Correlation	.493**	.390**	.253**	1	.464**	.305**	.447**	.316**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000
V5	Pearson Correlation	.488**	.458**	.226**	.464**	1	.320**	.340**	.247**
	Sig. (2-tailed)	.000	.000	.001	.000		.000	.000	.000
V6	Pearson Correlation	.373**	.204**	.420**	.305**	.320**	1	.430**	.381**
	Sig. (2-tailed)	.000	.004	.000	.000	.000		.000	.000
V7	Pearson Correlation	.353**	.314**	.287**	.447**	.340**	.430**	1	.233**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.001
V8	Pearson Correlation	.245**	.269**	.279**	.316**	.247**	.381**	.233**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.001	

** . Correlation is significant at the 0.01 level (2-tailed).

3.4 The regression analysis of marketers' competency with job performance

We explore the relationship of the six different marketers' competency dimensions with job performance with the method of hierarchical regression analysis, the results as shown in table 2.

Table 2 The Regression Analysis of Marketers' Competency with Job Performance

		Unstandardized Coefficients B	Standardized Coefficients Beta	t	Sig.	Adjusted R Square	F
V7	Constant	1.393		4.716	.000	.294	14.874
	V1	.017	.018	.228	.000		
	V2	.269	.102	1.415	.009		
	V3	.152	.158	.858	.392		
	V4	.242	.274	3.779	.000		
	V5	.037	.056	.753	.003		
	V6	.254	.276	3.992	.000		
V8	Constant	2.186		7.715	.000	.191	8.857
	V1	-.044	-.053	-.628	.531		
	V2	.185	.139	1.805	.003		
	V3	.281	.101	1.393	.005		
	V4	.134	.170	2.185	.030		
	V5	.012	.020	.257	.098		
	V6	.224	.272	3.673	.000		

3.5 Results analysis

1) It gets supported for hypothesis H1, marketers' competency can be divided six dimensions, management and decision ability, market development ability, interpersonal ability, communication skill, professional knowledge and personality traits.

Based on the analysis of the valid data, we find that the correlation and communality are good. The

cumulative variance contribution rate is 63.920%, so it is reasonable that divides the marketers' competency into six dimensions.

2) It gets supported for hypothesis H2, marketers' job performance can be divided into two factors, task performance and relationship performance.

The cumulative variance contribution rate of the two factors gets 63.920%, the variance contribution rate is high, it has good structure validity, so job performance can be divided into two dimensions.

3) It gets supported for hypothesis H3a, there is positive correlation between marketers' competency and task performance.

According to the correlation analysis between marketers' competency and task performance, the correlation coefficient of management and decision ability is 0.353, market development ability is 0.314, interpersonal ability is 0.287, communication ability is 0.447, professional knowledge is 0.340, personality traits is 0.430, they are all less than the level of 0.01, so the marketers' competency features has significant positive correlation with task performance.

4) It gets supported for hypothesis H3b, there is positive correlation between marketers' competency and relationship performance.

The correlation coefficient of management and decision ability with relationship performance is 0.245, market development ability is 0.269, interpersonal ability is 0.279, communication ability is 0.316, professional knowledge is 0.247, personality traits is 0.381, they are all less than the level of 0.01, so the marketers' competency features has significant positive correlation with relationship performance.

5) Market development ability has strong effect on task performance.

In the regression analysis between marketers' competency and task performance, the coefficient of management and decision ability is 0.017, market development ability is 0.269, communication ability is 0.242, professional knowledge is 0.037, personality traits is 0.254, they are all less than the level of 0.05, interpersonal ability does not enter into the regression equation. It can be seen that market development ability has the greatest influence on task performance, and the second is personality traits, the third is communication ability. The stronger the market development ability, the bigger the promotion of the products or services, thus it can promote task performance.

6) Interpersonal skill has strong effect on relationship performance.

The coefficient of market development ability in the regression analysis with relationship performance is 0.185, interpersonal ability is 0.281, communication ability is 0.134, personality traits is 0.224, management and decision ability and professional knowledge do not enter into the regression equation. From the regression equation coefficient, interpersonal ability and personality traits have stronger impact than others.

4 Conclusion

This study constructs the relationship model of marketers' competency with job performance, and analysis the proposed theoretical assumption with the 201 valid questionnaires with the methods of exploratory factor analysis, correlation analysis and regression analysis. The results show marketers' competency contains six dimensions, management and decision ability, market development ability, interpersonal ability, communication skill, professional knowledge and personality traits. Each dimension has significantly positive correlation with task performance, the coefficient of market development ability in the regression analysis is biggest that means it has the strongest effect on task performance. Each dimension has significantly positive correlation with relationship performance, interpersonal ability has strong influence on relationship performance. It also finds there is positive correlation between task performance and relationship performance, the correlation coefficient is 0.233.

This empirical research not only enriches the theory of the relationship between marketers' competency and job performance, but also provides reference for the practices of human resources management. However, there are many shortcomings in this paper. Samples are mainly come from Henan province of China, it hasn't been able to equal distribution in the provinces, so the results are more representative for developing provinces. Limited to the research conditions, the collected questionnaire is discriminating in different industry, not equal distribution, the final results may appear deviation. In this study, marketers that employed less than 3 years account for 79.6%, the number of senior marketers is relatively small, the following study need to improve the rate of senior marketers.

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Meta Analysis of the Relationship Between Intellectual Capital and Organization Performance

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Abstract: How much does intellectual capital improve organization performance? Is there any discrepancy of their relationship among different situation? Furthermore, what kind of discrepancy? All of these have been the focus problem of the innovation management academia that the relationship between intellectual capital and organization performance. Based on the systematic search of relative empirical literature and sifting of data, this paper acquires 55 effect values and makes use of the method of Meta-analysis to a quantitative comprehensive analysis. The results show that there is a positive effect on organization performance made by intellectual capital. Moreover, it also offers a proof that SMEs' influence on organization is more significant than large size companies' as well as "after 2008" and "before 2008". Also, we find industry difference surprisingly make little impact on organization performance.

Key words: Meta-analysis; Intellectual capital; Organization performance; Situational variables

1 Introduction

Intellectual capital(IC) has long been the hot topic among management researchers for its well-known capability of predicting organization performance(OP).The fact is that traditional physical capital theory can't be regarded as an universal predictor for all the merits which are made by entity. However, it's hardly sufficient to offer us a good impulse if the so-called intellectual capital weren't important to the final performance. Above all, it seems a synthetical analysis for its "forecasting ability" is absolutely necessary.

Although the concept of IC has been put forward for more than 40 years, the influence and mechanism of "IC-OP" are still in suspense. For one thing, IC's definition and implication are still in a gradual progress so that a multi-dimensional argument is unavoidable^[1-3].For example, some scholars extend the IC's scope so that innovation's effect^[4,5] is also considered as a kind of IC

Another problem is that different studies are always based on different background and situation^[6]. Which always lead to a "narrow result". In addition ,it's also plausible for us to blame on an general instrument to measure the IC and OP.

Above all ,we try to integrate myraid qualitative and quantitative research ,extract latter's data to analyze the relationship of IC-OP and the moderating effect of situational and measurement factor to set an relatively precise commentary for these problems.

2 The Framework of IC-OP Based on Related Paper

Studies of IC differs in multifarious facets, from the basic definition to measurement .As the original point our paper start from ,we conclude them as follows.

2.1 Structure dimension

There exists discrepancy on division of IC's Structure dimension in different research for at least two reasons. First, Macro environment's evolution. provokes the changes of importance of factors. Also, on the other hand, different study perspective can usually be another reason for this phenomenon . Among these studies, dualism(human capital and structure capital) and trialistic theory (human capital ,structure capital, relation capital) are dominant perception on how IC can be constructed. Their argument largely focus on the issue that if relation capital ,as an indirect element should be treated individually, though most of their concepts of these three factors are basiclly similar.

2.2 Organization size

Almost all the research objects differ in their organization size. Based on general logic: the bigger the size an organization has the harder it needs to form an reasonable working system. This may lead to difference of the relation between IC and OP. So it's meaningful to analyze the size's influence on IC-OP.

2.3 Industry

Industries' influence on IC-OP seems obvious. High-tech industry always involves high attention on IC which is the core competence of every individual^[6-7]. In contrast, Low-tech industry may to a large extent depends on scale expansion. Though some papers try to prove this conclusion, at the overall level ,it's still an awayingstoring question

2.4 Business cycle

Business cycle may affect IC at many levels. During downturn, enterprise may tend to “Bourbonism” and austerity to retain the market position at strategic level. Also at Business Level, product line can possibly be shortened and narrowed down .This kind of expediency can change the IC’s effect on OP. Above all, we can conclude the basic model for IC-OP relationship as figure 1

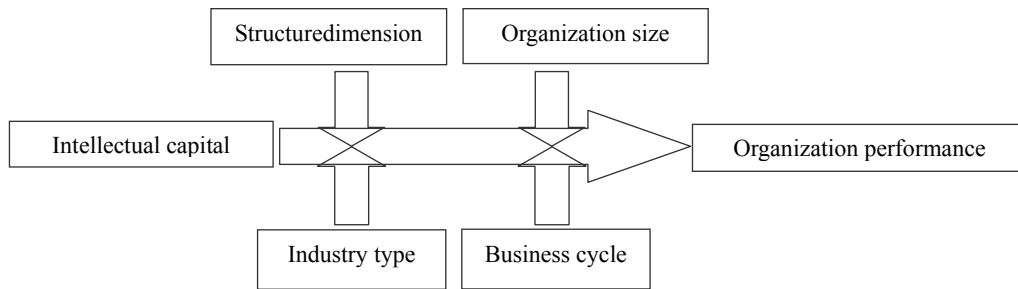


Figure 1 Conceptual Framework of IC-OP

3 Data and Methodology

First of all, we retrieve the literatures with the intellectual capital and the performance as keywords in Scopus, Elsevier Science, EBSCO, Springer Link and CNKI; more than 5000 search results are obtained. Secondly, select the literatures preliminary, the screening principle basically is to judge whether the title and abstract in conformity with the purpose of this study^[8-9]. Since the results of the literatures in literature database are often significantly in Meta analysis, those indistinctive results of literatures are not available, resulting in the publication bias in the Meta analysis. In order to minimize the publication bias in the Meta analysis, this study collect 151 alternative literatures from a large number of dissertations and unpublished papers through the above two stages. Next, based on the following principle to analyze and screen these literatures: first of all, must be empirical research; Second, intellectual capital has a direct effect on organizational performance, and has clear correlation effect value (or can be converted into the correlation coefficient r by calculation); third, different from other literatures of Meta analysis, for the purpose of representativeness, the literatures whose standard deviation of Fisher’ s Z value is too large (std>0.2) are not included in this paper. By filtering and sorting the literatures, there are 55 available samples for analysis eventually. Figure 2 is the distribution of effect value, the horizontal axis is the conversion of Fisher’ s Z effects values, the vertical axis is the standard deviations of Fisher’ s Z effect values.

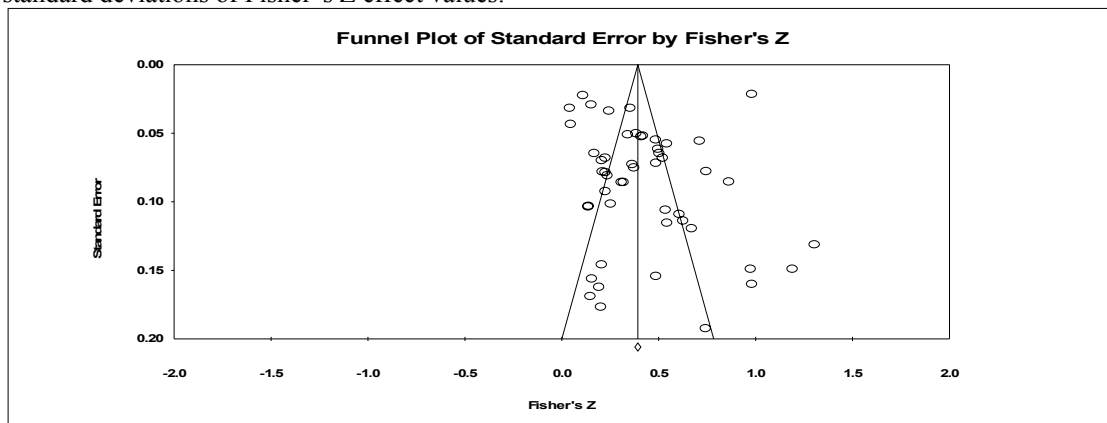


Figure 2 The Distribution of Effect Value

From figure 2, the majority of effect value point inside the funnel graph. In addition, according to calculation of CMA, the fail-safe number reached 9836, which proves the wee probability of publication bias existing in this study.

In Meta analysis, heterogeneity inspection is very important. So-called heterogeneity is refers to the degree of difference between multiple independent researches, only the differences among multiple independent studies within a certain range, the statistic can be weighted combination. In Meta analysis, if there is heterogeneity between multiple independent studies, it's necessary to choose random effects model to analyze. Test results as shown in table 1.

Table 1 Overall Heterogeneity Test

Method	Synthetic Effect value	95%CI		Asymptotic value		Sample size
		Lower limit	Upper limit	Z value	P value	
Fix effect	0.380	0.367	0.393	51.960	0.000	55
Random effect	0.408	0.336	0.475	10.152	0.000	

Heterogeneity test: $Q=1515.932$ ($p=0.000$)

In table 1, the Q value of the data in this study by heterogeneity test is 1515.932 ($p < 0.001$), therefore, the random effects model will be used. In the random effects model, the comprehensive effect value is 0.408 ($p < 0.001$), which suggests that the correlation between the intellectual capital and organizational performance is 0.408 generally, and the following hypothesis test is meaningful.

4 Empirical Analysis

Based on the theoretical model, variables should be in the form of 0-1. In order to verify the above hypothesis put forward, first of all, classify and code the literatures, and then make the binary heterogeneity test, the results shown in the following table. There are 4 points can be found in table 2. First, the effect value of large size enterprise ($ES = 0.364$, $p < 0.364$) is lower than the value of small size ($ES = 0.416$, $p < 0.001$), and the heterogeneity inspection is significant ($Q = 8.215$, $p = 0.001$). Therefore, we can conclude that moderating effect on the relationship between intellectual capital and organization performance from small-scale enterprises is stronger than the effect from the large-scale enterprises. Secondly, the effect value of High-tech industry ($ES = 0.314$, $p < 0.314$) is lower than that of the non-high technology industry ($ES = 0.404$, $p < 0.001$). Thirdly, the effect value before 2008 ($ES = 0.359$, $p < 0.359$) is less than it after 2008 ($ES = 0.423$, $p < 0.001$). Fourth, the effect value of the dual structure ($ES = 0.431$, $p < 0.431$) is greater than the value of multiple structure ($ES = 0.326$, $p < 0.001$), so it can be inferred that the relationship between intellectual capital and organizational performance under the dual structure is stronger than under the multivariate structure circumstances.

Since the Meta heterogeneity test of the literatures in this study is significant, which showed that not only on the situational factors, there may be larger difference of the samples obtained in this study on the measurement factors. And these factors may affect the relationship between intellectual capital and organizational performance. We'll make a Meta regression analysis for further inspection. In the regression analysis of this paper, we code literatures in the form of 0-1 according to the requirements of control variables (the type of performance is classified into subjective performance or objective performance, while the dimensionality divided into two categories, Measurement item number falls into single and multi-dimension. At the same time, we set the value of literatures whose size can't be confirmed as 0.5, to make the comparison on the same sample size). In model 1, only add the type of performance, performance dimensions and performance measurement items number as three control variables, while, in the model 2, there are 4 hypothetical variables in addition. As shown in table 3.

It can be perceived from table 3 that the regression results of performance type and performance dimensions as control variables are not significant in model 1 ($p > 0.05$). Only the measurement item number factor is significant on the relationship between intellectual capital and organization performance. In model 2, further analysis can also found that the effects on organizational performance of large-scale enterprises and small enterprises are significantly different ($Coef = 0.202$, $p < 0.05$), which supports H2. Meanwhile, period also have a significant moderating effect ($Coef = 0.104$, $p < 0.1$), which supports the H4. In addition, the structure dimension number differences of the intellectual capital have certain moderating effect on the relationship between intellectual capital and organizational performance ($Coef = 0.240$, $p < 0.01$), which supports the H5. However, we also found that the differences between industries did not produce significant moderating efforts ($Coef = 0.069$, $p > 0.1$). Moreover, as a whole, although the model 1 and model 2 are both significant ($F1 = 13.105$, $F2 = 13.105$) but compared with model 1, whose moderating goodness of fit is 0.385, the number of model 2 is 0.716, it's a massive promotion. So the result of model 2 is the more worthwhile compared with model 1.

Table 2 Binary Heterogeneity Test

Variable type	Sample size	Synthetic Effect value	95%confidence interval		P value	Q value
			Lower limit	Upper limit		
Large size VS Small size						
Large size	33	0.364	0.349	0.379	0.000	
Small size	17	0.416	0.384	0.447	0.000	
Heterogeneity test					0.000	8.215
High-tech VS Low-tech						
High-tech industry	24	0.314	0.287	0.339	0.000	
Low-tech industry	31	0.404	0.389	0.419	0.000	
Heterogeneity test					0.000	36.376
Before 2008VS After2008						
Before 2008	27	0.359	0.343	0.375	0.000	
After2008	28	0.423	0.401	0.445	0.000	
Heterogeneity test					0.000	20.891
Dualistic VS Polyphyletic						
Dualistic structure	22	0.431	0.414	0.448	0.000	
Polyphyletic structure	33	0.326	0.307	0.345	0.000	
Heterogeneity test					0.000	63.409

Table 3 Meta Regression Analysis

	Model1		Model2	
	Coef	P value	Coef	Pvalue
Performance type	0.165	0.191	0.073	0.440
Performance dimensions	-0.069	0.658	-0.125	0.243
Measurement Index	0.335	0.015	0.080	0.412
Large size VS Small size			0.202	0.001
High-tech VS Low-tech			0.069	0.268
Before 2008VS After2008			0.104	0.092
Dualistic VS Polyphyletic			0.240	0.001
Adjusted R ²	0.385		0.716	
F	13.105		25.382	
Sig	0.000		0.000	

5 Conclusions

Though predecessors have proved IC has an positive effect on OP. However, due to specific research background, their commentary on the influence varies. we use META strategy to discuss the relative articles. Our conclusion as follows.

First of all, the overall correlation coefficient is 0.408(p<0.001), which means in general, IC indeed do good to OP. So in organization operation. manager should put sufficient attention on IC, balance IC and physical capital, strengthen import and cultivation of talents, improve incentive mechanism,adjust dynamics, adaptability and implementation of regime.

Secondly, small size companies has an significantly different effect on their OP with large size companies. IC works much better on improving the OP in small size enterprises . The reason for this phenomenon may depends. However, at least two kinds of effect can offer explanation for it. The first one is the scale effect that large size corporation has which may slow down their investigation on IC while for small size company, IC, in most of time, is the only path for their rapid growth. Design of experiment can also account for some part of the proposition.Large size companies' long term operation can form a great deal of tacit knowledge and principals which might affect without being caculated in IC.

Also, we roughly prove that in different business cycle, there exists discrepancy on IC's influences. The relationship "After 2008" is much more stronger than "before 2008". Basically The Result comes from two kinds of effect: eliminative effect and strengthening effect. The former helps to weed out the IC-lack enterprises while the latter promote the survivors' investment on IC.

Comparing with multi-dimension structure, we find IC could better predict the performance of companies in the situation of dual dimension. The point is dualism structure often ignore the effect of factors which produce indirect influence through but not in accordance with human capital and structure capital. Therefore, the tactic may lead to underestimate of IC's absolute value, thus exaggerate the final effect.

Finally, different from some empirical literature. The regression shows, industries' moderating effect is not as large as we think it should be. We believe the phenomenon is caused by both objective and subjective reason. To simplify the model, we roughly divide the whole into high-tech industry and low-tech industry. It might weaken the differentiating effect industry has. However if we take step further, the unavailability also convey to us an meaningful result which can probably be another reason: some industries which we traditionally treated as low-tech are gradually integrating some elements that originally owned by high-tech industries. Strategies like innovation of business model, professional refinement have also been taken by those so-called low-tech industries.

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The Exploration into the Safety Education and Management of College Students Based on “Students’ Organization”

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Abstract: Nowadays, with the rapid development of higher education, all kinds of new situation, new changes and new contradiction continually arising, the safety education and management of college students are facing new challenges. This article analyses the problems on the safety education and management of college students via reviewing the situation of it under new period. Then make an initial exploration on how to enhance it from the perspective of “Students Organization”.

Key words: Students’ Organization; Safety; Management

1 Introduction

In the new period, with the rapid development of economic society, the continuous deepening of the reform of higher education, the gradually extending of universities, and the constantly strengthens of students’ subject consciousness, as well as the value diversification, the safety education and management of college students are facing many new problems and challenges. For safety education and management of college students, many scholars put forward several solutions and methods from different perspectives, but most of them have neglected the importance of ‘students’ organization “-- the right-hand, in different degrees. Therefore we propose new ideas of college students’ safety education and management in new period from the perspective of “students’ organization”.

2 The Status and the Problems in Safety Education and Management of College Students

At present, although the universities have had a profound understanding of the new security situations, the new safety issues, as well as a variety of new factors that affect safety, and many efforts on the human and material resources have been invested, including safety awareness and safety education guidance. Yet, universities worksite accidents occur frequently, students are still lack of safety awareness, safety education is still far from satisfactory. Some scholars attributed the reason to the unclear content, invalid method and imperfect education system, and that the theory of safety education has been divorced from practice^[1-2]. we believe that the fundamental factor lies in students’ insufficient recognition, also that the students’ self consciousness has not been fully stimulated.

During the traditional process of safety education, as a manager, universities lack a broad understanding of the characteristic and the psychological demands of the management objects. Students have long been regarded as the object of the education management, they have to obey the rules negatively and passively. While the students in new period, most of who are after 90th, they are unusual, and sensitive to new things and new knowledge, and they have high intellectual curiosity^[3]. Therefore, in the education and management, conflicts and contradiction will inevitably happen between students and universities. For some of the university regulations, students are forced to obey at first, gradually becoming to ignore them, and finally turn into a negative confrontation, as a result of that, their self-consciousness are hard to inspired. According to the principle of internal and external cause of Marxism, the external cause must work through internal cause which is the students’ self-consciousness. Not until college students’ subject consciousness is awakened, the safety education and management are difficult to achieve its desired effects.

Currently, the university’s safety education and management team is relatively simple, and most of the universities mainly rely on school security guards and student staff, while few students involved in it. As a result, the weak power of the safety management is difficult to deal with the new challenges in the new period. If we lack communication and link during the management, universities can’t accurately master the safety situations of student group in dynamic, which result in low management efficiency.

3 The Position of Students’ Organizations

As the basis of building a harmonious university campus, students’ organization is the main

environment for college students' living and studying, which is built according to the relevant education regulations and the requirement of the education management, or established spontaneously by students' actual needs. Students' organization is a mass group with certain organization and management capabilities^[4]. Visibly, students' organization is the nature of mass organizations, with the flexibility, autonomy and other characteristics, it also has the function of self-education, self-management as well as supporting school education.

The scoping for students' organizations is different in broad and narrow senses. Broadly, it is composed by student party, mission organization, student union and graduate students council, also includes the class committee and student associations. In a narrow sense, it refers to the student union and student associations^[5]. What referred to in the article is the broad sense.

4 The Function of Students' Organizations in Safety Education and Management of College Students

College students' organization as a student mass group under the leadership of the Party, aims at achieving students' self-education, self-management and self-service. College students' organization is the backbone of strengthening and improving the students' ideological and political education as well as the right-hand of the management team in universities. Even more important, College students' organization as a bridge between universities and students, plays a crucial role in the student work, also, in the college students' safety education and management.

4.1 Education and guidance

Students' organization as a subsystem in the higher education system, its core goal is to achieve education function.

The first function is to educate the members. Students' organization as a mass organization, not only its members can accept the concepts, the culture, the atmosphere and other aspects of the organization, but also function properly like wind into the heart via the interaction between the members.

Secondly, as a student practice site, the students' organization is the main carrier of cultivating the correct security concept. By the safety education activities, the connection of theory and practice can be achieved to a large extent, which helps students to digest safety knowledge via extracurricular exercise, thereby enhancing their safety consciousness and security capabilities.

In addition, the organization is composed of student representatives who are with advanced natures. They can play an exemplary role in helping students improve their consciousness in carrying out the universities' safety management regulations and measures, and helping them strengthen their safety awareness.

4.2 Communication and coordination

On the one hand, students' organizations act as the messengers to bridge the universities and students. They protect the interests of the school and promotes school's development. Meanwhile, they play important role in representing and safeguarding the students' interest, stabilizing the campus security, and ensuring student's benefits. They come from students, go round to the students, they can collect information immediately and accurately and reflect to the executives how the students thought. In this way, activities about safety education would be conducted more closely, pertinently and effectively.

On the other hand, students' organizations are the friends of the students. They are able to collect and sort out the responses and needs of the students, discover potential threats timely, benefit for the efficient conduction of all kinds of activities, the reinforcement of the security alarm efficiency, the protection of students' interests, and the stabilization of the security in universities.

4.3 Auxiliary management

In recent years, with the rapid development of higher education, university enrollment has been sharply raised, college students become more and more. As a result, it is difficult to achieve an all-round, high-efficient and overall management by the limited human resources of universities. Therefore, in the new period, safety education and management have to be carried out with the help of satisfactory assistance of students' organizations. On the one hand, they can help executives deal with daily chores and ensure universities safety education and management work steadily; additionally, according to students' quality development mechanism theory, universities actively absorb students' organizations involving in the management activities can turn negative factors into positive ones, and form the resultant of forces, thus achieve an benign interaction between schools and students, so as to promote

efficiency of safety education and management.

5 Safety Education and Management of College Students Based on Students' Organizations

Students' organizations involved in safety education and management is an important entry point of university governance and democracy in harmony. College students' organizations play long-term role in the maintenance of stability, it needs to proceed from the following aspects :Ideological foundation level - first, the students' organization must build core values to lay the ideological foundation ;Angle design level - the students' organization play the role of Party branch, league branch, the student union, and other organizations at the same time. They give full play to the advantages of their organizations, to strengthen the students' main part role, through different organization forms, the students can improve their own quality duiring the participation; Behavior level-Sundry students' organization should encourage students to participate in a characteristic behavior patterns, and stimulate students' interest and potential of self-management and self-education.

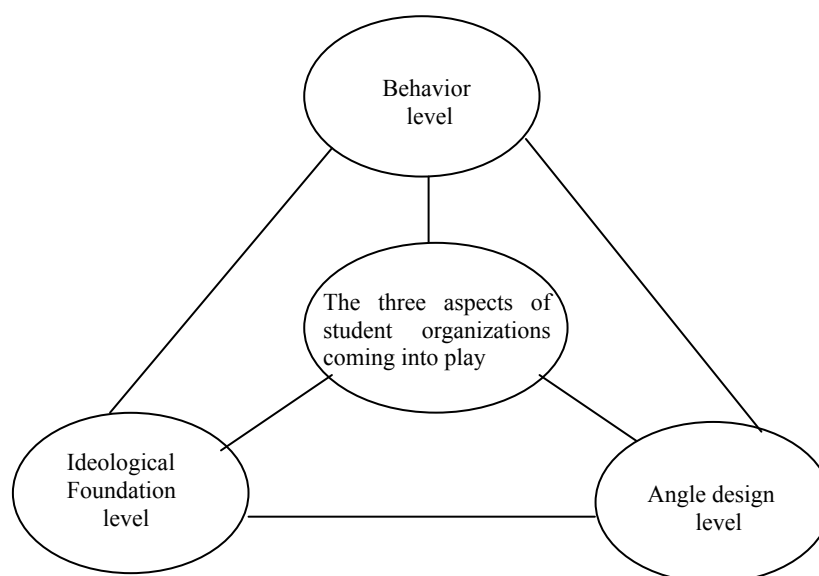


Figure 1 The Several Aspects of Students' Organizations Playing A Role in the College Students' Safety Education and Management

5.1 Raise awareness, enhance the dominant position of students' organizations

The crux of the campus safety and culture construction lies in the positive school-to-student interaction, which can be used to build up an interactive platform with students' organizations, so as to realize the maximization of management benefits^[6]. In this regard, university executives must recognize the significance of students' behavioral expression and the information transmission of students' organizations. Currently, student union and associations, which now are the most universal carriers of students' participation in school management, need to be consolidated. In addition, universities should build and expand new students' organizations, and guarantee the material provision and financial support for their activities.

University executives are required to recognize the significance of students' participation in management, and give students the executive right, provide more opportunities on the platform of school's website and BBS, to motivate the students to participate and truly promote the dominant position of students' organizations in the safety management.

5.2 Strengthen guidance, let students' organizations play a dominant feature

Students' organization, as a mass organization,, which core and key is students backbone, who act as the bond connecting universities safety department with students. For these students, their ideological quality and working ability directly influent the image and function of the organization. However, in the new period, due to the impact of multiple cultural trend of thoughts, many students' values and outlook on life have become increasingly complicated, and so it is the same with students in charge. Problems

like a lack of security sense, little passion for work and emergence of bureaucracy have appeared. Hence, when students' organizations are endowed with justifiable and appropriate autonomy, schools should allocate professional teachers to them for proper instruction and management, and truly implement "to leave alone with trust, but not to let go unchecked". Under the circumstance of staying in the right general orientation, the school should encourage students to be innovative, hold all-round, multi-angle and three-dimensional activities of safety education and make full use of the college students' leading position in safety education and management.

5.3 Improve the management system, strengthen self-construction of students' organizations

When drawing great attention of the university executives, students' organizations should focus more on their own development and improvement of the systems, so as to guarantee their efficient and harmonious development. On the one hand, they should perfect the system of safety education and management, such as provide regular trainings on safety knowledge, keep reinforce members' safety awareness and promote their sense of responsibility and mission, in order to act as a model for students.

On the other hand, information communicative system must be built. Students' organization, should take an initiative in investigating and collecting students' ideas and suggestions for the universities security, reporting nearby potential safety hazards in time, calling together student representatives to attend regular conferences, they should fully fulfill their responsibility and obligation by proactively reflecting problems to the relative departments in safety education and management and offering advice.

6 Conclusions

In short, college students' organizations for college students is a reliable platform for self-management, self-education, self-service, they are important and effective ways for the school safety education and management of work. Students' participation embodies the democracy of education and management, and provides opportunities for students to taste the significance of safety management in practice, and further reinforce the safety awareness and practical skills, which is paramount for promoting college students' comprehensive quality and building a harmonious university campus.

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Imitation & Innovation in Emerging Countries: A Conceptual Framework for Analysis

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Abstract: The ultimate aims of our research are to i) offer a technical description of imitation behavior, ii) modelize imitation with other related factors to present an overall model where all important factors can be measurable, and iii) utilize the model to measure the impacts of imitation. Therefore, understanding the concept of imitation and other related concepts in order to properly characterize these concepts, and then building a conceptual model are the first steps toward achieving this aim. This paper will focus on i) the review of the literature on imitation and its limitation, ii) the understanding of the relationship between imitation and other related concepts, and iii) the resultant suggestions on a conceptual framework for analysis.

Keyword: Imitation; Innovation; Copycat; Technology Transfer

1 Introduction

Innovation is without doubt an influential factor that is crucial to enterprise survival and growth. It contributes an authoritative power of monopoly that generates profits until competitors show up. Having said that, however, in fact, nearly 98% of the value of innovation goes to imitators instead of innovators (Shenkar 2010).

Imitation in this paper refers to the intentional copying of the innovator (or pioneer, market leader)'s existing technology, design or function as well as the pioneer's organizational practices, business models or other strategies. Illegal forms of imitation, such as piracy and counterfeiting are not part of our paper.

If one takes a look at the leading player in many sectors, one will be surprised to find that the leading player is not the pioneer but the able and creative imitator. Visa, Master Card, and American Express copied what Diners Club once pioneered in credit card business. After a long period of creative imitation through global partnerships, China's Huawei is today the largest telecommunications equipment, and Brazil's Embraer is the third largest global aircraft company. The majority of today's giants have grown up from creative imitators.

Moreover, in developing countries, most economic development in the catching up processes started with imitative innovation. In emerging countries, imitative innovation is a topic of great practical and policy interest.

From legal perspective, imitation itself does not necessarily imply a negative behavior or illegal infringement. There are legal as well as illegal imitation. Japan and Korea obtained their rapid industrialization through inspiring many European and America enterprises' advanced technologies and business practices. All of these innovative imitations thus do not necessarily involve illegal patent infringements or counterfeits. In Korea, the majority of large local pharmaceutical and cosmetic companies have evolved from small firms. They first started as business traders importing drugs, then gradually participating in pharmaceutical manufacturing process through imitating from the simplest steps like packing the finished drugs, next importing chemical materials to produce drugs, and finally manufacturing the pharmaceutical materials. Their growth in size, technological skills and capabilities has been expanded through their imitation process. Their imitation strategy has changed and is thus optimized to their internal condition and external environment over time.

Despite the fact that imitators often overshadow innovators, imitation is unjustly neglected in the academic literature. It receives inadequate attention on most economics and business studies.

It might be because that we have been educated from a young age to consider imitation "undignified and objectionable" (Shenkar 2010). In companies, the word "imitation" has been treated as a taboo by both executives and employees. Consequently, imitation is not an available option for enterprise strategy or it is conducted tacitly in the dark without properly strategic management.

Furthermore, even if enterprises embrace imitation and treat it as important as innovation, it is not easy to make it successful. The imitation strategy tends to backfire, for instance, when imitators are attracted to the observable elements of an innovation and fail to learn and copy what makes it successful.

In addition, in many cases, what worked with the innovators may not work with the imitators. On top of that, imitation itself does cost a lot of money, time and efforts. To successfully compete with the innovators, understanding the “true” imitation and being able to develop capabilities to conduct imitation strategies are crucial to imitators.

In order to understand the mechanism of imitation, this paper focuses on building a conceptual framework for analyzing imitation. Our conceptual framework is primarily concerned with five questions.

Firstly, how should we categorize and classify the different aspects of imitation? This part will introduce some of the key concepts used in defining, categorizing and classifying imitation. It also gives a broad overview of similarities and differences between imitation and innovation, learning and knowledge accumulation, and technology transfer.

Secondly, how does an imitation look like in an imitation game? We will examine some findings in the literature regarding imitation strategy as well as the strategic players.

Thirdly, how do customers react to imitation? This part examines consumer response to imitation. A proper understanding of how customers react to imitation requires us to understand a broader range of theories of consumption. We then draw out the connections between these theories of consumption and the evolution of imitation into innovation.

Fourthly, which is the optimal choice for a company, choosing between two strategies, that is, engages in R&D or abstains from own R&D and imitate the outcomes of innovators? We discuss the relationship between imitation, innovation and intellectual property protection. The basic premise is that imitation is not only as critical as innovation to business but also is vital to the effective development of innovation itself.

Fifthly, what effects does imitation have on the economy as a whole? This can be analyzed at various levels. We look at the implications of imitation in the economic growth of emerging countries as well as examine the inter-relationship between imitation, competitiveness and market structure. We also take a brief look at the role of imitation supporting a sustainable economy. This part reveals the two sides of imitation. It can sometimes be a threat to sustainability but can also - perhaps unexpectedly - help to achieve sustainability.

2 Review of Literature

2.1 Definition of imitation

Imitation is the intentional copying of the innovator (or pioneer, market leader)'s existing technology, design or function as well as the pioneer's organizational practices, business models or other strategies. Imitation is thus an imitator's optimal strategy that is a resultant dynamic equilibrium satisfying firm internal condition, market external environment, and customer demand.

2.2 Different forms of imitation

(1) From the perspective of innovativeness:

- Technological imitation: There are two distinct levels of imitations according to how the imitated products or services are different from the originals.

- ◇ Pure imitations (also duplicative imitations): legal copies of the original product. Most of them are third party' products like lithium batteries for a Nikon camera or numerous YouTube-like websites where users can upload, watch, and share video clips.

- ◇ Innovative imitations (also creative imitations): various kinds of modifications (or improvements) from the originals by designing differently, adding new functions, improving product performance, using different manufacturing processes and changing materials. Microsoft Excel is an innovative imitation over its pioneering product Lotus 123. Innovative imitations can be realized through several ways, for instance, reverse engineering, patent purchase, outsourcing (purchasing from open market), joint product development and imitation with adjustment for the local needs.

- Organizational imitation: Organizational imitation consciously replicate organizational procedures, business models or strategies. It can be also categorized into pure or innovative level like technological imitation.

(2) From the perspective of strategicness:

- ◇ Exploitative imitation (from an imitator): the imitator provides an imitation with more improvements or at a more competitive price. It happens when market barrier is low or is hard to establish. For example, take a look at digital camera that was first commercially marketed by Fuji Camera and now has been continuously improved by many other makers.

◇ Incompatible imitation (from an imitator): the imitator's counter-strategy against the innovation by introducing similar product but incompatible with the existing originals, for instance, an incompatible imitation of Apple iPad is Samsung Nexus. This strategy is particularly adopted when there is the existence of network effects, and thus tends to lead to a war of de facto standard.

◇ Proliferative imitation (from an innovator): instead of offering one product, the firm imitates its own originals and provides a lineup of various imitations with slightly different characters and prices. The firm benefits from the price discrimination. It is also a preemptive defense against any possible market entrance by curtailing competitor's opportunity and profitability.

◇ Open imitation (from an innovator): one partner agrees to let the other partner use, for example, a particular technology that was strategically selected under specified conditions.

2.3 Relationship between Imitation and Innovation and Intellectual Property Protection

In the economic literature on innovation, there are two contradictory results regarding the relationship between innovation and imitation. One starting with the works of Schumpeter (Schumpeter 1934, Schumpeter 1942) argues that imitation deters innovation as it discourages efforts of innovators in creative innovation. As a result, imitation has negative impacts on innovation, and strong protection of intellectual property is the prerequisite to promote innovative activities in R&D (Arora and Gambardella 1994; Gallini and Scotchmer 2002; Gans and Stern 2003; Gan et al. 2008). On the other hand, other studies (Aghion et al. 2001; Bessen and Maskin 2009; Zhou 2009) show that the pressure of being imitated stimulates the incumbents' innovative endeavors. Therefore, intellectual property protection can hinder rather encourage the innovative activities.

Regarding the protection of intellectual property, there are two approaches. One is the *formal* method having intellectual property to acquire some kinds of official acknowledgement, for example, patents, registration of design, trademarks, and copyrights. Making the IP public, however, also induces the competitors to imitate, particularly in countries where the IP law enforcement is still weak. The other approach is *informal* but strategic, that is, i) wise use of lead-time, ii) ensuring product/process/design complexity, iii) confidentiality agreements, and iv) other strategies for secrecy. Literature has shown that the informal strategic approach offers much better protection effectiveness for the IP regardless of firm size (with exceptions found in chemical and pharmaceutical industries).

2.4 Innovative Imitation, Incremental Innovation, Technology Transfer

Innovation expresses a strong implication of invention – the process that the firm involves the development of a radically new product. There are two types of innovations according to the impact of the innovation on the competencies of established incumbents: incremental innovation and radical innovations.

Incremental innovation implies the improvements that are made steadily to a product or process without changing the fundamental characteristics of that product or process. Established incumbents are able to respond effectively to these incremental innovations from competitors.

Radical innovation refers to the fundamental improvements that transform the product features. It seriously threatens the market power of established incumbents and deteriorates their competencies. Established incumbents find it hard to respond to these radical innovations. Incremental innovation occurs steadily along a product life while radical innovation happens very occasionally, but it is disruptive to the incumbent products, for instance, CD-R disks that displaced the 2.5-inch floppy disks as a storage media in personal computers.

In general, innovative imitation is not the same as incremental innovation. Innovative imitation is a superset of incremental innovation. Innovative imitation encompasses not only improvements made to the originals, but also innovative degenerations, for example, that may abate the originals' functionality but reduce the product price. The innovative degeneration does not contribute any technological improvements, but by, for example, wisely adjusting the production process or using inferior materials, the imitator can offer a downgrade but useful product at a much cheaper price. Without a clear distinction between the two concepts, many may barely tell innovative imitation from incremental innovation. This ambiguity may give a wrong impression that the study of incremental innovation covers the other and thus makes the study of innovative imitation look less important. In this paper, we suggest two new definitions: *inferior* imitation and *superior* imitation. The latter is incremental innovation itself while the former refers to the innovative degenerations.

Technology transfer is a deliberate activity of a technology patent holder to transfer technological knowledge to an imitator. It is considered to be beneficial to both sides as imitators can gain new technology or update their existing technological base while technology patent holders can earn license fee or exploit the advantages of the imitators. For instance, using the natural and human resources of

imitators, expanding the patent holder's market or forming a favorable technology standard. From an imitator's view, it is a technological imitation with the support from the innovator.

Technology transfer occurs in the manufacturing sector, whereas in the service sector, there is a similar imitation form that is called "franchise".

2.5 Players in an imitation game and their strategic action

According to Schnaars (Schnaars 1994), "the concept of imitation is related to, but distinct from, the concept of later market entry". Therefore, an innovator may not be a pioneer, but a later entrant. Likewise, an imitator may beat the innovator to be a pioneer in the market instead of being a later entrant. Schnaars adds the "time" factor that is the timing of entering the market into the imitation game between innovator and imitator.

Shenkar (Shenkar 2010) expands this thinking by integrating the "space" factor into the game. It results in three strategic types of imitators: "the *pioneer importer*, an imitator which is the pioneer in another place (another country, industry, or product market); the *fast second*, which is a rapid mover arriving quickly after an innovator or pioneer; and the *come from behind*, a late entrant who typically relies on pronounced differentiating factors." (Shenkar 2010).

Additionally, in most markets, we can identify a core of firms that are persistent innovators or persistent imitators while other firms are either occasional innovators or imitators.

2.6 Imitation Strategy

It is generally accepted that a successful imitation strategy is contingent on various internal capabilities. Previous literature (Luo, Sun and Wang 2011; Yoon 1998; Cohen and Levinthal 1989, Cuervo-Cazura and Genc 2008, Lieberman and Asaba, 2006) indicates five capabilities as follows:

- ✧ Combinative capability: skillfully combine and integrate the imitator's own resources with outside technologies.

- ✧ Absorptive capability: speedily evaluate, learn, apply and enhance new knowledge.

- ✧ Networking capability: foster reliable formal and informal network.

- ✧ Hardship-surviving capability: a combination of entrepreneurship with persistence and flexibility to overcome economic, political and institutional uncertainty.

- ✧ Intelligence capability: ability to detect, collect, and evaluate information regarding imitation-relevant PEST, market and industry intelligence.

The ultimate goal of these capabilities is to acquire and enhance three competitive advantages:

- ✧ Cost advantage: to deliver suitable technology at a low cost.

- ✧ Speed advantage: fast imitation is the key to succeed when confronting the innovators and other competitive imitators.

- ✧ Channel advantage: standalone imitators will never succeed with any imitation strategy.

Regarding the relationship between imitation and market competition, the literature on innovation shows an ambiguous result. To grasp the overall relationship between three factors: imitation – innovation – market competition, the reasons are sequenced as follows:

Firstly, market competition means market pressure that is inversely proportional to the degree of market concentration. Market competition can also be measured by the degree of product differentiation, that is, an increase in the homogeneity of products (i.e. lower degree of product differentiation) implies that market competition is more intensive.

Secondly, the effect of market competition on incentives for innovation is inconclusive. There are three conflicting results. One is that market pressure fosters innovation as a decrease in market concentration spoils the innovative spirits (Dasgupta and Stiglitz 1980; Geroski 1990; Blundell et al. 1999). On the other hand, several researchers argue that more intensive market competition discourages incentives for innovation, as innovative advantages are temporary (Arrow 1962; Futia 1980; Gilbert and Newbery 1982; Reinganum 1983; Zhou 2009). Therefore, market concentration vitalizes firms' innovation as monopoly power of larger firms proved a major accelerator of technological progress (Henderson and Cockburn 1996; Cefis 2003). These controversial arguments gave a support that the relationship between market competition and innovation may not be monotonic. For instance, Aghion et al. (2005) shows that the relationship is an inverted-U shape. At low and high level of market competition, the incentive for innovation is low, whereas firms will increase efforts in innovation when they are in a medium level of competition. Again to make the issue more complicated, Boone (2000) indicates that the innovative efforts depend on not only the market competition but also the innovative capability of the firms: less efficient firms tend to increase innovative activities when competition is weak. Conversely, firms that are more efficient will boost their investment in R&D when competition becomes more intensive.

Finally, as mentioned in the previous part, there are contradictory results regarding the bi-directional relationship between imitation and innovation: it can be positive or negative. Moreover, Braguinsky et al. (2007) reveals that the relationship between imitation and innovation is also contingent on other factors like the maturity of the industry itself or the characteristics of the market. When the industry is still in its early stage and small, innovators as well as incumbents do not have incentives to prevent imitation. However, as the industry keeps growing, imitation will deteriorate innovative effort.

As a result, further work needs to be done to understand the complex interrelationship between market competition and imitation.

3 Conventional Methodologies for Analyzing Imitation and Their Limitations

Recently, there have been an increasing number of studies on imitation. According to their analysis approach, the majority can be categorized into two types:

(1) Business management approach: It often uses survey data to conduct empirical analysis (Lee and Zhou 2012; Luo, Sun and Wang 2011; Zhou 2006). A distinctive tendency of this kind of study is the research context originates in China. Foreign investment has poured into China to seize the huge opportunities in this fast-growing market. The influx of foreign firms brings new technologies as well as creates competition in China market. Consequently, firms in China have to rely on innovation orientations to survive the competition. The initial and realistic step of many firms is to imitate the innovators. This phenomenon provides rich material for studying imitation.

This approach without doubt offers several very useful and applicable results. However, due to the nature of latent analysis, there is still considerable ambiguity with regard to the design of the survey which is the foundation of the analysis. The empirical analysis was built on previous qualitative research of Schnaars (1994) in which three questions are set up to measure pure imitation, similarly another three questions to measure creative imitation. As discussed above, not only imitation type but also the types of imitators as well as the characteristics of the industry should be included in the survey. Moreover, this survey method also suffers from uncertainty that with only three answers from an imitator, is it possible that one can identify and measure pure imitation or creative imitation?

(2) Economics approach: This approach is developed from two distinct perspectives: Macroeconomics (the North-South model of growth and trade) and Microeconomics (the Two-stage Cournot model).

Theoretical results are beautifully constructed and very instructive. Nevertheless, because of the characteristics of the models, the main limitation is that the analysis cannot be conducted with empirical data.

4 Discussion toward A Conceptual Framework to Analyze Imitation

This part will be quite short, but that does not imply its content is unimportant. Rather it is because parts of discussion have been mentioned earlier in the previous parts. Issues that are related to the characterization of possible variables and parameters will be discussed as follows.

Firstly, the literature on imitation would seem to omit an important factor, that is, *consumers*. Products, either imitations or innovations, eventually will be evaluated by customers. The response of customers will decisively determine the success of that imitation. In general, the response may be active or passive with regard to an imitation. It is not clear about the effects of consumer types on imitated products. It may vary over the consumer segmentations (or customer attributes), place of living, or product life cycle. Additionally, the aggregate demand, network effects or sunk costs are also important factors. Moreover, in theory, there are several types of consumers such as Douglas, Veblen, Marshall, and Galbraith consumers, or utility-based economic consumers.

Secondly, the behavior of imitation would seem to be a process of absorbing and applying new knowledge originated by an innovator. As for the imitator, the knowledge that he imitates is the subset of the knowledge of the innovator. However, it may be either completely new to the imitator (i.e. it has the empty intersection with the imitator's own resource), or partly overlapped. As mentioned earlier, one of the distinct differences between imitators and innovators is that while the innovator tends to enhance its technology by their own and keep it secret from others, the imitator exploits its network (or channels) to learn and apply the technology. It implies that i) the knowledge once the imitator obtained will be more versatile, and ii) the existence of spillover effects over its network. It is a hint for an imitator to succeed in its imitation strategy as well as for a counter-strategy of an innovator.

In sum, an ideal model for imitation analysis is proposed to take the following aspects into

consideration:

- ✧ Types of imitation
- ✧ Types of imitators
- ✧ Types of consumers and their response to imitation
- ✧ Characteristics of the innovator
- ✧ Characteristics of the industry include but not limited to: market competition (or market concentration, or product differentiation), the industry maturity, innovation diffusion degree, intellectual property protection, and networkability.

- ✧ Capabilities required for an imitation strategy

Hence, analysis results will include an imitator's optimal strategy that is a resultant dynamic equilibrium satisfying firm internal condition, market external environment, and customer demand.

5 Conclusion

This paper conducted a review of the literature on imitation and the relationship between imitation and other related concepts. We also explained some limitations in the literature. Our study provided some suggestions on a conceptual framework for analysis. However, our work clearly has its own limitations. The current study was limited to offering academic suggestions. Despite this, we believe this study has gone some way towards enhancing our understanding of imitation. Future work will focus on i) offering a technical description of imitation behavior, ii) modeling imitation with other related factors to present an overall model where all important factors can be measurable, and iii) utilizing the model to measure the impacts of imitation.

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Research on Inner Circulation Mechanism of Security Housing

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Abstract: Housing is basic human rights and claims for survival and development. Housing issues, particularly low-income housing security issue has been highly concerned by governments around the world. As to the presence of problems like imbalance between supply and demand and exit difficulty, this paper proposed a new housing security mode that suggests supply subsidy changing to demand subsidy for security housing and rent and sell combined pattern changing to mainly rent pattern, and we analyzed different types of security housing problems in rent subsidy and title transfer of property, and ultimately established an inner circulation mechanism for security housing in China and achieved sustainable operation of security housing sequentially.

Key words: Security housing; Inner circulation; Operating mechanism

1 Introduction

Housing plays an important role in the process of industrialization and urbanization, and it has become a consuming hot spot in the upgrade process of demand in urban consumption. The essence of housing security problem is the contradiction between affordability of urban low-income households and housing price with suitable housing standards. Countries worldwide have developed a diverse housing security system according to their own national conditions to ease the housing contradiction between low-income families and maintain social stability. Housing security has gradually become an important part in social security system.

In recent years, the Chinese government continued to increase security housing investment and expand the scale of construction of security housing, but as more and more migrants and newly workers are brought into the housing security system, and the practical application of the exiting mechanism for security housing faces many difficulties, there is still a giant gap between the supply and the demand of China's security housing. In the face of the serious imbalance between supply and demand in security housing in our country, this paper starts from the change in the pattern of housing security, presents the recycling and dynamic flow for existing security housing, and builds inner circulation mechanism for security housing.

Currently, scholars have proceed many useful explorations in housing security pattern and sustainable operation of security housing, and most of them focus on improving utilization efficiency of security housing resource and improving the exit mechanism and so on. American scholar Arthur O'Sullivan (2007) advocated the adoption of cash subsidies in lieu of direct housing subsidies, and thus to improve the utilization efficiency of housing guarantee fund^[1]. According to the development process of U.S. housing security system, Olsen Edgar' O (2001), summarized the housing security system in four basic forms, and his research data shows that direct subsidy based on leasing is the most cost efficient housing security^[2]. Cao Xing (2006) advocated that the government should increase the weight in exit mechanism and circulation mechanism of security housing^[3].

2 Necessary Conditions for the Operating of Inner Circulation of Security Housing

2.1 Subsidy pattern transfers to demand subsidy

Security housing subsidy is an effective measure of regulation and intervention for government in the housing market, and can be summed up into two types, one is that the government directly intervenes housing supply and inputs financial subsidies to producers, which is called supply subsidies or "bricks and mortar subsidies"; another one mainly refers to that the government provides financial subsidies to the housing demanders in the form of cash or direct tax relief, which is called the demand subsidy or "poll subsidy"^[4].

Overall, despite that the two kinds of subsidies often co-exist in the actual operation, most countries in the world that implementing housing security policies have experienced or are experiencing the transition from demand subsidy to supply subsidy, for the demand subsidy have his incomparable advantage. Firstly, the demand subsidy achieved an organic combination of market resources allocation

and market regulation mechanism, which avoided direct intervention in the housing market. Secondly, housing subsidies directly reaches to housing needed families, which reduced the risk of the real estate developers might take the subsidy funds and reduced the regulation difficulty and cost of the government. Finally, it is conducive to the formation of withdrawal mechanism. The government can make changes in the amount of subsidies or even eliminate the subsidies to encourage residents to buy their own house when the resident income changes, which would simplify the exit mechanism and reduce management cost.

It can be seen that demand subsidies are more efficient security housing subsidies, and it will play a positive role in promoting the development of urban real estate. However, throughout the whole evolution history of housing security system in major western countries, the government often participates in housing construction directly in the period of serious housing shortage in order to ease the housing shortage pressure in a short term; and when housing supply and demand become more reasonable, the government generally adopts a currency subsidy way to meet the housing needs of low-income families. Concerning the current housing situation, China's housing subsidies should not abandon supply subsidies and change into demand subsidies totally or blindly, rather than determine ways of housing security subsidies by stages and local conditions according to housing development, and gradually transfer to the demand subsidies pattern.

2.2 Supply pattern transfer to rent

At the beginning of implement of China's security housing, it was artificially divided into low-rent housing and affordable housing, and low-rent housing is only for rent and not for sell. While affordable housing the opposite, and there are still public rental housing and price limited housing. In general, China's security housing has combined rent and sell, and different security patterns works relatively independently.

The way of being mainly for sale of affordable housing supply is consistent with the orientation of corporate development strategy of financial oriented affordable housing developers, however, the rigid way of only sell is incompatible with the dynamic changes of secured groups, often accompanied by the withdrawal mechanism, the complex of title transfer and ill-defined value-added benefits and other issues, is not conducive to the circulation of affordable housing and recycling of support housing resources, resulting in the loss of security housing benefits.

By contrast, the rent-mainly way of security housing supply has its unique advantages. First of all, it can effectively avoid the housing security resources been purchased or use by non-security households, it can alleviate the supply and demand of security housing, and reduce the government's financial burden on housing security. Secondly, excluding part of the purchasers those who regard the security housing as an investment, the filtering effect produced by non property transfer filtered out the families with no need for security housing automatically. Finally, it is facilitate for the government conduct dynamic management to those secured families and ensure their in-time withdrawal. Once the lease tenants do not meet the security conditions, as a property owner, regulatory agencies can force households to move out of the security house to protect the formation of exit mechanism according to compelling force of laws and regulations.

An overall consideration of the pros and cons of mainly rent supplying pattern of the security housing, distribution pattern of China's security housing should be combined with rent and sell and most rent to meet the dynamic needs of housing security groups. With the transfer of property rights of early-sold affordable housing and the improvement of our housing security pattern, we can gradually reduce the proportion of affordable housing for sale, achieve a unified operational mechanism of all kinds of security housing, and thus reduce the management difficulties of security housing.

3 Build Inner Circulation Mechanism for Security Housing

Compared with developing new security housing to solve the supply problem of China's security housing, the recycling and dynamic flow of existing security housing and build inner circulation mechanism for security housing may be the key point to solve the problem at all. Inner circulation mechanism for security housing is a closed circulation of affordable housing in the secured groups, the link between the exit of families beyond protection and access of families newly need for housing, from the regime perspective, affordable housing is always used to solve housing problems of low-income families, the welfare nature of security housing remain unchanged in order to achieve sustainable operation of security housing, as shown in Figure 1. The transition of security housing subsidies and changes in the way of supply are the foundations to build the inner circulation mechanism for security

housing, from application, access, distribution, regulatory to exit are the whole processes of the operating mechanism cycle, in which exit mechanism is the key factor to the formation of the inner circulation.

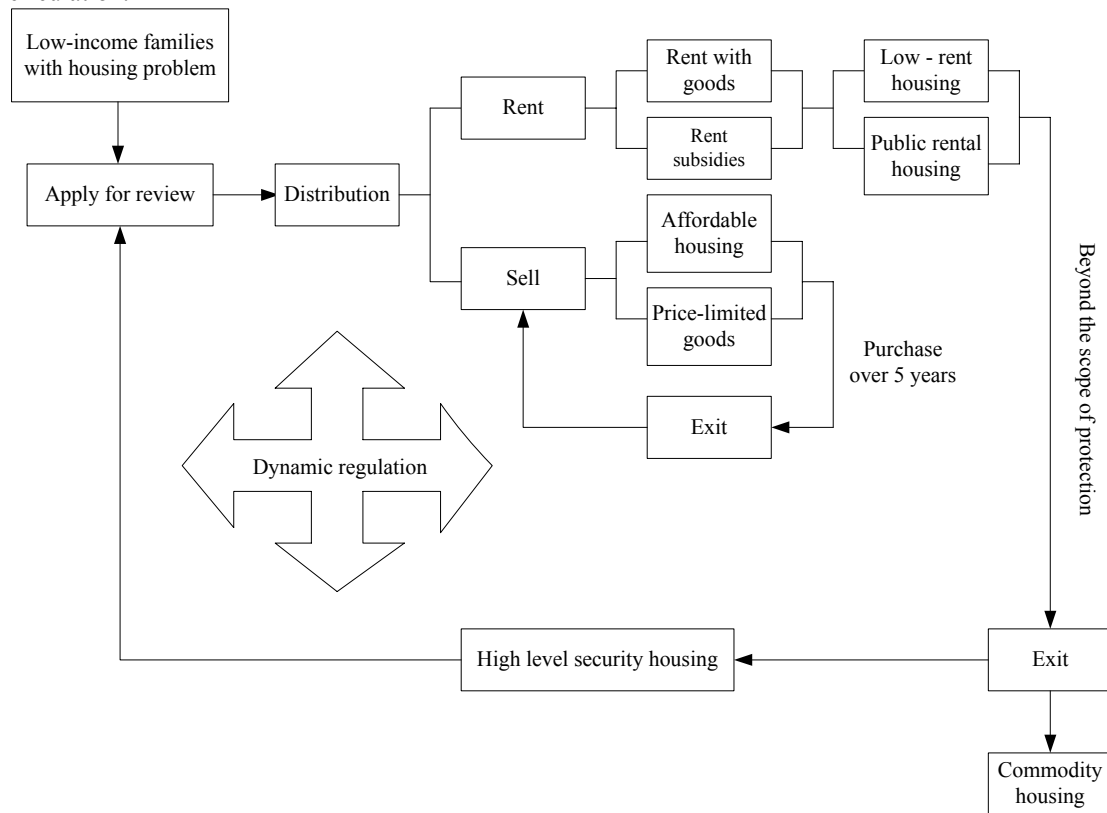


Figure 1 Inner Circulation Mechanism for Security Housing

3.1 Rental subsidies of security housing that mainly for rent

Rent with goods and rental subsidies are two main types of subsidies of security housing in China. As the housing authority’s management and regulations of exit mechanism for security housing are still not perfect, punitive measures are not sufficiently clear and legal mandatory can’t be bring into full play, thus make the security house that rent with goods much difficult to reclaim when it is beyond guarantee period or the living household is beyond the scope of insurance coverage, which takes government a lot of regulatory costs.

Compared with the problems caused by the rent-with-goods style to the exit mechanism of security housing, rent-subsidized security is more favorable to the formation of it, and can make changes in the amount of subsidies when resident income changes; the rental subsidies can be canceled once if the lease contract expires and without re-apply or the family no longer meets the lease conditions after audit, and thus makes rental price of security housing consistent with the market price, thereby encouraging the resident to rent or purchase housing all by themselves and simplify exit mechanism and reduce management costs.

3.2 Property transfer of security housing that mainly for sale

The operation of China’s affordable housing adopted a sales-oriented mode, when the secured families purchase affordable housing, they own part of the property of the affordable housing, and become affordable housing property owners together with the municipal government. When the purchase time of affordable housing reached five years, the buyers can list their affordable housing for sale, and thus exit the housing security system, and it is clear that the exit mechanism is always accompany with the transfer of their property rights for affordable housing, therefore, to solve the property transfer problem of the affordable housing is conducive to the withdrawal mechanism for affordable housing and sustainable use of housing resources.

After a period of more than five years, the owners of China's existing affordable housing can hand in the land revenue and other related costs in accordance with the proportion of the Municipal

Government, thus obtaining full ownership of the affordable housing, they can trade their houses freely in the secondary market with market prices, and purchasers are not restrict to the access qualifications, resulting in affordable housing resources possessed by groups that outside the scope of housing security. Although the assignment of affordable housing property made families that no longer meets the eligibility for protection quit affordable housing successfully, but it did not increase the supply of affordable housing, instead it was accompanied by the loss of affordable housing resources.

To solve the above problems, the exit and title transfer of affordable housing can be implemented with separated operation of general commodity housing, on the one hand, the government can control trade prices of the affordable housing with the implementation of non-market price, which is determined by the welfare nature of affordable housing, on the other hand, the government should carry through strict entry eligibility assessment for affordable housing transaction, only those families which meet the access standards of affordable housing and are in the waiting state for placing have the right to purchase affordable housing. The exit mechanism, on the one hand makes the affordable housing resources circulate in the of objects of housing security, avoiding the waste of protection resources; On the other hand, reducing the funding pressure that the government repurchase the affordable housing, and thus reduces the implementation costs of the exit mechanism for affordable housing.

4 Conclusion

This paper presents the concept of inner circulation mechanism for security housing, through research on subsidies which changes from demand subsidy to mainly rent pattern, as well as different forms of title transfer issues and rental subsidies issues of security housing, we established the inner circulation mechanism for security housing, and strived to achieve recycling use of the housing security resources and sustainable development of security housing. Meanwhile, although the view proposed by this paper is certainly kind of scientific and targeted, but its practical guidance still needs to be strengthened, and further empirical research is still needed to support the application of this idea to policy recommendations and implementation plans.

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Empirical Research on Innovation Path Selection of Express Service Company

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Abstract: It firstly analyzes the necessity of service innovation of delivery enterprise and establishes the overall framework of basic path of innovation about courier service based on the theory of flower of service. Through two metrics of service needs and service costs, we propose three directions about selection of service path, namely basic items, innovative items and future items. Finally an empirical analysis about service innovation of a courier enterprise is presented. The study has important theoretical significance and practical guidance value.

Key words: Courier companies; Service innovation; Path; Theory of flower of service

1 Introduction

As an emerging industry, courier service has receiving more and more attention from people both in and outside the industry. Courier service is a consignment service which is fast in acceptance, transport and delivery of a single package, an addressed mail and other items without store, it can express mail to the recipient or the designated place in promised delivery time and get signed. It is characterized by fast, security, network, service and traceability. Courier service has a positive role in promoting the development of other industries and its correlation effect is significant^[1]. However, with the rising demand of courier services, courier companies have continued to remain at a lower level of service, and even show different degrees of decline. Courier companies must carry out service innovation if they want become bigger and stronger, and finally own the core competitive advantages. How to carry out service innovation, is an important and urgent mission faced by courier companies and even the whole industry.

2 Literature Review

The current academic have done some research on the issue of how to improve service levels of courier companies. Junhua Sun, Qiang Su (2009) established a fuzzy comprehensive evaluation method of courier service, they conducted evaluation and comparative analysis on Chinese express delivery service companies and proposed measures to enhance the level of service. Qing weiYan (2010) researched on quality improvement methods of courier companies from the perspective of the human resource management service. Shuping Wu (2010) proposed methods to improve the service in courier enterprises service based on the theory of service recovery. Tim Lau Don (2011) analyzed the appropriate service quality evaluation of the courier company and its influencing factors, proposed measures for improvement of the service quality. Meihong Zhu (2011) assessed and validated the dimensions, reliability and validity of the SERVQUAL model and provided some countermeasures and suggestions to enhance the level of delivery service with the modified model. Xudong Li (2012) established a courier service value chain model and proposed a long-term level enhance mechanism of courier service based on the optimization of value chain^[2].

Although the existing literature provides some research ideas, most of the literature just studied how to enhance the level of service delivery, and its focus limited to static optimization services, there is little literature focus on the issue of service level and scope of courier enterprises from the perspective of service innovation path. Drawing on the basis of relative research results, this paper proposed a complete set of service innovation path options for courier companies with the service flower model, and finally carried through an empirical analysis.

3 Necessity Analysis on Courier Service Innovation

In recent years, the rapid development of e-commerce drive the development of courier industry with unprecedented speed. The business volume of national wide courier companies totaled 1.86 billion in 2009, an increase of 22.8% year on year, operating income totaled 47.9 billion yuan, an increase of 17.3%; business volume of express delivery companies reached 2.34 billion in 2010, an increase of 25.8%. Business revenue fulfilled 57.46 billion yuan, an increase of 20%^[3]. China has become one of

the fastest growing countries in express industry in the world.

And still, a lot of problems emerged under the rapid development of delivery services, the most prominent one must be the decline in overall industry service level and gradually increase of service complaints. 315 Consumer Complaints Net of China handled a total of 17,536 valid complaints from courier industry in 2009, an increase of up to 70.9%; April 2011, through the "12305" consumer complaint telephone postal services and the national Post website, the State Post Bureau and the Postal Service of provinces (autonomous regions and municipalities) received a total of 5,234 consumer complaints in which involving issues with courier services 4744, accounting for 90.6% of the amount of complaints ^[4]. As can be seen from the above data, it is an important and urgent task for courier companies to take effective measures to improve the service level.

4 Basic Theories of Courier Service Innovation

4.1 Concepts and goals of Service innovation

In a narrow sense, service innovation means service-oriented organizations, aiming to gain greater business and social benefits, should provide their target customers more efficient, more thoughtful, more accurate and more satisfied service pack (which is a range of products and services consisting of the supporting equipments, auxiliary materials, significantly services, and other elements of stealth service). It includes several major forms such as the organizational structure innovation, service delivery methods innovation, service process innovation, and service operating systems innovation. Broadly speaking, service innovation means all types of organizations (or departments) continue to provide intangible services, tangible products or a combination of both, in order to create greater value and effectiveness and enhance customer satisfaction and loyalty .

From the above discussion it is obvious that the essence of service innovation is on the basis of a strong sense of innovation and integrated knowledge system, and careful analysis of the existing services in the goods, services marketing, service system and other conditions, strive to explore the development trend of commodities, services market as well as the potential demand service system modernization process, and constantly develop new services and the creation of goods, services, technology and service measures to improve the quality of service, and satisfy people in material, spiritual and other needs, and to achieve the efficiency unity of economic, social and environmental. Service innovation process is virtually the forming process of enterprises competitiveness by providing low-cost, personalized, high-quality services ^[5].

4.2 Service Flower theory

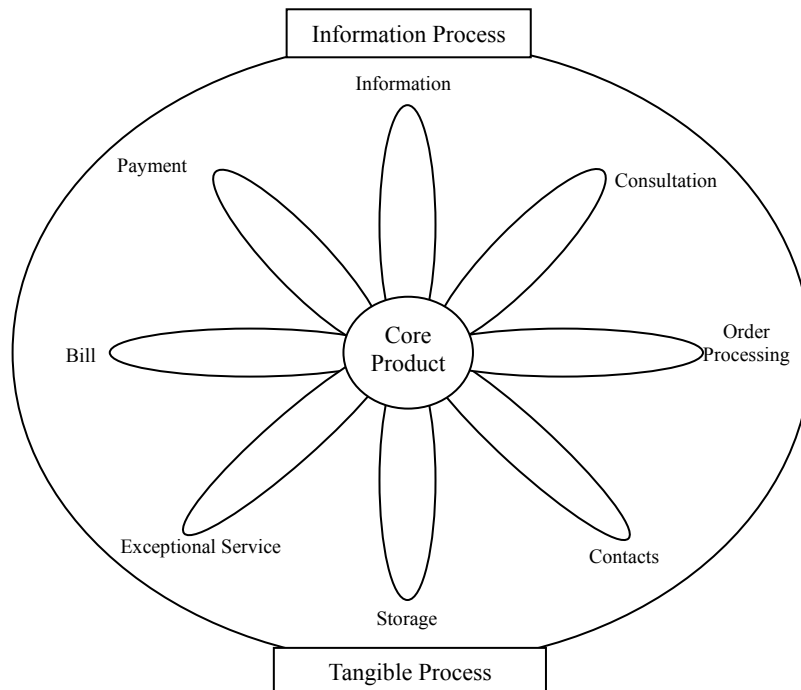


Figure 1 Model of Service Flower

There are many service innovation theories and methods. Chinese scholar Zuoyi Liu and Shaofu Du (2008) established a four dimensional model of service innovation refer to others' researches. In this model, the concept of service innovation, customer contact interface innovation, service delivery innovation are on their own stake, and the three elements are the main content of service innovation, and technological innovation is the key intermediate^[6]. The innovative approach of this paper mainly based on the service flower theory. Compared with the four dimensional service innovation model, the service flower model is more workable and with a wider coverage. Services business is initially presented by a famous American scholar in services marketing, Christopher • H • Lovelock, in his masterpiece "marketing service". From the standpoint of the overall product or service, it likens the relationship between the core product and the add-on product to the "pistil" and "petal" of a flower, focuses on how to add value to the "pistil" namely the core products through the "petals" namely the additional services. In which, eight additional products including information, consultation, order processing, contacts, storage, exceptional service, billing and payment, are like eight petals around the periphery of basic services, shown in Figure 1.

4.3 Analysis of courier services category

According to service flower theory, the courier service can be divided into core service and additional service. Core services are those services with most essential core value, the core services of the express industry is the service of fast delivery of goods to the customers. Additional services are derived new services which through the use of various technologies and different service delivery model and based on the value of core services, it is to expand the use of the product value. Additional services of express industry including eight areas: information services, consulting services, order processing, touch service, custodial services, exceptional service, billing services and payment services.

According to their role, additional courier services can be divided into convenient services and value-added services. Convenient service is an essential element of courier services, which includes information services, billing services, order processing, payment services. The so-called value-added courier service is a high additional value services developed by courier companies in order to meet the diverse needs of customers, which is based on its rapid web services and information technology support, its in-depth understanding of customers' service needs and the traditional "delivery" service^[7]. Courier services include consulting services, contact services, custody services, and exceptional services.

5 The Main Method of Innovative Courier Service

5.1 The building of the basic path in innovative courier service

Based on definition and basic content of eight elements of flower of service and the interviews of seven courier industry professionals, the researching group designs a questionnaire which also references to relevant literature. Survey includes courier employees, courier industry customers, courier industry researchers, and so. We send 120 questionnaires and 94 valid questionnaires are recovered, of which are 57 courier employees, 26 courier industry customers and 11 industry researchers. The ratios of innovative Path projects selected are above 60% and the projects which rate are lower than the 60% are not involved in the innovation path. Based on the statistics of questionnaire, we have compiled a summary of courier service innovation path.

Table 1 The Main Path of Courier Service Innovation

	Project	Definition	The main path
1	Information Services	In order to obtain the full value form any commodity or service, customers need relevant information.	Enterprise Service website; services Directory (including services items, service time, service prices, scope of services); service outlets directional; telephone or online free fast order and mail inquiry; SMS notification; safety warning signs.
2	Billing Services	Bills are almost all services' common elements. Safe and accurate billing is done to ensure a smooth transaction.	Site clearing, site confirmation bill; book-entry settlement (the bill, the amount payable); opened on behalf of policyholders; mobile POS settlement systems; collecting money, agent receipt.
3	Order Handling	Once the customer decides to purchase the products, the order processing begins. Order processing process should be polite, prompt and accurate.	Exchange and pay the orders on the network site; Telephone or online free fast orders; telephone booking orders.
4	Payment	Payment service which should be "Simple, safe, fast" provides customers with a more enjoyable shopping experience.	Shipper payment; Recipients payment; Third-party payment; Online payment; Automatically deduct; Pay for another; Cash on delivery for import.

5	Consulting	Consulting is a kind of quest to customers' needs, and then we design a targeted dialogue which can solve the program.	Advisory Service Manual; Through telephone, Internet exchange platform, live, radio, providing consulting services; Service tracking and feedback system.
6	Contacting	Touch service is a very beautiful petals, it reflects the pleasure of new customers and the greeting of old customers.	Etiquette and greetings; Free food, drinks and umbrella bags; Services and facilities of waiting area; The newspapers, magazines and television of waiting area; Pick-up and home delivery express.
7	Custody	Custody is taking care of the items which customers buy, purchase or rent. It is one of the important enterprise service capabilities.	Object holding; Free packaging; Regular mission services; Helping installation and commissioning; Conservation; The creation and maintenance of customers' file.
8	Exceptional Service	Exception service is an additional service beyond routine service delivery.	Overtime recipient, emergency submittal; Commodity inspection; Transportation of dangerous goods; Automatically sending and picking service; Abnormal parts service center; Exceptional service management manual.

5.2 The influencing factors of the innovative path selection.

The influencing factors of the innovative path selection include cost, demand, as well as the development of business and industry.

(1) Cost factors

The scope and depth of service innovation have the most directive contact to its cost of inputs. The service innovation requires investment, while service innovation is an important channel to raise revenue and reduce the cost. To some extent, the cost is an important indicator to measure service innovation.

(2) Demand factors

Customer demand is the most important factor to business services innovation. Customer demands for services can be self-aware, and it may be stimulated by external factors. The higher the customer demands for services, the greater the expectations of the service.

(3) Development factors

It includes the development of the industry and enterprises. Each company has its own corporate positioning and service localization. Only do Business find its own place in the fast-growing market and establish goals for each stage, they can continue moving forward on the road of innovation.

5.3 Classification of innovation path

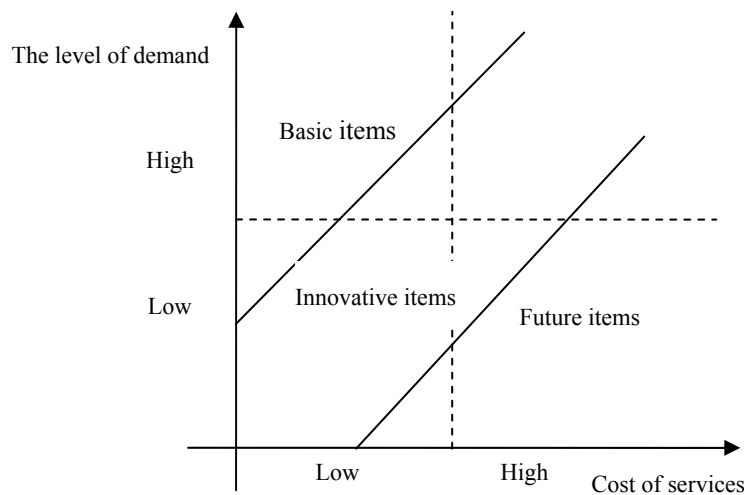


Figure 2 The Three Categories of the Primary Path

According to Table 1, the courier service innovation has 40 primary paths. Depending on service innovation factors of path selection, we build the category structure of service innovation path on the basis of the demand in the market and the cost of service, showing in Figure 2. According to the demand

and cost of services, we define the projects which have low costs and high demands as basic items. Basic items are the survival-oriented projects of express company and the most basic component of the projects. Innovation Project items is the interval between the low costs, demands and the high costs, demands. Innovation items are often overlooked by companies, but they can quickly achieve service improvements by investment and attention. The future items are the interval between the low demands and the high costs. At some stage, it may show higher service costs and lower demands. As time goes on, the above condition may change. Since it is difficult to achieve and the demand is not obvious, therefore, the future items are always becoming the long-term goal of enterprise service innovation.

6 Empirical Analyses

Company Y is a private courier companies, from past three years, the company has expanded rapidly, customer service problems gradually become the bottleneck for further development. Based on The main path in the service innovation, Research group produced a convenient service innovation path selection worksheets, and value-added service innovation path selection worksheets. Research team convened Y 12 all middle-level cadres, grassroots charge 21 people, as well as some level employees 27 people, two assignments table 40 projects sub basic items, innovative items and future items to choose, the proportion of each option maximum shall be final option. The results are shown in Table 2, Table 3.

From Table 2, Table 3 shows that, the Y company service innovation path, there are 19 Basic Items, 11 Innovative Items, 10 Future Items. Among them, the innovation Items for the company service innovation's the recent (During three year) work tasks, the future Items for the company service innovation's forward (three years later) work tasks. Companies were developed specific implementation plan on 11 Innovation items, while puts forward the basic idea of the work on 10 Future Items. Company's services work of innovative ideas become increasingly clear, objectives and task has become increasingly clear-cut.

Table 2 The Worksheet of Convenience Services Innovation Path Selection

Element	Primary path	Basic Items	Innovative Items	Future Items
Information Services	Enterprise Service Web	√		
	Service directory		√	
	Directional service outlets			√
	Phone or online free fast order and mail inquiries	√		
	SMS notification		√	
	Safety Warning Labels			√
Billing Service	Site clearing, site confirmation bill	√		
	Book-entry settlement	√		
	Opened on behalf of policyholders	√		
	Mobile POS settlement system		√	
	Payment collection, Back to a single agent	√		
Order Processing	Outlets pay a single site, the next single	√		
	Telephone or online free fast orders		√	
	Telephone booking orders			√
Payment Services	Shipper pay	√		
	Recipients pay	√		
	Third-party payment	√		
	Online Payment		√	
	Automatically deducted			√
	Pay the purchase price, import to pay for services			√

Table 3 VAS Innovative Selection worksheets

Element	Primary path	Basic Items	Innovative Items	Future Items
Consulting service	Advisory Service Manual		√	
	By telephone, Internet exchange platform, live, radio, providing consulting services	√		
	Service tracking and feedback system			√
Contact Service	Etiquette and greetings	√		
	Free food, drinks and umbrella bags			√
	Waiting area services and facilities	√		
	Waiting area newspapers and magazines and television		√	
	Pick-up, home delivery items	√		
Custodial services	Object HOLD escrow	√		
	Packaging, free packaging	√		
	Regular service mission		√	
	On behalf of installation, commissioning generations			√
	Object conservation		√	
	The establishment and maintenance of customer files	√		
Exceptions services	Time out recipient, emergency Delivery	√		
	Generation of commodity inspection, customs		√	
	Transport of dangerous goods			√
	Automatic Outgoing mail collection service			√
	Exception Parts Service Center	√		
	Exception Service Management Manual		√	

7 Conclusion

Service innovation is the only way of the express company to achieve sustainable development in the fierce competition in the market. By courier service innovation path selection as the starting point, Clear the scope and main content of courier service innovation, promote various services step by step, improve service levels, establishing companies courier service system different from others, which is an important task of courier business foothold in the market, expanding the scale, sustainable development, form the core competitiveness of enterprises .

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The Process of Global Brand Strategy Development and Regional Implementation

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Abstract: Although standardization-adaptation has long been recognized as a dynamic negotiation, less is known about the attendant processes within organizations. Accordingly, this study “pulls back the curtain” on a new global brand management strategy at Kimberly-Clark (KC). An extended case method was employed, comprising three rounds of semi-structured interviews with senior regional and global marketing managers on six continents. Global brand strategy development at KC entails sharing information and best practices, implementing common brand planning processes, assigning responsibilities for global branding, and creating and implementing effective brand-building strategies. Indeed, KC approach, predicated on accountable empowerment and capacity-building, is transforming the organization by increasing marketing capability locally while instilling better processes and disciplines centrally. An examination of these seemingly orthogonal objectives allows us to see how brand strategy cohesiveness is maintained in an unconventionally decentralized structure.

Key words: Global brand strategy; Standardization-adaptation; Extended case method

1 Introduction

The global integration of markets has spurred a convergence in consumer preferences (Townsend, 2009), prompting organizations to search for more effective ways to serve international customers and enhance their worldwide competitive positions (Wang, Wei, & Yu, 2008). Within this context, globalization is defined as the distribution and creation of products and services of a homogeneous type and quality worldwide (Moore, 2001). The attempts of multinational corporations (MNC) to globalize have resulted in the development and promotion of global brands (Townsend et al., 2009; Wang et al., 2008). Therefore, as competition globalizes, an MNC success hinges on its ability to position and manage brands across the numerous countries in which it operates (Lee, 2005).

Although most MNC recognize the advantages of global brands and the value of developing effective brand strategies that nurture their global identities, many are grappling with the challenges and complexities of competing in a global environment (Townsend, 2004). These complexities are amplified by the assumption that most MNC are regional, not global, and that there is no single global market or single global strategy (Moore, 2001). Thus, Townsend et al. (2009) argue that additional research using examples of the globalization of brands can provide managers and scholars with a deeper understanding of global brand management strategy. Prior literature has explored components of global branding and the ways MNC can exploit global opportunities, but limited attention has been paid to branding within a global context (Arnold, 2008). Furthermore, no consensus has been reached on the relationship between global standardization and centralization in global branding (Quester & Conduit, 1996).

We sought to extend current knowledge of global brand management by deconstructing and learning from the strategies and processes of a well-known and successful global MNC. The study viewed the global brand-building process as a dynamic capability of MNC, and the research therefore considered how dynamic and ongoing tensions are managed between global standardization and local adaptation, as well as the resultant decisions that shape corporate strategies and processes. Our focal MNC was Kimberly-Clark (KC), which provided an ideal and constant context by “setting the limits on the range of relationships to be expected”, (Johns, 2001, p. 33). KC global marketing and branding strategy has recently undergone extensive changes, thereby providing a rich context within which to understand the processes, procedures, and practices involved in becoming a Global Marketing Organization. After presenting an extended case method (Kate, 2006), we focus on understanding the dynamics of the KC setting in order to explore and build theory (Yin, 1994).

2 Literature Review

2.1 Conceptualizing global brand

Aaker and Joachimsthaler (1999) provide a more detailed definition, proposing that global brands are “brands with a high degree of similarity across countries with respect to brand identity, position,

advertising strategy, personality, product, packaging, and look and feel” (Aaker & Joachimsthaler, 2000, p. 306). Global brands can therefore be envisaged as tools that enable organizations to portray and manage consistent corporate and brand images across a diverse customer base.

According to AC Nielsen (2001), a brand can be considered ‘truly global’ if it is sold in all 30 countries used in the sample (which represent 90% of the world's gross domestic product), and if more than 5% of its sales come from outside of its home region. Further, Inter-brand (2006) identifies six principles shared by the Best Global Brands: recognition, consistency, emotion, uniqueness, management and adaptability. Kleenex, one of KC core brands, was named a billion dollar brand that could be considered truly global based on these definitions and principles (AC Nielsen, 2001; Business Week/ Inter-brand, 2009).

2.2 Global brand management

Although extant literature is replete with examples of ‘global’ brands (Jain, 1989), there is a dearth of prescriptive theory on “how brands become global” (Townsend et al., 2009, p. 540). Several global brand management strategies have been proposed, but they tend to be limited to specific business contexts (Ger, 1999; Walker, 2003). In a more generalizable sense, Van Gelder (2003) calls for brands to be ‘harmonized’ across markets to ascertain which aspects of the brand proposition should be the same across markets. These core aspects can then be standardized without upsetting (but rather, inspiring) local managers and/or consumers. To determine the best way to manage a brand globally, firms must understand the extent to which factors relating to the brand vary across national boundaries (Van Gelder, 2003). Moreover, managers should be aware that in some instances, a single brand cannot be imposed on all markets (Keegan & Green, 2005). To achieve a balance between standardization and local adaptation, Kapferer (2005) proposes seven globalization strategies, all based on the notion that the brand is a system consisting of concept, name, and products or services. Thus, MNC must also deduce what processes and strategies can be standardized and how best to manage decision making authority within their organizations in order to find the balance necessary to manage global brands.

2.3 Centralization and decentralization

Centralization determines the extent to which decisions are made at high levels of executive authority in an organization, while decentralization delegates decision making to lower levels of authority (Zannetos, 1965). The type of decision making method that will be used is usually determined at an organizational (Edwards, Ahmad, & Moss, 2002) or marketing level (Özsomer & Prussia, 2000). Edwards et al. (2002) further explore these decision making philosophies in terms of the level of autonomy an MNC gives to its subsidiaries. However, determining how much control an organization exerts over its subsidiaries is not easy (Harris, 1992). Indeed, most global organizations embrace both philosophies (Heiden, 2007). Success in global markets may therefore require MNC to incorporate both centralization and de-centralization in their structures to enable them to act quickly locally while leveraging global best practices.

3 Research Approach

3.1 Study context

KC is one of the world's leading manufacturers of health and hygiene products, with manufacturing facilities in 36 countries and products marketed in more than 150 countries. In addition to being a large MNC in terms of geographic scope, KC is ranked 126 on the Fortune 500 list (Fortune, 2010). Moreover, AC Nielsen (2001) identified Huggies and Kleenex, two of KC flagship brands, as billion dollar brands that ‘could be considered truly global’. Recently, however, KC adopted a global brand management strategy aimed at increasing inter-organizational alignment and standardization. KC therefore provides a unique example of how global brands are managed in an MNC that has recently shifted from decentralized, regional brand management strategies to a global brand management strategy.

3.2 Research design

The study employed the extended case method (ECM) (Kate, 2006) to examine global brand management. Kayla and Eckhardt (2008) note that ECM is the preferred method for researching the types of global and cultural questions explored in this study because it “engages with the contexts in which the phenomena occur” (p. 218). Moreover, single case studies are considered more effective in providing theoretical insights than are multiple cases (Dyer & Wilkins, 1991). Thus, single case studies can be used to describe real-life contexts in which interventions have occurred and explore situations in which the intervention being evaluated has no clear outcomes (Yin, 1994).

3.3 Interview protocol and sample

A semi-structured interview approach was used. Interviews ranged in duration from 45min to 75 min. Telephone interviews were used in phase one, followed by face-to-face interviews in phase two and a combination of telephone and face-to-face interviews in phase three. With the interviewee's permission, all of the interviews were recorded to facilitate coding and the interpretation of direct quotes, as well as to increase the accuracy of the findings (Eisenhardt, 1989). Due to the semi-structured nature of the interviews, the research protocol acted as a mechanism for guiding conversation. In total, we interviewed fifteen respondents (see Table 1 for respondent profiles). Of these, nine had global roles and six had regional roles. Of the regional respondents, one was from Asia, one from Australia, one from Europe, one from sub-Saharan Africa and two from South America.

3.4 Data analysis

The first stage in ECM (Kate, 2006) involves the reduction of empirical data into a set of themed materials. The second stage involves explaining the studied phenomenon in the context of existing theory to better understand the larger context shaping the phenomenon. Descriptive codes based on the literature review were created before the interview phase commenced. The goal of coding is to 'fracture' findings (Strauss, 1987) into categories that permit comparison and thereby facilitate the development of theoretical concepts. Once the interviews were completed, the descriptive codes were considered in terms of the data to explore emerging patterns within that data. The pattern codes permitted the themes identified by the descriptive codes to be elaborated further, enabling more thorough analysis. Initial codes were based on the research questions, which allowed the interview to be conducted analytically and ensured that the coding was linked to the conceptualization of the research.

4 Results

4.1 Decision making autonomy

To understand the issues and obstacles facing KC over autonomy and control between global and regional teams, we explored the perceived roles of global and regional marketing team members. Interviewee 3 observed, "The U.S. business is very different from the state of play in India, Turkey or South Africa...so there's...a necessity for...local positioning, but within the umbrella of...some governance around what we want the...brand to stand for". KC global strategies seek greater alignment of their brand offering, but interviewee 5 admits that "there's probably some standardized processes that our global and regional communicators use, but we're still trying to get more aligned and merged". However, any uniform strategy would, according to Interviewee 7, "...fall apart because of the consumer nuances, the language in which you speak about the product. The need states that can be satisfied by the same product can be a wide spectrum of needs". Since standardization can be perceived as an impediment to innovation and creativity, KC global brand management strategies attempt to reduce mandatory elements, thus allowing the regions to adopt and adapt within a prescribed framework.

Interviewee 4 explained, "...at the end of the day, every market has to do what's best for them. However, part of the reason why these jobs like mine exist within this company is to provide...freedom within the framework. So we have to establish some frameworks 'because you don't want...your brands to mean different things in different places". The KC framework uses various processes and templates to determine what a brand stands for, and allows the markets to "adapt what's relevant for them" (Interviewee 4), thereby giving the regions "almost total autonomy" (Interviewee 3) and creating "powerful regional organizations" (Interviewee 10) that have the ability to "pick and choose" (Interviewee 2) the strategies most relevant to their market. This strategy aligns with Thrassou and Vrontis (2006) assertion that marketing strategies should be customized to suit the unique dimensions of each market. Although senior executives lead KC global brands in roles created by the recent marketing/branding restructuring process, the findings suggest that, given the firm's organizational structure, the global marketing/branding team lacks the blanket ability to mandate strategies. "My role", Interviewee 4 clarified, "is to establish what the strategy is and then establish...how each market executes their strategy because every market is in a different place in terms of development of competitive set and so forth. So then we have an overarching strategy in terms of this is what we want...and what we want the brand to mean. These are our business objectives. These are the innovation platforms that we're going to work on, and then we translate that down into each market and how each market is going to execute that".

Table 1 Respondent Characteristics

Interviewee	Position	Role	Region
<i>Phase 1</i>			
Interviewee 1	Regional Marketing Director	Category/Region Specific	Southeast Asia - regional
Interviewee 2	Senior Brand Manager	Brand/ Country Specific	Southeast Asia - local
Interviewee 3	Global Brand Director	Brand Specific	Global
Interviewee 4	Global Marketing Director	Category Specific	Global
Interviewee 5	Global Communication Director	All Categories and Brands	Global
<i>Phase 2</i>			
Interviewee 6	Global Digital Director	All Categories and Brands	Global
Interviewee 7	Global Brand Director	Category Specific	Global
Interviewee 8	VP of Corporate Innovation	All Categories and Brands	Global
Interviewee 9	Global Marketing Operations	All Categories and Brands	Global
Interviewee 10	Chief Marketing Officer	All Marketing Functions	Global
<i>Phase 3</i>			
Interviewee 11	VP Global Brands	All Categories/Brands	Global
Interviewee 12	Regional Director	One Major Category	Regional (Europe)
Interviewee 13	Regional Marketing Leader	One Major Category	Andean Region (Latin America)
Interviewee 14	Regional Marketing Leader	One Major Category	Andean Region (Latin America)
Interviewee 15	Regional Marketing Leader	One Major Category	Regional (sub-Saharan Africa & Middle East)

Overall, the interviewees agreed that the global roles focused on applying and transferring global best practices, even though they had no “line of authority over regions or countries” (Interviewee 3). This experience is consistent with Aaker and Joachimsthaler's (1999) findings that global brand managers and teams often have little authority to mandate the strategies they create. Indeed, Interviewee 3 observed that the global role seemed to be about “influence, suggestion, coercion...[and] negotiation”. Interviewees implied that communicating the value of new strategies and persuading regions to “opt in” is the best way to overcome autonomy issues.

4.2 Balancing global standardization with regional adaptation

KC is attempting to “get as many synergies and efficiencies as it can without subjecting itself to a one-size-fits-all view of the world” (Interviewee 11). This method of change management aims to embed the fundamentals of global branding in the regional teams, thereby increasing their adoption of best practices. Starting with its core brands, KC global team completed segmentation studies on six key markets whose regional leaders volunteered for the process. This segmentation work “established global strategic targets, consumer targets, and target audiences, and illustrated key target segment characteristics in various geographic locations” (Interviewee 11). Thus, with a consensus process similar to the one already used inter-regionally, the global brand team “prioritized needs” and created a global brand promise and associated architecture. With the same strategic plan in mind, regional leaders then adapted these promises and architectures to create a more regional focus based on local market opportunities. This process combined “bottom-up local market insights and requirements and ideas with...top-down strategic assessment of the brands' problems and opportunities” (Interviewee 12).

The purpose of establishing global branding fundamentals was thus to “change people's perspectives” so that they became more brand driven and used the “right analytics before making decisions”. Therefore, if data were used as a guide for regional decision making, the findings from global studies and the results from global best practices would be enough to increase strategy adoption. However, research budgets are limited, and the “sit on the side line and cherry pick” attitude remains prevalent, particularly in the countries that were not part of the global studies. A global mindset is required to overcome this attitude, a mindset that increases the degree to which people opt in and requires an exception to opt out. This is consistent with Heiden's (2007) argument that MNC should empower subsidiaries by giving them greater autonomy while using centralized strategies to enhance consistency and corporate compliance. Thus, without any distinct plans to reduce the autonomy of the regions, KC is seeking greater alignment and adoption with “mechanisms to drive compliance”, such as standard brand measures that allow for regional comparison and medications to employee objectives and remuneration.

4.3 Building regional marketing capability

Interviewee 12 saw the underlying tenant of the current global brand strategy as being less about the standardization issue itself and more about building regional marketing capability and elevating the marketing function within the organization globally. In fact, Interviewee 12 commented that KC CMO challenged and inspired regional marketers “to do great work”. This view matches the practice of

facilitative leadership, where managers promote critical thinking and act as mentors or coaches to improve employee capabilities. According to Simonin and Özsomer (2009), however, facilitative leadership is typically insufficient in disseminating knowledge among subsidiaries. Nevertheless, other manifestations of a firm's commitment towards developing a knowledge-sharing culture, such as instituting formal mechanisms and processes for knowledge dissemination, can encourage knowledge transfer and sharing. Consistent with this notion, Palmer introduced rigorous new marketing processes and disciplines and created a culture of sharing whereby regions submit their best work for peer review. If a regional office has a genuine need to deviate from global strategy and a genuine capability to execute great marketing, the Global Sector Leadership team will empower it to act more independently. Otherwise, the regional office will be strongly encouraged to share and borrow from global best practices.

5 Conclusions

Our findings explicate how KC has implemented numerous changes to become a global marketing organization. According to Interviewee 10, KC global brand management did not appear to be about control and influence: "...control in this environment, in this world, is completely overvalued. It is all about influence and inspiration and getting people to do it because they want to...You've got to inspire them and lead them to do it..."With this sentiment rooted in its management philosophy, KC is seeking to strike the right balance between "multiple market development and local inspiration" (Interviewee 8). Interviewee 15 added that, as in all matrix structures, regional marketing leaders must be good influencers. They do, after all, perform staff functions, not line functions. Finally, Van Gelder (2003) contends that firms should standardize global brands by inspiring, not upsetting, local managers, an argument reiterated by Palmer.

The success of KC global brand management strategy depends on balancing consistency with regional decision making autonomy. It is, notes Interviewee 8, about "delivering new benefits...in multiple markets with similar positioning, similar communication, similar product formats" without losing its local footprint or global dominance. Interviewee 7 explained that balance can be achieved by "satisfying real, un-met consumer needs on a local level...Meeting those local-level needs and then aggregating them up and looking for commonalities that might then become a global mindset and a global platform". Such balance, Interviewee 7 believes, will occur through a non-systemic, evolutionary change, assisted by global brand teams that act as "great facilitators". The balancing point between global standardization and local adaptation is dynamic; organizations are "living organisms that transfer knowledge and grow in capability"(Interviewee 10), and organizations such as KC should be designed to meet changing consumer needs. Is KC new global brand strategy working? Preliminary evidence suggests that recent marketing strategy changes have indeed resulted in superior financial performance. For instance, after KC improved the dissemination of regional insights within the firm, its North American division adopted successful brand strategies from Israel and Australia, a move that increased United States market share in the associated product lines vis-à-vis KC chief competitor, Proctor and Gamble. More generally, a recent independent financial analysis predicted that KC would experience sustained financial growth in the coming years, due in part to the improved sales growth of its brands. The early evidence confirms that recent changes in the firm's global brand management process have enhanced its performance.

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ISCO Four-Dimensional Structure Model of Design Management Innovation System

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Abstract: This article establishes ISCO four-dimensional design management innovation system model based on analyzing and summarizing the latest design management theories, especially Four-Three structure model which proposed by professor HU Shuhua in Wu Han University of Technology, with the experiences and lessons of famous companies, such as Apple, Samsung, and Nokia and so on. The model builds a new innovative design management system by integrates inputs, subjects, contents and outputs four aspects which are considered for industry and regional innovation. The purpose of the model is to make a analysis and appraisal reference model for design management innovation.

Key words: Design management; Innovation; ISCO; System model

1 Introduction

Design management is not only manage the design project, but also a purposeful and organized activity that can affect strategic decision of a company even can affect the develop strategic decision of a country. In the fierce competitive marketing, the design activities are becoming more and more complex. The method like Human factors engineering, Universal design, User research, Interaction design, User experience are always promoting design to develop and improve, so that Design management become more and more complex. Wei Wang from China Bridge said that the main difference between China and west countries in industrial design is that the companies of west countries have a high-quality design management system.

Now in china, design management is in its infancy, but the international competitive environment forced us to catch up with and surpass the trend of the world to improve our design and design management. Design-driven innovation theory is one of the forefront of research design management proposed by Roberto Verganti in 2003^[1]. Chen Xue Song is the earliest scholars who systematic study of design-driven innovation in china. The traditional model of innovative power is the market pull and technology push model. And design-driven innovation is driven by the product language (meaning) to be technological innovation and market innovation. Roberto Verganti believes that firms should constantly communication with artists, designers, educational researchers and other external "interpreter to achieve and spread new language product^[2]. Charles C. Snow and others established a model of collaboration between enterprises from industrial background, organizational design and other aspects of output and profit^[3]. And Chen Jin and Chen Xue Song establish mechanisms model by designing elements of design-driven innovation, design innovation ability and design innovation result^[4].

But we think Design management is a systematic project, which needs to consider the whole process of the activity of design business. So we want to establish ISCO four-dimensional design management innovation system model which constants input, subject, content and output four diminutions. "ISCO" are the four capitalized first letter of words of input, subject, content and output which must be carefully considered for industry and regional innovation.

2 Models and Method Analysis

2.1 Main theory

The ISCO four-dimensional structure model proposed by Professor HU Shuhua (previously named "four three structure" model), this model is developed from input-output theory and black box theory. The "I" is input, the "S" is subject, the "C" is content, the "O" is output; it is mainly used in regional innovation development research field, analysis and diagnosis regional innovation situation through input elements, innovation subjects, innovation information, and output target. This theory model accommodate the input-output feedback principle, subjects and contents hierarchical mechanism, contents and outputs hierarchical correspondence principle ,outputs and subjects directivity transform principle.^[5]

Generally speaking, design management system can be summarized as resources, methods and

results .Company use resources, technology and management to transform design elements to be new product or service. (See Figure 1)

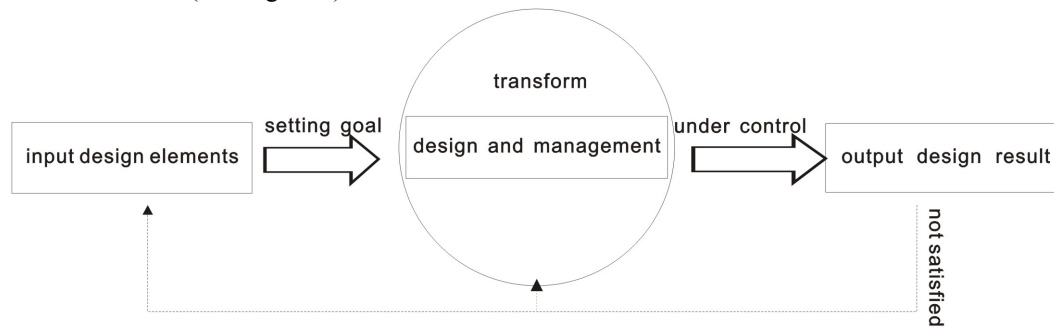


Figure 1 General Design Management System

Consolidated the changes in the field of consumption, marketing, technology A kind of “big design” concept in the design of management is gradually formed. Its manifestations are divided into: large collaboration, namely parallel design with the rise of collaborative design; large integration, means that design must by way of communicate with user experience and use a variety of media. Having creativity without losing continuity and systematization^[6]. So we need to build a structure model to help enterprises analysis overall design management innovation. And four-dimensional structure model should be a good choice.

2.2 Model operational mechanism analysis

(1) Input to output mechanism. The results of output related to input elements and conversion process. If you want to have good output, you must have good resources and cooperate with excellent management.

(2) Elements of synergy mechanism .According to the principle of bucket short board, no matter how strong the other factors are, the ultimate effect of product is decided by its weakest. So the design management innovation success is not put into some factors, but need to integrate the internal and external resources, multi-pronged can increase the likelihood of design management innovation.

(3) Loop feedback mechanism. From input to output is not a single route, the process of integration and conversion of resources will have feedback information. Output can reflect if inputs are reasonable. Check the conversion process through consideration of the results of monitoring, can timely to guide resource inputs and improve the management innovation method. Good results will promote further innovation.

(4) Subject and object conversion mechanism. Subject is the executor of behavior. Object is the object that subject wants to influence or change. But they can transform to be the opposite side. From the perspective of enterprise, designers and design managers are human resource, and design management is objects. But from the perspective of design and management, designers and design managers are the subjects of innovation.

3 ISCO Four-Dimensional Factors

3.1 Design of innovation inputs

3.1.1 Talents

Talents are indispensable fundamental resources of design innovation and innovation management. For design management innovation inputs, talents are designers and design managers. When Steve jobs back to Apple, the company is losing money, in order to realize the innovation of management and design ideals, Jobs tried to find out the most excellent designers and design managers. Finally,one design director in the company whose name is Jonathan Ive is the best one. Thanks to Jonathan Ive, who made jobs realized many genius idea to perfect and implementation Designers and design managers is the core of the design or design driven enterprises, enterprises from top to bottom should be respected for design to fully understand and support.

3.1.2 Funds

According to the statistics of American Association of Industrial Design, when enterprise spent \$1 in design and development, they will get \$2500 averagely; Japanese Hitachi one statistics show that for every 100 billion yen in sales increase, the role of industrial design (51%), and technical reformation effect accounted only for 12% more and more companies are beginning to take industrial design as the

enterprise profit leverage and brand building tools.

3.1.3 Working environment

Environmental design innovation management as inputs of reason is that a good design environment, Can promote exchanges and cooperation between design team members and inspiration. Many companies can create a communication and discussion of office space, such as audi, hearing aid company in Denmark found that the natural interaction between the different floor staff in stairwells, widen the stairs. Sweden's Ericsson's London headquarters in abstract beautiful staircase to link together the floors.....The purpose of adapting their workplace is enhanced the natural basis of everyone meet each other and communication.^[7] Similarly Apple's design teams with engineers, marketing personnel even peripheral manufacturers have close contact. IDEO also often work together to organize specialists in different areas, The most direct way to deal with problems is to make the building designer, architect graphic designer client meeting together, found problems in different areas, then carries on the overall planning.

3.1.4 Platform

Contains the immateriality platform: Such as knowledge information platform of network media, as well as the materiality platform like warehouse design model making platform. Platform's function is to promote the sharing of knowledge and experience, enhance the design efficiency.

3.2 Design management innovation subjects

3.2.1 Enterprise senior manager

Corporate executives are the major makers of design activity, design strategy and design policy. If understand design will decide the fate of design department, even the whole company. MOTOROLA is the first inventor of cell phones which once the leader of mobile phone industry. But the senior executives just concern engineering and technology, and took less attention to design content and users, made their phones less and less popular. At the same time companies such as apple, Samsung fully awareness the important of design, and took design content and ser experience as product design center, fully fusion art and technology in design, make their phones very popular. Master policy trends and concerns of the market trend is the corporate executives' one of the most important thing.

3.2.2 Design manager

Design manager is the executor of the design strategy and the concrete design project, the head of the positive contact design agencies and institutions. A good design manager should achieve the overall strategy of the enterprise. Enterprise should give more freedom to their design managers to try.

3.2.3 Designer

Designers are both design resource, and subject of innovation management. They are the core of design activities who are the executor of the design strategy and design activities. Apple's Jonathan ive used new tool materials and technology with constantly experiments, designed many breakthrough new products. Such as iMac, iBook, the PowerBook G4 and iPod MP3 player. Designer should think positively and needs to find out.

3.3 Design management innovation contents

3.3.1 Design strategy

Design strategy is a long-term planning to create the future. As the development of design with economic globalization, more and more companies accept the Design-driven strategy. Creating design brand is already the focus of large companies. IDEO CEO Tim Brown proposed that design thinking is people-centered innovative approach which requires integration of the needs of users, technological feasibility and commercial success. I think nobody will doubt that Apple's success is that Steve Jobs made the company focus on the concept of industrial design, and pushed design on the same status with technology.

3.3.2 Design identity

Identity system generally includes concept, behavior, and visual identity. Corporate should set up their own image system include design concept, design behavior and visual identity once adjust the design strategy. Every large group will conduct a comprehensive brand identity design for each new brand, even modify the company's identity system. For example, Apple removed "computer" out off its name in January 2007, then positively develop phone business.

3.3.3 Design content

Italian scholar Roberto Vergant put forward the concept of design -driven innovation after a study of some Italian corporates design strategy in 2003. And he thinks that the basic of design innovation is that each product has its own language and meaning. The appearance of the product is juest the one side

of all. Now is the era of experience economy, design contents should be focus on user experience, otherwise no matter how high technology a product have, it will lead to a invalid design or unpopular. Motorola and Nokia were once brilliant in China even the world more than ten years, have advanced management technology and manufacturing technology, and always focus on it, do not carry on the design content updates ,that lead to the demise of the entire enterprise.

3.4 Design management innovation output

3.4.1 Product

The product here contains general industrial products, apparel, services and other design results. Designing new products or services is the basic requirements for design innovative, and also the key ability to further success. New products should not only be innovative in content and form, but should give more attention in whether it is user-centered or meets the needs of users’ experience.

3.4.2 Performance

Performance includes individual performance and organizational performance, that is, we should not only consider the output of innovation in new products or services, but should give more attention in considering whether the organization's objectives are achieved, whether the individual's innovation and management capability are improved.

3.4.3 Brand

In the earlier stages of development, the most important thing of companies is to survive, they might focus on just design as more as possible, don't have the energy to consider how to build a brand. But companies have to create their own brand if they want to go further. For large enterprises, they should make a new product to be a new brand, just like the iphones, obviously not just ordinary products.

3.4.4 Standard

“First-class design for standard, second-class design for brand, third-class design to make products”, it means that the bottom line of design management innovation is new product, while the highest is firstly captured the market opportunities and have the right to make industry standard.

According to above, design management innovation system would be summarized as innovation subjects input design resources to create innovation results through design contents. Different design content needs different resources and will get different outputs. Design management innovation model extracts different design contents in common, While generalizations same factors for summarizing and explaining the general design management. (See Figure 2) .

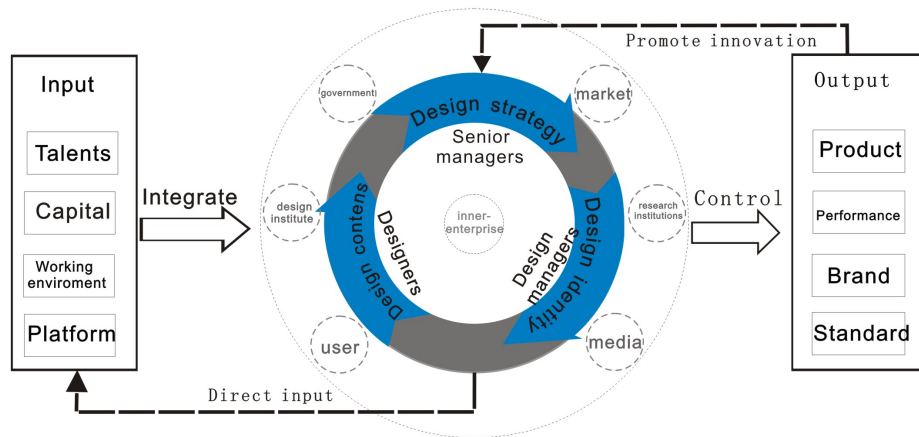


Figure 2 ISCO Four-Dimensional Structure Model of Design Management Innovation System

4 Conclusion

Design management is a systematic project, which needs to consider the whole process of the activity of business. Design management innovation is also not just one factor changing, but involves a series factors. Now, Nokia is trying to regain the world's top mobile phone market status, so far the mobile phone design updated, and administrators also changed, but shortage design innovation inputs, design innovation and design contents. Although they have innovative products, the innovation performance is still far lower than Apple and Samsung, even not to say innovation brand and standard. ISCO four-dimensional model integrated inputs, subjects, contents and outputs four aspects, may be used as the analysis and appraisal reference model of design management innovation.

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Research on the Synergetic Performance Evaluation of High-Tech Enterprises

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Abstract: The synergetic performance of high-tech enterprises is the foundation to promote economic growth and society development. This paper presents the principle of synergetic matrix and synergy degree, and establishes the model of synergetic performance evaluation. The results show that the enterprise is comprised of several subsystems, each composed by multiple factors. The synergetic performance of each subsystem is decided by the synergy degree of elements and performance of the system together; the synergetic performance of enterprises depends on the synergy degree between subsystems and the synergetic effects of enterprises' performance.

Key words: Performance evaluation; Enterprises' synergetic performance; Systems' synergetic performance; Synergetic matrix; Synergy degree

1 Introduction

The development of the high-tech enterprise is an inexhaustible force for economy and society growing, and will eventually become the ideal method to stimulate the economy. Synergetic performance of high-tech enterprises is the foundation to promote economic growth and development. How to evaluate the synergetic performance of high-tech enterprises has become the focus of research and development of high-tech enterprises.

In the field of synergetic research, Haken^[1], a German physicist, put forward synergetics. Bradley et al.^[2] got synergistic gains based on abnormal returns. Healy et al.^[3] evaluated synergistic gains with performance improvement. Later, advances in calculation methods of abnormal returns, changes of the calculation benchmark and others were provided by other more researchers. Andrei et al.^[4] established a model for evaluating financial synergies from mergers and acquisitions. Yu Shunkun^[5] carried on an empirical analysis during the power grid enterprise staff through the use of F-ANP synergetic evaluation method.

From the review of existing research results, it is obvious that, the achievement of synergetic performance research is not enough, and research to the high-tech enterprise synergetic performance is much less. This paper presents the principle of synergetic matrix and synergy degree, and establishes the model of synergetic performance evaluation.

2 The Performance Evaluation System of High-Tech Enterprise

2.1 Design of performance evaluation system of high-tech enterprises

High-tech enterprise performance evaluation subsystem mainly includes the leadership and command system, human resource system, technological system, supply and marketing system, and financial systems. The frame of high-tech enterprise performance evaluation system has been shown in figure 1.

2.1.1 Leadership and command system

Leadership and command system of high-tech enterprise is mainly about the enterprise senior managerial staffs' personnel coordination and communication skills. Performance evaluation of the system can be composed of some elements, such as coordination and communication skills of general manager, sales manager, production manager, financial department manager and technical manager.

2.1.2 Human resources system

Human resource system, a subsystem of the enterprise system, is the source of core competitiveness and sustainable competitive advantage. There are a lot of performance evaluation index system of human resources, such as training and development, compensation and benefits, employee relations and motivation, internal coordination and other indicators, depending on the enterprise own situation.

2.1.3 Technology system

Technology system is the whole about business and technology associated with a series of activities. It is an important component of the high-tech enterprises' technology system. So far there is a great

number of literatures about this system whose evaluation index including technical team, the ability of R&D, support conditions, output and effectiveness.

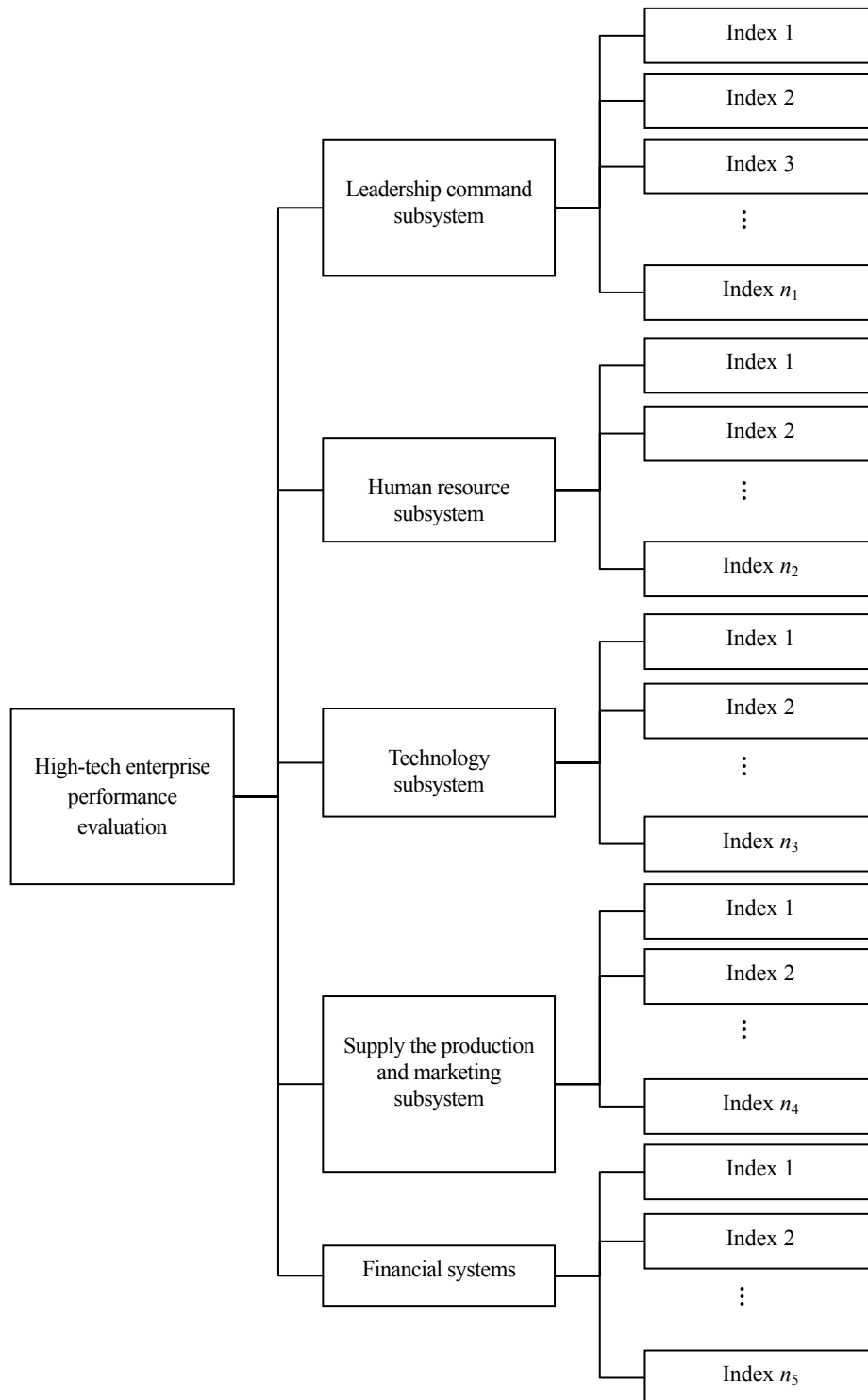


Figure 1 The Framework of High-Tech Enterprise Performance Evaluation System

2.1.4 Supply, production and marketing (SPM) system

Supply, production and marketing system, also known as the supply chain system is responsible for the enterprise’s production and distribution. The system’s performance can be evaluated by purchasing

process, the competitiveness of products, customer service and information sharing and other aspects.

2.1.5 Financial system

The financial system, based on the financial goal, is responsible for establishing organizational structure, position, management responsibilities and labor configuration, to reflect, supervise, control, and coordinate business and financial activities. The performance appraisal system mainly investigates the enterprise in terms of profitability, asset quality, debt risk status, and business growth.

2.2 The principle and method of high-tech enterprises' performance evaluation

2.2.1 Principle of performance evaluation

From theory analysis, performance evaluation of high-tech enterprises belongs to comprehensive evaluation. Through two mappings, the comprehensive evaluation^[6] will map disordered points in space to the orderly points in space, so as to achieve the purpose of optimization.

If using m indexes, then this m indexes constitute a space A . The space A is m -dimensional, each dimension has a specific unit (dimension), and the unit is not necessarily the same. Any one of the average object m index of the actual value constitutes point a in the A .

The first mapping of comprehensive evaluation is to use them m function f , turn the index of each evaluation object of the actual value x_i into scores of all index values of y_i , i.e.:

$$y_i = f(x_i) \quad (1)$$

Seeing from the space the space A is mapped to the space B , i.e. $f: A \rightarrow B$. The space B is m -dimensional, each dimension is no unit of measurement (which is expressed as a fraction). By mapping f , a point a in the space A is mapped to a point b in the space B .

Second mapping of comprehensive evaluation is the use of weighted average method (the important weights of each index is w_i), turn the index of each appraisal object evaluation value y_i into an integrated index z , i.e.:

$$z = g(w_i, y_i) \quad (2)$$

On the analysis of space is that the space B is mapped to the space C , i.e. $g: B \rightarrow C$. The space C is one-dimensional.

In two mapping of comprehensive evaluation, the space A is m -dimensional, and the dimensions of the units are not necessarily the same. It is in disorder, whose points are not in space size comparison. The second space B is m -dimensional, and is in disorder, but each dimension is no unit of measurement. The third space C is one-dimensional, and is orderly, any ordered space points can compare its size.

2.2.2 The process of the performance evaluation

Although there are many different kinds of evaluation objects, features, goals' vary, comprehensive evaluation procedure is the same in general.

(1) Determine the evaluation target of evaluation object. Define the overall goal of the evaluation object and target clearly, make its connotation and denotation border clearly, and definite objectives between the primary and secondary and subordinate relations.

(2) Establish comprehensive evaluation index system. Indicator is the embodiment of the connotation of the target and the determination of the measurement scale.

(3) Determine the index values (or indicators data standardization processing). Determining the index values have two aspects, one is defined index quantification; the second is to index standard.

(4) Determine the index weight. Due to the importance of each indicator towards target is different, namely each indicator's contribution is different, and therefore, different indicators should be given different weights.

(5) Construct the comprehensive evaluation model. Comprehensive evaluation result is not the simple sum of the index values. The comprehensive evaluation results need to be processed based on the certain mathematical method, which is called evaluation model.

(6) Sort the comprehensive evaluation result. Each object of the evaluation is sorted according to the comprehensive evaluation result, and then makes a choice and decision.

In each link of the comprehensive evaluation, the index system is the premise, index standardization of data processing is the foundation, the index weight is the key, and the comprehensive evaluation model is the core. In order to get reasonable conclusion for each link, we must carefully study system analysis. Each link must be studied carefully and analyzed systematically in order to get reasonable conclusion.

2.2.3 Model of performance evaluation

Comprehensive evaluation of a lot of mathematical model, but the essence can be divided into the weighted arithmetic average and weighted geometric mean of the two main basic models. That is:

$$z_a = w_1 \cdot y_1 + w_2 \cdot y_2 + \dots + w_m \cdot y_m$$

$$= \sum_{i=1}^m w_i \cdot y_i \tag{3}$$

$$z_b = y_1^{w_1} \cdot y_2^{w_2} \cdot \dots \cdot y_m^{w_m} = \prod_{i=1}^m y_i^{w_i} \tag{4}$$

In the formula z_a as the weighted arithmetic mean evaluation object values; z_b as the weighted geometric average value of evaluation objects; w_i for the i evaluation index weights, there are m indicators, $\sum_{i=1}^m w_i = 1$; evaluation object y_i is value for the score function index i , it is the index value of the standardized data processing after the score, $y_i = f(x_i)$, the i index to evaluate the value of the object x_i .

Weighted arithmetic average model synthesize indexes in the form of addition, and the weighted geometric mean model integrate these indexes with the multiplication. Therefore, weighted arithmetic average method is simpler; the weighted geometric mean method is more sensitive for the score differences between indicators: once an indicator valued as zero, its comprehensive evaluation must be zero. Using this feature and according to the following evaluation principle, we can choose comprehensive evaluation model.

(1)“Good match” evaluation principle, that is allowed to use some high score to make up for some low score of indicators, reflects policymakers’ efforts to optimize for the guiding ideology, if using the principle of weighted arithmetic average model is optional.

(2) “Cannot be ignored” evaluation principle, which is not allowed to use some high score to make up for some low score of indicators that reflect decision makers’ comprehensive and balanced optimization of the guiding ideology, if using the principle of weighted geometric average model is optional.

(3)The “ambiguous” evaluation principle, it is a mixture of the above two kinds of evaluation principles, namely:

$$z_c = (z_a + z_b)/2 \tag{5}$$

3 The Synergetic Performance Evaluation Model of High-Tech Enterprises

3.1 The synergetic performance evaluation model of subsystem

3.1.1 The synergy degree matrix of element

For each subsystem, which includes the leadership and command system, human resource system, technology system, SPM system and financial system, each system is composed of multiple elements. For each element, they have the synergistic relationship.

In the leadership and command system for example, the subsystem of S_1 , assuming that consists of five main elements: general manager, vice president of technology, CFO, vice president of sales, vice president of production, construction of the synergy degree matrix is as follows:

$$B_1 = \begin{bmatrix} - & a_{12} & a_{13} & a_{14} & a_{15} \\ - & - & a_{23} & a_{24} & a_{25} \\ - & - & - & a_{34} & a_{35} \\ - & - & - & - & a_{45} \\ - & - & - & - & - \end{bmatrix}$$

Among them, a_{ij} means the synergy degree of factor i and factor j .

3.1.2 The synergy degree model of element

In the leadership and command system, according to the synergy degree matrix of elements to establish average the synergy degree model, i.e.:

$$b_1 = \sqrt[10]{a_{12} a_{13} a_{14} a_{15} a_{23} a_{24} a_{25} a_{34} a_{35} a_{45}}$$

The principle is extended for application. If the subsystem of S_i has n elements, the elements of synergy degree are:

$$b_i = \sqrt[n(n-1)/2]{a_{12} a_{13} \dots a_{1n} \dots a_{(n-1)n}} \tag{6}$$

3.1.3 The synergetic performance evaluation model of subsystem

In the leadership and command system, the comprehensive evaluation model can be set up system S_1 , and its performance as Z_1 while the synergetic performance as U_1 is:

$$U_1 = \sqrt{b_1 \bullet Z_1}$$

Similarly, for any subsystem of S_i , the synergetic performance is:

$$U_i = \sqrt{b_i \bullet Z_i} \tag{7}$$

3.2 The synergetic performance evaluation model of enterprise

3.2.1 The synergy degree matrix of subsystem

Assuming that m subsystems as $S_i (i=1, 2, \dots, m)$, between subsystems the synergetic degree matrix is:

$$D = \begin{bmatrix} - & c_{12} & c_{13} & \dots & c_{1(m-1)} & c_{1m} \\ - & - & c_{23} & \dots & c_{2(m-1)} & c_{2m} \\ - & - & - & \dots & & \\ & & & & \dots & \\ - & - & - & - & - & c_{(m-1)m} \\ - & - & - & - & - & - \end{bmatrix}$$

3.2.2 The synergetic degree models between subsystems

The synergetic degree model between subsystems and the synergetic degree model of elements are the same principle, the synergetic degree between subsystems is:

$$d = \sqrt[m(m-1)/2]{c_{12} c_{13} \dots c_{1m} \dots c_{(m-1)m}} \tag{8}$$

Among them, m means the number of subsystems.

3.2.3 The correction performance evaluation model of enterprise

The correction value (V) of high-tech enterprise performance for each subsystem (S_i) of the importance weights (w_i) and synergetic performance (u_i) of the weighted evaluation, i.e.:

$$V = \sum_{i=1}^m w_i u_i \tag{9}$$

3.2.4 The synergetic performance evaluation model of enterprises

According to the synergetic degree of system and correction value of enterprise performance, the synergetic performance evaluation model of high-tech enterprises (CV) is established as:

$$CV = \sqrt{d \bullet V} \tag{10}$$

4 Conclusions

The enterprise is composed of several subsystems. Each subsystem is composed by multiple factors. The synergetic performance of each subsystem is decided by the synergetic degree of its elements and the performance; the synergetic performance of enterprises depends on the synergetic degree between the subsystem and the performance of synergetic results.

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The Proposal of Metrics and Evaluation Methods to Explicit Knowledge of the Absorptive Capacity

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Abstract: The importance of Absorptive Capacity has been stated in many previous researches. When small and medium-sized enterprises with poor management resources perform product development with an outside-in open innovation approach, one of the important factors determining the success or failure is Absorptive Capacity of the licensing-in company that form a foundation of technology learning. In this paper, we propose a method for evaluating the Absorptive Capacity of the company, and it is intended to propose a method for utilizing Absorptive Capacity as a measurement of “readiness” to external knowledge.

Key words: Absorptive Capacity; External knowledge; Open Innovation

1 Introduction

Since the open innovation is advocated by Chesbrough (2003), the promotion of innovation by utilizing external knowledge, including industry-university cooperation is in the spotlight more and more in Japan. Outside-in open innovation, that is to say licensing of technology itself is widely being used among large corporations in Japan, for the Japanese company where it is supposed that it has an independent management tendency about technical development (Not invented here; NIH syndrome), an accepted technology has a high possibility that only a restrictive and complementary role will be given. Therefore, the way of organization appropriate in open innovation era is explored. (Motohashi et al., 2012).

One of the major important factors that determine the success or failure of the outside-in open innovation is Absorptive Capacity (AC) of the licensee company that form a foundation of technology learning (Veugelors and Cassiman, 1999). Since AC was applied to microanalysis by Cohen and Levinthal(1989,1990), although many researchers have studied AC theoretically and empirically, it is claimed that the original meaning of AC is becoming ambiguous through these studies (Lane et al., 2006; Volberda et al., 2010) and a redefinition is tried (Zahra and George, 2002; Todorova and Dursin, 2007). However, an investment for activities of all studies that focus on AC is common in that the value to the organization of external knowledge is influenced (Fabrizio, 2009), and as the definition of Cohen and Levinthal (1990) has been widely accepted most (Murovec and Prodan, 2009), in this paper, we define AC as “the ability of an organization to recognize the value of new, external information, assimilate it, and apply it to commercial ends”.

Many previous studies have been to clarify the factors that improve AC of an organization. As a typical factor, they can cite in-house R&D investment (Cohen and Levinthal, 1989), skills that employees possess (Vining, 2006), past joint R&D experiences (Becker and Diaz, 2004), routine of the organization (Zahra and George, 2002) and organizational culture (Van Den Borch et al., 1999) etc. .

As given condition which is with an effect of AC to give innovation and a factor to influence AC accumulation, to apply to decision making to introduce a concept of AC into actual external knowledge, it is necessary to be operationalized to derive an answer to questions such as the following: “Given the current status of our own company, what is the activity to contribute to improvement of AC most?” or “As for the premise of our current AC, is it possible to implement innovation that utilize an external knowledge?”. We thus believe a framework that provides guidance to those questions would increase the possibility to exploit the concept of AC as management techniques. However, AC is essentially qualitative and so far as we know, it cannot be said that the trial of quantification is performed enough until now. In this paper, we have devised a framework for assessing this question, and it is intended to propose a method for utilizing AC as a measurement of "readiness" of its company to external knowledge.

We think that AC quantification is especially suggestive when SMEs with poor management resources aim at innovation which utilized external knowledge. AC is cumulative, and it is said that it is also important to have the broadness of knowledge (Cohen and Levinthal, 1990). As for this, from a

viewpoint of accumulation of AC, it is thought that the possibility that SMEs have advantages for large enterprises with use of external knowledge is extremely low, if other conditions are set the same. In other words, SMEs which are implicitly inferior to AC are considered to mean that working as a creator is effective as an accepting person of knowledge. The uneven distribution of AC depending on the corporate scale can support progress of the inside-out open innovation by SMEs theoretically, but the outside-in opening innovation by SMEs does not suggest the situation becoming effective in it alone.

In order for SMEs which face a resource constraint to compete for big-firms, a network with outside plays a decisive role (Dodgson and Rothwell, 1994), in addition, it is apparent that the level of AC is an element which is more important to innovation by SMEs so that it is insisted when an actor connecting the company and the outside environment is assets which are important to SMEs (Noteboom, 1998). Furthermore, as represented in the cluster policy, it is strongly desirable from the point where the outside-in innovation by SMEs, the growth of the company by it will lead to the development of local economy (Maskell and Malmberg, 1999). In Japan, in spite of many political activities, the penetration into SMEs of industry-university collaboration, which is a representational approach of the outside-in innovation, does not reach sufficiently level.

Madrid-Guijarro et al. (2009) states that the human and financial barriers have a negative correlation with innovation in SMEs, additionally and they tend to hesitate to funding from outside due to the high risk of innovation. Innovations that utilizes external knowledge, and if the risk is higher (the cognitive theory at least) than when based on the knowledge that was created internally, it is expected that SMEs become more cautious in practical use of external knowledge. If we assume this, in order to promote efforts of outside-in open innovation by SMEs, we consider that it becomes important to show objectively whether innovation that utilized external knowledge accompanies allowable risk assuming the company's AC.

In this paper, we describe the evaluation indices and methods for AC which is basically tacit in nature.

This paper is made up from 6 chapters. In the 1st section, we mentioned object of the paper, purpose and the background. In the 2nd section, we will perform an analysis of previous researches of AC with a focus on small and medium-sized manufacturing companies in Japan. In the 3rd section, we will explain a framework of this research. In the 4th section, we will do the evaluation and analysis of two AC case studies by a patent map which is the framework of this research. One is Ball Semiconductor case that does not result in commercialization of a maskless lithography system, the other is PMT case that is successful for the commercialization. In the 5th section, we will explain the implications of in when you aim at innovation which has a core of external technology, and conclusion in the 6th section.

2 The Previous Work about Absorptive Capacity

For AC, since there are many good quality review papers, I describe some of the previous research about the importance of AC which pay attention to small and medium-sized manufacturing companies in Japan.

According to the analysis of a company survey, in terms of manufacturing industry, Kodama (2010) states that the development of product type SMEs which has design and sales competences of in-house manufactured goods that has much research and development result such as patent application or new product development and they has power of utilizing industry-university cooperation, cooperation with a big firm, and cooperation with SMEs in research and development result. The ability to effectively apply external technology or scientific knowledge with other universities and other firms is called AC, and just by having the ability for external knowledge and technology to be utilizable, it is supposed that they can have needs which tackle industry-university cooperation and cooperation between companies positively. Motohashi (2005) also supposes that existence of AC which performs additional technical development which takes in fundamental knowledge of a university in the innovation process in the company for a success of industry-university cooperation that is important in the R&D-oriented company. Hosoya (2013) examined a survey of manufacturing niche top companies in Japan and found a background that they have been maintained to a high level of AC compared to other SMEs through continuation of business and product development.

As a way to enhance AC, since the research and development that was assisted publicly produce a learning effect, the company will enhance the ability to obtain the latest scientific and technical knowledge (Okada and Kushi, 2004).

In industry-university cooperation from above previous researches, we have found importance of

AC and the enhancing method of AC in the organization. The preceding studies conceptually show importance of the high AC for the result of cooperative project such as industry-university collaboration. This has inhibited to be analyzed based on a framework for the AC to SMEs poor management resources to increase the success probability of industry-university collaboration. In this paper, we aim at the proposal of a tool for solving this problem. The following section develops our AC evaluation framework.

3 Absorptive Capacity Evaluation Framework

Many of the previous researches have set up R&D expenditure as a proxy variables of AC. However, with most of SMEs, the acquisition of AC is performed implicitly to large extent (Vinding, 2006), in addition, R&D activity is performed in private in many cases (Muscio, 2007). As well as Muscio(2007), we focus on human resources, that is, we evaluate the AC based on the experience level of the members of the organization more directly. Although the AC of organization is not a simple sum of the organization member's AC (Cohen and Levinthal, 1990), considering that the organizational learning be realized only through personal learning (Nicolini and Menzar, 2007), besides, the knowledge in SMEs strongly depend on the person characteristics, we think that there is a certain reasonableness in this approach.

Decision-making on the introduction of external knowledge (technology) is performed subject to a fixed knowledge set unit at the time. In other words, it is natural to think that the product concept is formulated at least when considering the introduction or business utilizing any such knowledge. And by thinking in combination technical resource of its company with technology under consideration, it will be judged whether innovation which utilized external knowledge is realizable. Therefore, in order to construct metrics of AC, a higher level abstract concept, as a measure "readiness," we should associate with the specific product concept.

Although it is assumed that it is fully recognized in the company about inside information, and it can be accessed in the previous work of AC (Tu et al., 2006), since the maldistribution of knowledge has taken place as mentioned above in SMEs, there is also a case which is hard to be referred to as that the internal knowledge base is recognized enough by the decision maker. Therefore, subjective judgment of the president who is a decision maker in many cases has always conceived a possibility of becoming a thing based on recognition of an inaccurate knowledge base. In addition, if the judgment is not based on a reasonable understanding of the knowledge base of its company, it leads to challenge which does not suit the company's capacity, and the risk of jeopardizing the survival of the company is higher. Thus, assuming a company's knowledge base, by the setting of the benchmark to judge whether the introduction of a concerned knowledge set is permissible, we think that we can promote outside-in open innovation of SMEs by supporting the decision making to introduce appropriate outside knowledge into SMEs.

All the industrial products consist of several different engineering components. For example, the main technical component of a liquid crystal panel is constituted by the combination of many technical components like method of display mode (For example, multi domain vertical alignment (MVA)), active element (for example, thin film transistor (TFT)), light volume controller (for example, polarizing plates) and display driver (for example, traffic light controller). In this paper, we propose a method that evaluate AC by decomposing a concerned knowledge set into technical components. By decomposing in this way, even SMEs without the knowledge base for evaluating knowledge systematically, they can consider their AC for external knowledge set under consideration and will be able to evaluate more objectively. However, decomposition into the technical components of the product is difficult if not experts in the product and service. So, this paper shows how to use a citation and quotation patent map by Patent Gazette, as a method of decomposing unfamiliar knowledge set into the technical components mechanically. Many previous researches have described the necessity for the patent map in patent analysis. For example, it is said that in order to remind the intellectual property strategy of their company by recognizing a technical trend as a fingerprint like an illustration, and what is called a technical fingerprint, and grasping it from patent information (Kiryama, 2009). However, this paper is the first trial to utilize a patent map as an evaluation tool of AC, as far as we know.

First, as a method of decomposing into the technical components mechanically for a licensing-in patent, Patent Gazette which patent examiners quoted in the examination process "for patent assessment", are considered to be the technical components which constitutes the patent. Then, as a way to mechanically identify main technical components from the quote Patent Gazette of those (technical

components), a technological contents of the Patent Gazette are cited with a large number of other Patent Gazette that is considered to be important components of the technical license. Therefore, it is possible to find out main technical components for the technical license mechanically by performing the sorting in descending order of number of citations for the quote Patent Gazette (technical components).

Next, we evaluate by “Excellent> Good> Average> Bad” for own AC of main technical components which were extracted. The basic idea is in the definition of Cohen and Levinthal (1990) about each technical component, it means that AC belonging to an individual about concerned technical elements is enhanced whenever we go a step, such as "recognize", "assimilate" and "apply".

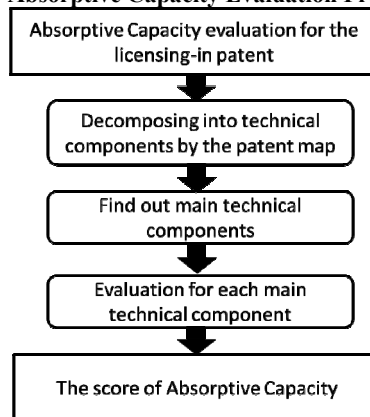
In addition, it is where there is debate about whether more than the number of citations is made into as main technical components, but we should assess all reviews if the number of the quoted Patent Gazette (technical components) is less than 10. However, since those technical components will become in redundant if it becomes 100 or more, about the top 10 % is considered to be appropriate.

Although the previous research has presented many factors as variables for the each construct as "recognize", "assimilate", and "apply" (Jean-Pierre Noblet et al., 2011), when we consider the effectiveness as a decision-making tool in SME, the simplicity of measurement is also important . Based on the above, each evaluation criteria is defined as follows.

- If SMEs have a track record of product development using the technical component, it should be evaluated as “Excellent”.
- If SMEs have the special engineer who takes charge of the technical component, or made a related research paper and related patent application, it should be evaluated as “Good”.
- If SMEs have engineers to understand the technical component, it should be evaluated as “Average”.
- If SMEs do not have the technical component engineer, it should be evaluated as ” Bad”.

Finally, as an evaluation index, each evaluation of “Excellent”, “Good”, “Average” or “Bad” will be given points of 100, 75, 50 and 25 respectively, then obtain an average score. In case of the higher score, it is estimated that AC of its company to perform the licensing-in patent is higher, and it is expected that the industrialization achievement probability of commercialization will be higher. Thus, it is possible to quantitatively evaluate the AC of its company using the patent map for quotation & citation by the Patent Gazette in this way. The AC evaluation procedure for each technical component with the mentioned above patent map is shown in Table 1.

Table 1 Absorptive Capacity Evaluation Procedure



First of all, without ability to search of the promising external technology, we cannot perform innovation that utilized external technology. Although the framework of this paper is utilizable also for evaluation of AC in the viewpoint of recognition of a certain external knowledge group, the evaluation of cognitive power to each external technical set requires a multi-faceted discussion, such as a method for a knowledge group definition. In this paper, since we have focused on AC as a measure of readiness for specific external knowledge set, we would like to suppose to hand over the evaluation framework of recognition relates to "recognize" to another paper, and we will define the external knowledge set under consideration in this paper, we will show how to apply the framework in the next section.

4 Case: Mask-Less Drawing Equipment

The use of the AC evaluation method described above is illustrated by comparing the two

companies for which it was going to realize the same product innovation by taking in external technology from the same university researcher by practical use of industry-university cooperation.

Mr. Ishikawa who was former vice president of Texas Instruments, Inc. (TI) founded the Ball Semiconductor, Inc. (Ballsemi) at Allen in Texas, U.S., in October, 1996, with \$US 52 million of capitals, 50 employees, and develop and manufacture spherical semiconductor sensors, medical device and photovoltaic device.

PMT Corporation (PMT) is the SMEs in Japan, \$US 500,000 of capitals, and about 100 employees, it starts from a trading company, and becomes a research-and-development type company through outside-in open innovation by industry-university cooperation, and major business is the manufacture of a semiconductor manufacturing related equipment, ultra-precision axis control related equipment etc..

4.1 Case Outline

It is necessary for various process technologies in semiconductor manufacturing, the semiconductor technology has been making drastic progress by lithography process to do microfabrication in particular. The exposure equipment transfers an integrated circuit on a wafer in the lithographic process. The exposure equipment performs the transfer in reduction projection onto a wafer by using a mask drawing a circuit pattern obtained by dividing each layer integrated circuits. The number of masks required for one kind of semiconductor manufacture needs 20 to 40, and mask cost for a submicron or a nanometer patterning semiconductor is about \$US 10 million to \$US 100 million, even at the micron level, the mask cost is some \$US 10,000. Furthermore, it is needed long lead-time that is 1 to 3 months. High running costs are required to maintain the mask in this way.

In order to solve this issue, CEO/CTO Ishikawa of Ballsemi had an idea that used TI DMD (Digital Micro-mirror Device) chip instead of the mask, because he had a profound knowledge of DMD when he was vice president of TI. He conducted industry-university cooperation with a professor of Tohoku University to develop a mask-less drawing technology with DMD, and he performed the patent application with Tohoku University. This does not need a mask and transfers a circuit pattern to a DMD chip and draws a circuit pattern on a wafer with a reduction projection lens by scanning X-Y stage in sync with the transfer speed (Figure 1). However, this equipment development did not lead to up to commercialization.

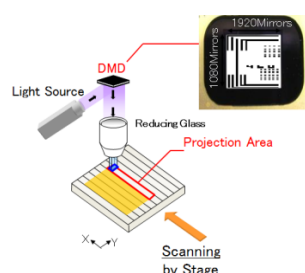


Figure 1 The Mask-Less Drawing Technology with DMD

On the other hand, PMT has acquired an ultra-precise XYZ stage control technology with a resolution of the nano-level performance through the "development of micro-nano fabrication system" by METI (Ministry of Economy, Trade and Industry) regional consortium. In addition, a researcher who has a PhD in this field was also joined.

The professor had continued research and development even after the end of joint research with Ballsemi, and PMT has been able to achieve commercialization of the mask-less drawing equipment with Tohoku University by taking advantage of public subsidy (supporting industry program) that is "Research and development of pattern generation technology and positioning accuracy of the microfabrication device". In this way, originally Ballsemi started innovation of the mask-less drawing equipment with a researcher of Tohoku University and let PMT succeed it in licensing-in later and has achieved commercialization. The interest of this paper is to explain why Ballsemi was forced to abandon the commercialization of joint research results, while PMT was able to come out. We will analyze and evaluate the difference in AC of both companies with the citation and quotation patent map by Patent Gazette which is the framework of this report.

Figure 2 is a quote-cited relationship diagram of Japanese Patent Laid-Open No. 2005-1567788 of mask-less lithography system that Tohoku University has been filed. Table 2 shows the number of quotes-citations in Japanese Patent Laid-Open No. 2005-1567788. As can be seen on the patent map, the

patent examiner referred to 246 Patent Gazette in order to determine "refusal" or "patent assessment". As for that we can say, the mask-less drawing equipment is constituted by very much inventive technical components. In other words, it is expected that the commercialization is very difficult if AC of these technical components is lacking.

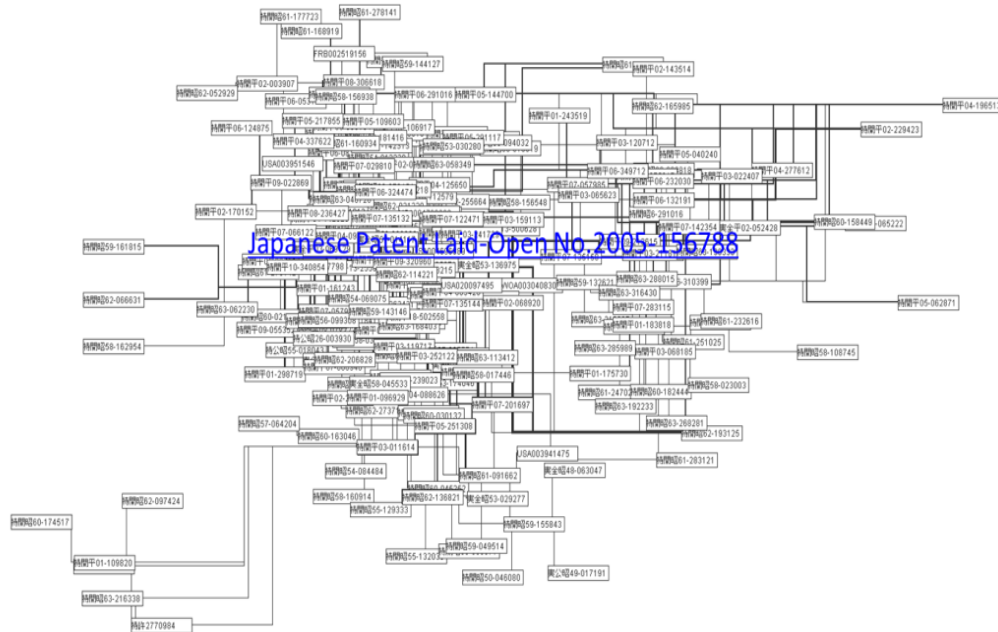


Figure 2 The Quote-Cited Relationship Diagram of Japanese Patent Laid-Open No. 2005-156788
Data source: YUPASS (Yamaguchi University Patent Search System)

Table 2 The Quotation & Citation Patent Map for Japanese Patent Laid-Open No. 2005-156788 –
Data source: YUPASS

246 Patents

出願番号	公開番号	発行国	名称	出願人
特願2003-393419	特開2005-156788	0	パターン描画装置	株式会社国際科学振興財団
引用文献				
公開番号	名称	引用国数	被引用数	
特開04-196513	投影露光装置および走査露光方法	19	52	
特開06-193125	露光装置	12	0	
特開01-298719	露光装置	11	0	
特開02-037774	走査露光装置	11	28	
特開02-229423	走査及びパルス高輝度投影露光装置	9	39	
特開02-065222	半導体装置の露光装置	9	17	
特開04-277612	投影露光装置及び投影露光方法	8	16	
特開06-1380619	露光装置	7	0	
特開05-226217	投影露光装置及び方法、並びに電子装置方法	6	14	
特開08-038822	投影露光装置	5	14	
特開06-091662	投影露光装置	5	0	
特開02-061323	投影露光装置および投影露光方法	4	1	
特開00-133562	パターン装置	4	28	
特開05-367124	投影露光装置	4	16	
特開06-145730	投影露光装置	4	0	
特開06-158449	露光装置	4	0	
特開07-201697	露光装置	4	8	
特開07-029810	走査露光装置	4	10	
特開01-175730	露光装置	4	10	
特開05-206006	パターン装置	4	16	
特開05-275317	露光装置及び方法、並びにデバイス製造方法	4	5	
特開04-030874	露光装置及び方法、並びにデバイス製造方法	4	5	
特開06-230629	照明光学装置	4	0	
特開08-140935	照明光学装置	4	0	
特開02-222844	マスク投影露光装置	4	0	
特開02-115718	照明光学系	4	0	
特開06-027414	照明光学系	4	0	
USA04796680	照明光学系	4	0	
特開08-103976	照明光学系	4	0	
特開09-076425	照明光学系	4	0	
特開06-1232616	露光装置	4	0	
特開02-074024	投影露光装置	4	16	
特開02-097424	半導体装置の露光装置	4	0	
特開05-143033	露光装置	4	0	
特開06-1117554	露光装置	4	0	
特開04-015440	投影露光装置	4	0	
特開01-257317	露光装置及び投影露光装置による露光方法	4	12	
特開06-182444	半導体露光装置	4	0	

4.2 Implementation of the AC Evaluation Framework

Since Patent Gazette with much number of citations is generally a fundamental patent for the invention, we suppose that the mask-less lithography system is possible to utilize technologies described in these publications. The roughly top 10% that is referenced more than 15 times are supposed having important technical components that are indispensable for the mask-less drawing equipment, and as shown in Table 3, we suppose technical component of the mask-less drawing equipment by analogy from the technical component of each Patent Gazette. For each technical component, based on the interview with Ballsemi and PMT, we evaluate as “Excellent>Good>Average>Bad” with the criteria mentioned above. Finally, for each and adding points 100,75,50,25, to obtain an average score. As a result, the metrics of the AC for Bollsemi is 46.9 points, while PMT is 73.4 points was found.

PMT has achieved the commercialization of the mask-less drawing equipment due to highly AC of each technical component, on the other hand, since Ballsemi was insufficient for AC of the ultra-precision moving control technology for the stage which synchronized with the pattern data transfer speed which is the most important technical component of the mask-less drawing equipment, we suppose that it did not technically lead to the product development. In addition, Ballsemi licensed out the technology to a company in Japan, which successfully commercialized.

Table 3 The AC Rating for Each Technical Component of the Mask-Less Lithography System

No.	Published patent#	Title	Applicant	# of quotation	# of received citation	Technical component for the patent	Technical component for the patent(2005-156788)	Absorptive Capacity			
								Ballsemi		PMT	
1	特開平04-196513	Scanning exposure method and projection exposure equipment	Nikon	19	62	Step-and-scan system	Ultra-precise movement control technology of stage synchronized with the pattern data rate	Bad	25	Excellent	100
2	特開平04-277612	Projection exposure method and projection exposure equipment	Nikon	8	46	A larger depth of focus of the apparent of the projection optical system	Ultra-precision axis control technology of stage	Bad	25	Excellent	100
3	特開平02-229423	Repeat high resolution projection lithography equipment and scanning	Kantial Jay	9	39	Step-and-scan system	Ultra-precise movement control technology of stage synchronized with the pattern data rate	Bad	25	Excellent	100
4	特開平07-037774	Scanning exposure equipment	Cannon	11	26	Corrects the exposure unevenness at the time of scanning, and a uniform exposure distribution	Effective Mirror Map	Average	50	Good	75
5	特開2001-135562	Lithographic equipment	Hitachi	4	28	Maskless exposure method	DMD control technology	Good	75	Good	75
6	特開平03-065623	Pupil illumination distribution measurement method, and the measuring device	Hitachi	1	25	Pupil illumination distribution measurement method, and the measuring device	Effective Mirror Map	Good	75	Good	75
7	特開平05-251308	Method for fabricating a semiconductor device	Nikon	3	24	High-performance lighting optical system	High-performance lighting optical system for exposure	Bad	25	Bad	25
8	特開平06-310399	Equipment and projection exposure method and device manufacturing method	Nikon	2	20	Exposure correction method	DMD control technology & Ultra-precise movement control technology of stage	Average	50	Good	75
9	特開平01-298719	Exposure device	Hitachi Hokkai Semiconductor	11	19	Automation of lighting adjustment	Automated generation effective Mirror Map	Average	50	Good	75
10	特開平05-045605	Lighting optical device	Pentax	2	19	Ways to increase the Amount of lighting Energy	High-performance lighting optical system for exposure	Bad	25	Bad	25
11	特開平07-057986	Exposure method and equipment	Nikon	2	17	Even if large, the exposure field exposure equipment without lowering the throughput, it is possible to transfer a circuit pattern under good imaging performance	DMD control technology & Ultra-precise movement control technology of stage	Average	50	Good	75
12	特開2000-058442	Lithographic projection equipment	ASLM	3	17	Uniform light distribution	Effective Mirror Map	Average	50	Good	75
13	特開平02-065222	Exposure equipment of semiconductor Manufacturing	Yamagata NEC	9	17	Automatic correction of exposure intensity	Light source intensity automatic variable	Good	75	Good	75
14	特開平06-232030	Exposure method, a scanning exposure apparatus, and device manufacturing method	Nikon	2	17	Proper exposure the exposure amount of the photosensitive substrate	Effective Mirror Map	Average	50	Good	75
15	特開平05-206006	Patterning equipment	Texas Instruments	4	16	Drawing device of step-and-repeat method using a DMD	N.A.	N.A.	N.A.	N.A.	N.A.
16	特開平05-267124	Projection exposure equipment	Toshiba	4	16	Improvement of the filter defining the pupil shape and source shape	DMD control technology & Effective Mirror Map	Average	50	Good	75
17	特開平06-324474	Photomask and Exposure method	Nikon	2	15	Reduction of contrast difference occurring in the connection of the screen during synthesis	DMD control technology & Ultra-precise movement control technology of stage	Average	50	Good	75
								Avg. Point	46.9	73.4	
								Bad: 25, Average: 50			
								Good: 75, Excellent: 100 point			

5 Implications

When aiming at an innovation which used external technology as the core, with AC of its company by evaluating on the quotation & citation patent map which is a framework of this research, it is possible to build an associate base of the management judgment such as licensing-out, licensing-in, outsourcing-in, partnership networking, etc..

Even if we carry out technical search and learning of the collaborative investigation and then created some kind of knowledge, the subsequent activity is not connected directly to the conclusion whether you should carry out in-house. When AC is insufficient like Ballsemi, a management judgment which carries out licensing-out to the other company can be attractive. Ballsemi acquired the loyalty by it, and the company which did licensing-in has succeeded in commercializing.

On the other hand, you can perform a management judgment to enforce licensing-in when you have enough AC to its commercialization as PMT. In addition, if there is a technical component which is

insufficient of AC, you should not give up R&D or commercialization, you should consider a management judgment which complement the lack of AC with open innovations, such as outsourcing-in and partnership networking, can also be made. Since PMT did not have an optical technology, the development of the technology was assigned to the external optical special marker. However, since an integration, such as adjustment, was required in order to incorporate an optical system in the equipment, currently PMT has employed optic engineers in the company.

6 Conclusion

When the product development type SMEs, where R & D resource is scarce, performs a licensing-in of a seed which a university or a research institution have, and commercialize with a unfamiliar technical component by industry-university cooperation, AC which assimilates and takes the technical component into its company is required. As a method to evaluate this, we extracted major technical component by the quotation & citation patent map by Patent Gazette and showed the method to evaluate the company's AC for it through the case study of the mask-less drawing equipment of Ballsemi and PMT.

If the evaluation score is low, the commercialization can be made by performing the licensing-out to other companies as example of Ballsemi. In addition, when an evaluation score of a technical component is low, neither development nor commercialization can be given up but a management judgment compensated with the lacking technology by licensing-in etc. can also be made.

However, when making the decision to embrace external knowledge, it does not necessarily mean that we should only take an external knowledge group that scores high. A high score suggests the height of the technical vicinity of external knowledge to company knowledge base, and suggests the height of the feasibility of commercialization. On the other hand, the decision to accept only high score promotes conservative posture against external knowledge as it implies to accept what is familiar and is at risk of inhibiting learning about external new knowledge. Therefore, in order to aim at the expansion of AC (Zahra and George, 2002) as a dynamic capability that affect the sustainability of the company's competitive advantage, you need to have a variety to the score of the external knowledge acquisition project which exceeds the lower threshold of AC designated in the company. A strategic judgment is necessary whether we should try it, even if AC score is low if it is risky yet promising project.

Finally we should show the limit of the approach developed in this report. Needless to say, this paper is exploratory research, and must be validated by the application to many cases. Be premised on it, when the seeds which a university or a public research organization create have limited path dependency from existing technical component, since there are few numbers of Patent Gazette which a patent examiner quotes, it is difficult to extract main technical components through the quotation & citation patent map. In addition, the evaluation method of this report is not applicable when technological components of the seeds are unobservable. In addition, even if we have the given conditions which is the validity of attention to individual, we must consider the need to consider the influence on AC such as individual learning ability, motivation, and personality. We would like to make these points in a future discussion.

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The Impact of Customer Participation on Innovation Capability: Moderating Role of Power Asymmetry*

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Abstract: This study outlines a model of why and how the respective influence of customer participation on innovation capability is likely to be moderated by the level of power asymmetry. The results are based on a sample of 256 firms in the B2B market of china. By testing our model using hierarchical regression, the results generally support the proposed hypotheses, in that power asymmetry has a significant negative moderating effect on the impact of information sharing and responsible behavior on innovation capability. In contrast, we find that power asymmetry has a significant positive moderating effect on the impact of personal interaction on innovation capability. Implications for management theory and practice are discussed.

Key words: Business-to-business market; Customer participation; Innovation capability; Power asymmetry

1 Introduction

In the focus of recent literature on capability research, an attempt to explain capability differences between firms has shifted from firms' internal elements to industry-level external relationships. Co-create value with customers can be necessary in a fiercely competitive environment. The topic of customer participation and its deterrent has been dealt with extensively in recent years. When focusing on innovation capability there is a great deal of room for further investigating how customer participation impacts a firm's innovation capability. Customer participation means the degree to which the customer is involved in producing and delivering the service (Dabholkar, 1990), which we focus on in the business-to-business (B2B) market of china. This study examines the innovation capability of B2B firms in order to better understand relationships between customer participation and innovation capability.

Power asymmetry refers to the degree to which one firm holds substantially more or substantially less power than another in a cooperative relationship (Pfeffer, 1981; Cani, 2009). Strategic management scholars have dedicated considerable effort to understand the power asymmetry effect (Johnsen & Ford, 2008). Although a few pioneering studies have examined how power asymmetry may affect the relationship between co-creators and firm-level performance, little is known about how power asymmetry influences customer participation and thereby differentiates firm's innovation capability. Because of continuing competition between co-creators, an investigation of the role of power asymmetry offers substantial value and importance to practitioners. Moreover, an investigation of the role of power asymmetry may refine our conceptual understanding of the customer participation-innovation capability link.

Given this, the authors argue that a close customer-firm relationship is important in the acquisition of information, in responsible behaviors and in personal interaction, if customers participate in value co-creation process. Specifically, we propose that power asymmetry play a moderating role in the linkage between customer participation and innovation capability. In order to further understand the effects of differing customer roles in value co-creation process, we adopt Ennew and Binks' (1999) categories, customer participation including following three dimensions: information sharing (CPIS), responsible behavior (CPRB), and personal interaction (CPPI). We examine the effect of customer participation on B2B firm's innovation capability and subsequently by assessing the moderating influence of power asymmetry on the relationship between customer participation and innovation capability.

Drawing from arguments of customer participation, innovation capability, and power asymmetry, through this richer explanation and empirical assessment, we contribute to greater clarity of how customer participation may contribute to successfully developing innovation capability. In the next section, we develop the theoretical model and hypotheses, drawing on prior literature from several

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theoretical disciplines that have studied customer participation. The details of data collection and analysis are then presented, and the results are discussed. The paper concludes with implications and suggestions for further research.

2 Literature Review

2.1 Customer participation

Customer participation is defined as “the degree to which the customer is involved in producing and delivering the service” (Dabholkar, 1990). Meuter and Bitner (1998) distinguished among three types of service production based on the level of customer participation: firm production, joint production, and customer production. The argument suggested by Vargo and Lusch (2004a), that the “customer is always a co-creator,” serves as one of the foundational premises for the emerging dominant logic of marketing. Further, Prahalad and Ramaswamy (2000) advocated co-opting customer competence as a competitive strategy. Customers are no longer “passive audience,” but “active coproducers.” They are actively co-creating values with service providers, through which their individual needs are better served and satisfaction enhanced. Ennew and Binks (1999) suggest that participation consists of three broad dimensions: information sharing (CPIS), responsible behavior (CPRB), and personal interaction (CPPI).

2.1.1 Information sharing

Information sharing is defined as the degree to which customers are involved in firm’s Value co-creation to share information stemming from their downstream customers. For successful value co-creation, customers should provide resources such as information for use in value co-creation processes (Lengnick-Hall, 1996). If customers do not provide essential information, employees cannot even begin or perform their duties. Through sharing information with employees, customers can ensure that employees provide the service that meets their particular needs (Ennew & Binks, 1999). For example, taking the car in for service, customers need to give the mechanic information about strange noises or vibrations. Or when ordering a cake for a special occasion, customers should provide adequate information for the flavor and design. Patients should provide the physician with proper information about their condition so that the physician can make an accurate diagnosis. If customers fail to provide accurate information, the quality of value co-creation may be low. Thus, information sharing is the key to the success of value co-creation.

2.1.2 Responsible behavior

Responsible behavior emphasizes a joint problem-solving approach, in which customers and firms work together to accomplish development tasks throughout the Value co-creation (Bonner, 2010). Responsible behavior occurs when customers recognize their duties and responsibilities as partial employees (Ennew & Binks, 1999). For successful value co-creation between themselves and employees, customers need to be cooperative, observing rules and policies and accepting directions from employees (Bettencourt, 1997). For example, customers must follow the employees' directives and be physically present for the successful value co-creation. Without customers' responsible behavior, little value co-creation occurs in the service encounter.

2.1.3 Personal interaction

Personal interaction refers to interpersonal relations between customers and employees, which are necessary for successful value co-creation (Ennew & Binks, 1999). Kelley et al. (1990) use the term customer functional quality to refer to the interaction between customers and employees, which includes interactional aspects such as courtesy, friendliness, and respect. Value co-creation in a service context takes place in a social setting; the more pleasant, congenial, and positive the social environment is, the more likely customers are to engage in value co-creation (Lengnick-Hall et al., 2000).

2.2 Innovation capability

Innovation is often described in terms of changes in what a firm offers the world (product/service innovation) and the ways it creates and delivers those offerings (process innovation) (Francis & Bessant, 2005). While there are many ways a firm can achieve a competitive advantage, two of the most important in dynamic markets are innovation and strategic flexibility (Barney, 1991). Innovation is a critical activity for companies and firms that do not innovate can not eliminate risks from the market. Samson (1991) classifies innovation into three categories: 1) product innovation; 2) process innovation; and 3) managerial and systems innovation.

Based on Samson’s concept of innovation categories, Tasi et al (2001) define a firm’s innovation capability as including product innovation, process innovation, and managerial innovation. The first

definition, product innovation, is that a firm can provide differentiated or new products/services in the market and obtain satisfaction from customers. In this definition, product improvement and new product development which can satisfy customers is the basis of product innovation. This product innovation may include three categories: radical innovation, incremental innovation and system innovation in the new product development process. On the other hand, process innovation is a process in which a firm can provide a better manufacture or service process than current operation in order to achieve better performance. Tasi et al. describe how a method of generating modification or a new process in a current operational step or procedure can offer a capability for innovative process. By doing so, a new process may reduce operational costs or generate more production for a firm. In the same vein, process innovation belongs to the area of technical innovation. Management innovation is a capability that improves a firm's performance by implementing new managerial regulations, systems, and methods etc. Therefore, knowing how to increase a firm's managerial functions and mechanisms in terms of improving managerial efficiency becomes an innovative capability. In this regard, management innovation is the management aspect of innovation.

3 Research Model and Hypotheses

3.1 Information sharing and innovation capability

Several studies have confirmed the effect of information sharing on innovation capability. For instance, Verhoef (2003) and Lagrosen (2005) found that manufacturers can launch more new products and services into the marketplace by using information from clients regarding market preferences, market demands, and market competition. Ottum and Moore (1997) and Souder et al. (1997) also verified that using information provided by clients facilitates the development of more diverse new products and modifications to the functions of existing products to meet the needs of specific target markets. Carr and Pearson (1999) pointed out that information sharing between manufacturers and their clients about markets, designs, and processes enables manufacturers to adopt technologies that can improve design and process innovative capabilities. Overall, there are positive effects of information sharing on product and process innovations.

Intra-organizational information exchange is important for the creation and diffusion of innovations within complex multiunit organizations. Frequent and close interactions allow actors to know each other, share important information, and create common ideas. Hence, an actor that is central in a network of social interactions likely has greater potential to integrate organizational resources (Tsai & Ghoshal, 1998). Dean and Evan (1994) observed that sharing information about market competition, sales promotion, market demand, and market preference enables manufacturers to develop better innovative mechanisms in pricing, sales promotion, distribution, and interaction marketing strategies. Therefore, information sharing has a positive effect on marketing innovation. Lin and Germain (2004) found it is important that customers are willing to provide feedback on their specific needs, such as after-sale services, warranty systems, and claims handling procedures. Manufacturers can follow up on the customers' opinions and feedback to improve their customer service systems. In other words, there is a positive effect of information sharing on service innovation. Accordingly, we suggest the following hypothesis:

H1: Information sharing will be positively related to innovation capability.

3.2 Responsible behavior and innovation capability

Responsible behavior emphasizes a joint problem-solving approach, Joint problem solving is considered as a key factor affecting the success of product and market development. In a joint problem-solving process, the Value co-creation consists of a set of interrelated, specific tasks distributed between the customer and the manufacturer (Von Hippel 1990). The development team can challenge traditional perspectives and discover novel linkages in the development process (Milliken & Martins 1996; Osborn 1963) by connecting different design parameters that have not been linked before or by finding new ways to uncover creative elements (Amabile 1983), which can significantly enhance *CPRB*'s effect on new product innovativeness (Krishnan & Ulrich 2001; Sethi et al., 2001). For example, Von Hippel (1990) argues that finding new ways to connect the design of a car's piston and engine cylinder could improve the innovativeness of auto engine designs.

Ritter and Walter (2003) believed that it would be easier for manufacturers to improve product quality and technical process ability when customers voluntarily provide assistance to solve product design or technical process problems. Joint problem solving influences innovation in that it generally introduces ongoing improvements to existing products, processes, or services, and it exploits the

potential of established designs, processes, and markets (Huang & Chang, 2008). Thus:

H2: Responsible behavior will be positively related to innovation capability.

3.3 Personal interaction and innovation capability

In social network theory, the strength-of-ties literature typically involves both strong and weak ties. Following Granovetter's (1973) description, strong ties are viewed as having a high degree of closeness, mutual trust and reciprocal action of a relationship between two parties, which are more likely to result in sharing of sensitive information than weak ties (Uzzi, 1997).

When customers participate in idea generation during a Value co-creation, they use a variety of cues and feedback to communicate customer preferences and needs through face-to-face interactions, group discussions, meetings and electronic communication channels. Such interaction is more likely to develop a better understanding of the pertinent knowledge possessed by both parties, and to identify what information needs to be shared (Fang et al., 2008), as well as generate an atmosphere of trust, raising inter-organization bonds.

The development project requires trial-and error and iterative procedures to find alternative routines and solutions. In addition, both parties may probe into the application and consequences of new products within the customer's organization (Bonner, 2010). During co-development, however, both parties must meet frequently to build understanding and solve problems (Peters et al., 2010). Rich communication offers important clues that enable interpretation of each party's behavior and motivations, which stabilizes the collaborating relationship and promotes trust (Dyer & Chu, 2000). Furthermore, firms would form new mechanisms to support and coordinate their efforts (Zablah et al., 2005) for identifying how to work more cooperatively and increasing innovation quality (Nambisan, 2002). Taken together, we propose the following hypothesis:

H3: Personal interaction will be positively related to innovation capability.

3.4 The moderating role of power asymmetry

Power asymmetry can have an important effect on the relationship between Customer Participation and innovation capability. Dialog, access, risk-benefits, and transparency (DART) are emerging as the basis for interaction between the consumer and the firm. Dialog is an important element in the co-creation view. Markets can be viewed as a set of conversations between the customer and the firm (Levine et al., 2001). Dialog implies interactivity, deep engagement, and the ability and willingness to act on both sides. It is difficult to envisage a dialog between two unequal partners. When one of the parties dominates the other and forces its views onto the other partner, innovation capability could be negatively affected. In such situations the sharing of data and information which is critical to value co-creation will be difficult or even impossible. Furthermore, Ford and Thomas (1995) showed that in asymmetric relationships communication will predominantly go from the dominating party to the dependent party. The lack of balance in power in turn hampers the dependent party's responses to the dominant party's initiatives. Hence, symmetry in the power situation of two partners is expected to facilitate co-creation experiences, power asymmetry will lead to less customer participation.

From the relationship marketing perspective, business relationships affect a firm's innovativeness and competence. The innovation capability of a firm reflects how successful it has been in combining relationships and its own features. Power symmetry therefore indicates to other firms that a company has the potential to be a strong contributor to co-creation within the relationships. Without the types of symmetry relationships that are considered to make important contributions in value co-creation process and are seen as valuable and distinctive by the other party, value co-creation may be hollow. Interaction with another party in a symmetrical relationship will determine the usefulness of value co-creation and will enhance the capability in which these symmetrical relationships are developed. In so doing, we expect to find innovation capability to be most effective when dyadic power relationship is symmetry. Thus, we propose the following hypotheses:

H4: Power asymmetry will negatively moderate the relationship between Customer Participation and innovation capability.

H4a: Power asymmetry will negatively moderate the relationship between CPIS and innovation capability.

H4b: Power asymmetry will negatively moderate the relationship between CPRB and innovation capability.

H4c: Power asymmetry will negatively moderate the relationship between CPPI and innovation capability.

The above hypotheses are shown in Figure 1. The Hypothesized model will be empirically

analyzed in the next section.

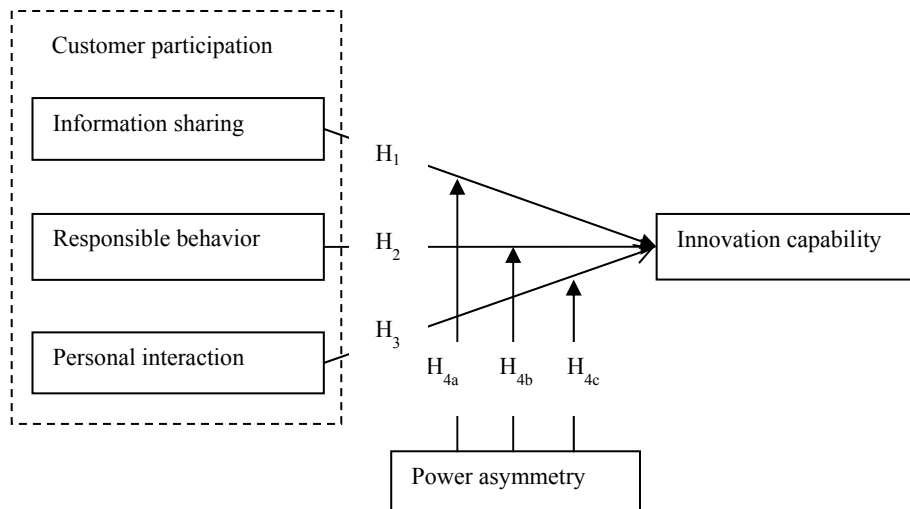


Figure 1 Hypothesized Model

4 Method

4.1 Pretest, sample, data collection

For pretesting, a random selection of 30 CEOs or senior executives was contacted to increase content validity. After obtaining their consent to participate, the 30 CEOs or senior executives were asked to evaluate the draft questionnaire. Based on their feedback, we modified some of the survey questions accordingly. Cover letters sent with the revised questionnaires confirmed the respondents' involvement with customer participation in question, stressed the importance of this research, and offered an incentive (a copy of the finished report summarizing our research findings). To maximize the response rate, we used the mail survey methods suggested by Dillman (1978), including a follow-up letter with an additional copy of the questionnaire sent to non-respondents 1 month after our initial mailings. We also assessed the key informant quality in our survey to make sure that respondents were knowledgeable about the customer participation on which they reported, and then eliminating respondents who were not knowledgeable about the customer participation on which they were reporting. A total of 600 questionnaires were distributed and 256 responses were received, for a response rate of 42.6%. The sample used in this study includes 256 firms in the B2B market of china, as described in Table 1.

Table 1 Distribution of firms

Variables	Number of firms	Percentage
Number of employees		
1-100	77	30.1%
101-300	53	20.7%
301-500	24	9.4%
501-1000	27	10.5%
>1000	75	29.3%
Industry		
Manufacturing	132	51.6%
Service	124	48.4%
Firm age		
1-5 years	38	14.8%
6-10 years	65	25.4%
11-15 years	59	23.0%
16-20 years	15	5.9%
>20 years	79	30.9%

Table 1 provides an overview of the relative distribution of the firms in terms of the following three relevant variables: number of employees, industry classification, and firm age. The largest group of firms has between 1 and 100 employees (30.1%), and 29.3% of the firms that employs over 1000 employees. In terms of industry classification, 132 firms (51.6%) belonged to Manufacturing and 124 firms (48.4%) belonged to Service. The largest group of firms established less than 10 years (40.2%), and 30.9% for firms of over 21 years, and 28.9% for firms between 11 and 20 years of age.

4.2 Measurement and validity

4.2.1 Customer participation

In customer participation, we utilized the work of Yi and Gong (2012) to distinguish three dimensions of customer participation, CPIS, CPRB and CPPI. Through sharing information with employees, customers can ensure that employees provide the service that meets their particular needs (Ennew & Binks, 1999). A new three-item, seven-point Likert scale was developed to measure CPIS. Cronbach's α for these items is 0.91. Responsible behavior occurs when customers recognize their duties and responsibilities as partial employees (Ennew & Binks, 1999). Three items that use a seven-point Likert scale were developed to measure this construct. Cronbach's α for these items is 0.83. In addition, CPPI refers to interpersonal relations between customers and employees, which are necessary for successful value co-creation (Ennew & Binks, 1999). Three items that use a seven-point Likert scale were developed to measure this construct. Cronbach's α for these items is 0.85.

4.2.2 Power asymmetry

The idea of power asymmetry was to see if dependence levels differ in asymmetric relationships when one party is less/more dependent than the other party. Therefore, operationally, there is difference in the dependence levels. Assuming dependence to be the obverse of power, a positive value indicates a power advantage, and a negative value a disadvantage. The three items (see Appendix) to measure dependence were drawn from Lusch and Brown (1996) and Gelderman (2003). Cronbach's α for these items is 0.82 and 0.90 respectively. We use mean of these items to measure dependence. More specifically, we computed the absolute difference between focal firm's dependence on the customer and the customer's dependence on focal firm to measure power asymmetry.

The reliability of each unidimensional scale was examined by computing the reliability coefficient. Convergent validity was investigated by performing a series of confirmatory factor analyses (CFA) at the first-order level. The criterion of all factor loadings being significant at the 0.05 level was used as an indicator of convergent validity. Discriminant validity was assessed by estimating a two-factor first-order model for each possible pair of scales. Thus, three dimensions of customer participation and power asymmetry, and their unidimensionality was asserted using CFA. The CFA fit statistics ($\chi^2=160.08$, $df=80$, $GFI=0.92$; $AGFI=0.88$; $NFI=0.95$; $CFI=0.98$; and $RMSEA=0.063$) indicate an acceptable level convergent and discriminant validity (Joreskog & Sorbom, 1989). After purification, the scales indicated a sufficient degree of unidimensionality, reliability, and validity.

4.2.3 Dependent variable

Innovation capability was treated as a unidimensional construct. The items of innovation capability were extracted from the literature on innovation and innovativeness. Specifically, this study measured innovation capability from the following two aspects: innovation of products and process (Song et al., 2008) and an innovative culture in the organisation, in terms of receptivity and willingness to foster innovation (Wang & Ahmed, 2004). Statements like "In comparison with our competitors in China, our firm has introduced more innovative products/services during the past five years" and "Key executives of our firm are willing to take risks to seize and explore 'chancy' growth opportunities" were included in the survey. Cronbach's α for these five items is 0.91.

4.2.4 Control variables

There are some variables not considered in the hypotheses that may still influence innovation capability. We thus control for some variables that are likely to affect capability, including firm size, firm age, and industry diversity. Firm size, a commonly used control variable often related to diversity levels, is measured by the logarithmic function of number of total employees (Blonigen & Taylo, 2000). This is significant because large firms have more resources invested in R&D, marketing campaigns, and production equipment than smaller firm, they may have greater innovation capability than smaller firms. Firm age, an important control variable, is measured by the natural logarithm of the number of years a firm has been in existence since younger firms often pursue more radical innovations than older firms (Huerger & Jaumandreu, 2004; Geenhuizen & Reyes, 2007). Industry diversity is very difficult to operationalize, and even the data necessary for empirical work are often unavailable or unreliable.

Hence if it is not possible to include these factors in an empirical study, it is especially important to control for innovation capability differences. The industries were divided into 2 different classifications.

5 Results

Table2 provides descriptive statistics and a correlation matrix. The hypotheses were tested by estimating the following equation using ordinary least squares regression:

$$IC = \beta_0 + \beta_1 FS + \beta_2 FA + \beta_3 IC + \beta_4 CPIS + \beta_5 CPRB + \beta_6 CPPI + \beta_7 PA + \beta_8 CPIS \times PA + \beta_9 CPRB \times PA + \beta_{10} CPPI \times PA + \epsilon$$

Table 2 Correlations among Variables (N=256)

	Mean	SD	1	2	3	4	5	6	7	8
1. Innovation Capability	4.77	1.01	1							
2. Information sharing	5.40	1.21	0.52**	1						
3. Responsible behavior	4.84	0.93	0.51**	0.57**	1					
4. Personal interaction	4.75	0.94	0.43**	0.63**	0.52**	1				
5. Power asymmetry	1.20	1.15	-0.05	-0.09	-0.09	-0.20**	1			
6. Firm age	2.60	0.86	0.55	0.03	0.10	0.02	0.07	1		
7. Firm size	2.64	0.94	0.26**	0.07	0.03	-0.05	0.02	0.58**	1	
8. Industry classification	0.48	0.50	-0.07	0.05	0.09	0.13*	-0.16*	-0.20**	-0.26**	1

In order to test this study's hypotheses, we analyzed different models (see Table 3). Using the three models shown in Table 3 helps us to examine the increases the variance explained, which is reflected by an increase in the adjusted-R squared. Moreover, following these steps, we can test for a moderator (Baron & Kenny, 1986) . First, the control variables were regressed in the dependent variable. Our findings are listed in Table 3. From the results presented in Model 1, it follows that firm size yield negative significant result and firm age yield positive result. Therefore, we find supports for differences that pertain to firm size and firm age.

Table 3 Results of Hierarchical Regression

	Model 1			Model 2			Model 3		
	β	t-value	VIF	β	t-value	VIF	β	t-value	VIF
Control variable									
Firm age (FA)	-0.15*	-1.96	1.52	-0.20**	-3.35	1.57	-0.23**	-4.11	1.61
Firm size (FS)	0.34**	4.54	1.57	0.34**	5.60	1.62	0.38**	6.68	1.65
Industry classification (IC)	-0.01	-0.04	1.08	-0.07	-1.37	1.12	-0.08	-1.73	1.13
Direct effect									
Information sharing (CPIS)				0.24**	3.55	1.96	0.27**	4.25	2.01
Responsible behavior (CPRB)				0.31**	5.15	1.62	0.28**	4.90	1.64
Personal interaction (CPPI)				0.15*	2.32	1.85	0.17**	2.80	1.88
Power asymmetry (PA)				0.03	0.51	1.07	0.01	0.12	1.16
Moderating effect									
Information sharing \times power asymmetry							-0.37**	-5.13	2.59
Responsible behavior \times power asymmetry							-0.08*	-1.97	1.67
Personal interaction \times power asymmetry							0.22**	3.03	2.62
Adjusted R-square	0.07			0.41			0.49		
R-square change	0.08			0.43			0.51		
F	7.42			37.93			13.30		

Note: * $p < .05$, ** $p < .01$

In testing the hypotheses relating to the moderating effects, moderated regression analysis, as recommended by Irwin and McClellan (2001) , was undertaken hierarchically to test for significant interaction effects over and above the simple effects of independent variables. These tests allow us to

expand on both the importance and the significance of the interaction. The resultant models are shown in Table 3. Model 2, containing the simple additive model, show that respective CPIS ($\beta=0.24, t=3.55, p<0.01$), CPRB ($\beta=0.31, t=5.15, p<0.01$) and CPPI ($\beta=0.15, t=2.32, p<0.05$) positively impact innovation capability. Thus, H1, H2 and H3 are supported, respectively. At the next stage the three interactive terms were added to Model 3 resulting in a statistically significant increase in R^2 . This result reveals that the effects of CPIS, CPRB and CPPI on innovation capability are influenced by the level of power asymmetry. Although the main effect of CPIS was positive, the interaction of CPIS and power

Asymmetry on innovation capability ($\beta=-0.37, t=-5.31, p<0.01$) was negative and significant. H4a is supported. To better interpret our findings, we conducted a simple slope test, as described by Aiken and West (1991). This revealed that, for the slope significance test at low level ($t=7.468, p=0.000$) of power asymmetry, the relationship between CPIS and innovation capability is statistically significant. We used the ModGraph software (2010) and graphed the interaction effects following procedures set forth by Cohen (2003), as shown in Figure 2.

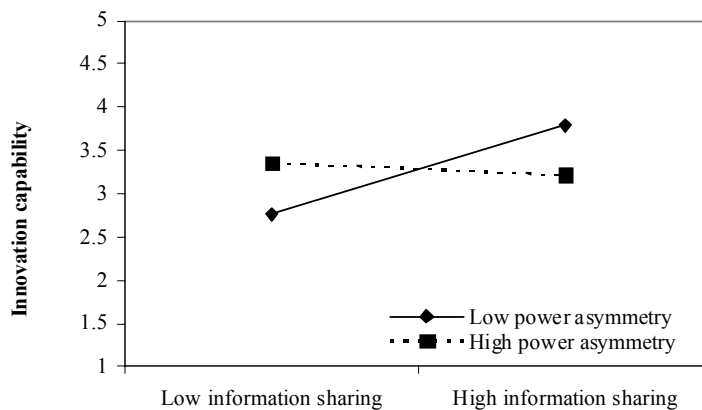


Figure 2 Moderating Role of Power Asymmetry on the Information Sharing-Innovation Capability Link

In addition, the interaction of CPRB and power asymmetry on innovation capability ($\beta=-0.08, t=-1.97, p<0.1$) was negative and significant. H4b is supported. A simple slope analysis showed that at both high ($t=2.661, p=0.008$) and low ($t=4.749, p=0.000$) levels of power asymmetry the relationship between CPRB and innovation capability is positive and statistically significant. Figure 3 shows the moderating role of power asymmetry (high and low levels) on the CPRB-innovation capability relationships.

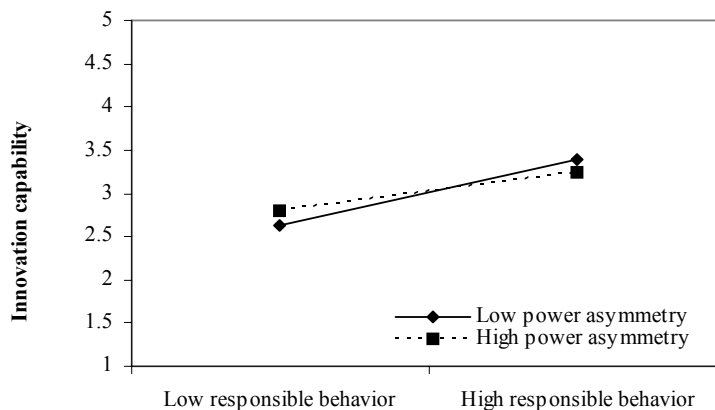


Figure 3 Moderating Role of Power Asymmetry on the Responsible Behavior-Innovation Capability Link

Finally, in contrast to the hypothesized relationship, the interaction between CPPI and power asymmetry is significant but positive for innovation capability ($\beta=0.22, t=3.03, p<0.01$). H4c is not supported. A simple slope analysis showed that at high ($t=4.808, p=0.000$) level of power asymmetry the relationship between CPRB and innovation capability is positive and statistically significant. Fig 4

shows the moderating role of power asymmetry (high and low levels) on the CPPI-innovation capability relationships.

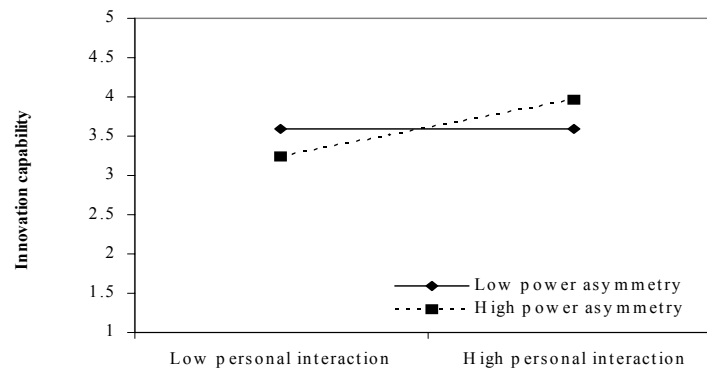


Figure 4 Moderating Role of Power asymmetry on the Personal Interaction-Innovation Capability Link

6 Discussions

This research examined the effects of Customer Participation on innovation capability. We have further theorized that power asymmetry may moderate the individual effect of Information sharing, Responsible behavior and Personal interaction on innovation capability. Our results demonstrate the need to make a distinction among the three moderating effects. Specifically, we found that the main effects for Information sharing, Responsible behavior and Personal interaction were positive, which largely extends previous research. We argue that, in order to enhance innovation capability, B2B firms must rely on more customer participation in the process of value co-creation. This finding also holds interesting managerial implications. First, when firms co-create value with its customers, the information obtained from its customers can be used to enhance strategy and operations in areas related to the innovative activities. This information sharing effect can constitute the benefits that a firm can earn unilaterally by acquiring innovative information from its customers. The information can be internalized by the firm and applied to innovative activities.

Second, the richer the prior responsible behavior of the customer is, the greater its exposure to various possible integrations with different co-creators is. Adaption should follow, as firms reduce inappropriate co-creator and find good ones. Thus, more extensive responsible behavior allows firms to identify effective processes for exchanging information and technology with their co-creators and for managing complex innovative activities with uncertain outcomes. More specifically, as customers accumulate responsible behavior, they are better able to make adaptations in value co-creation processes to attribute innovation capability. With customers' responsible behavior, firms can adopt better innovative processes to reduce the complicated time-consuming processes. This finding is in agreement with previous studies.

Third, better personal interaction will reinforce interaction between employees and customers, improve the member's openness and acceptance, These are the important psychological atmospheres for exertion of innovation capability. Moreover, good personal interaction will promote knowledge sharing between firm and customer, and benefit to firm's innovation capability. This finding is in agreement with previous studies that knowledge sharing works as an important mediator between personal interaction and innovation.

Most existing literatures implicitly suggest that information sharing is differentially effective, depending on whether the power situation is symmetrical or asymmetrical. Our results certainly do not detract from this view. We expand upon this notion that information sharing is likely to have a negative effect on the innovation capability under higher power asymmetry relationships. The potential explanation for this is that information sharing may have a negative effect when co-creators have imbalanced resources and capabilities in higher power asymmetrical relationships. This is typified in co-creation where one or more partners have more power or resources than the others. Since all parties in value co-creation relationships may face varying degrees of conflict in their interaction with other parties, conflicts may arise from partners' differing expectations in asymmetrical relationships so that goals and cultural norms of one party can eventually clash with those of another.

The implications are straightforward. First, innovation capability may have been underdeveloped in asymmetrical power relationships, or even have lain dormant over a period of time since the focus of

innovation development has been for the stronger partners' benefit. Conversely, weaker parties may lack capabilities in resource deployment and innovative development to assist the creation of new products. Therefore, it may be necessary for the stronger party to provide to weaker parties more new knowledge, specialized skills, resources, and activities.

The second implication is the development of new symmetrical relationships by information sharing and responsible behavior to improve innovation capability. Both parties need to redress the balance of their asymmetry relationship characteristics. Changing the nature of an asymmetrical relationship is not something that partners can do alone. Rather they must learn how to work in value co-creation with their partners, as both parties have influence over the direction of the relationship. Having learned to live with relationships where no mechanism for value co-creation has existed, weaker parties who are more used to coping with asymmetrical relationships with stronger parties may have gained little benefit in value co-creation. Therefore, the ability of learning to change from asymmetrical to symmetrical relationships between co-creators will be critical for creating better performance.

In the literatures, the relationship between personal interaction and innovation capability is mostly positive. Little empirical research has examined what moderators cause contradictory finding. As such, perhaps the most important contribution of this research is the results of our examination of power asymmetry as a moderator of the link between personal interaction and innovation capability. Personal interaction between co-creators with lower power asymmetry will result in less improve of innovation capability than co-creators with higher power asymmetry. A possible explanation for this unexpected finding is that power asymmetry could not be a polar opposite of co-creation. Power can be seen as a mechanism for achieving coordination among co-creators. Despite some critics' view of power as the antithesis of trust, Kumar contends that trusting partnerships can be built between unequal, but only that the onus is on the powerful party to treat the weaker, vulnerable party fairly. Relationships are seldom fair in power, nor are all parties equally active in commitment to a relationship. A general view is that such partnership arrangements tend to offer the most to the more powerful business partner. Therefore, this does not mean that such power asymmetry relationships are not workable or enduring. Moreover, power asymmetry may also be viewed as positive effect, which brings together different co-creators and staff within them with varied views, cultures, strategies and competitiveness.

7 Conclusions

In spite of these important contributions, several research limitations should be recognized to provide a balanced discussion of our findings. First, innovation capability, our dependent variable, might also be considered a type of corporate capabilities, and therefore, the use of innovation capability as a proxy of corporate capabilities might provide a limitation to this study. Future researches should examine other types of corporate capabilities, because customer participation is not only benefit to firm's innovation capability, but might also benefit to firm's other capabilities such as marketing capability, relationship capability, etc.

Second, due to the dynamic nature of the variables in study, customer participation, and power are seldom static and likely to change over time. This is because co-creators during the interactions may react differently depending on the different phases in the value co-creation relationships. Furthermore, another recent research has called for future studies' need to empirically assess the cooperation dynamics in value co-creation. In similar vein, this study employs of a cross-sectional design. In any model in which causality is suggested, longitudinal studies will provide for stronger inferences. Therefore, the proposed model developed in this study could benefit from being tested in a longitudinal design, so that actual situation of variables can be taken into account. Future research should also consider the need for longitudinal research, as longitudinal research designs may be needed to explore how comparison standards change over time, as customer participation along various phases of value co-creation developments. Though there is difficulty in this line of research, but this appears to be a critical area for future research.

Third, although the heterogeneous nature of our sample lends support to the generalizability of our results, there may be significant differences that might have attenuated our results. Had we used a sample that was more homogeneous, perhaps we would have reduced the variance noise, which might have resulted in more explained variance. One significant potential cause of attenuation involves the variables in a study: different industry may have different result of the research. Future research should take into account specific industry of customer participation.

To conclude, this article has conceptualized and tested a model to explain how customer participation influences innovation capability. The study of power asymmetry is still relatively new to

value co-creation research. We hope that this article has contributed to both researchers' and managers' understanding of these complex phenomena.

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An Empirical Analysis on Information-Based Innovation System in Chinese Enterprises*

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Abstract: In order to make the analysis of information-based innovation system in Chinese enterprises, confirmatory factor analysis (CFA) is used in this paper. By system design, system establishment, data collection and certification result, the CFA can effectively conduct empirical research on information-based innovation system in China's enterprises. For illustration, the collected copies are 200, and the effective rate of collection is 90%, which has satisfied the requirement that the questionnaire returns-ratio is not lower than 20% in the data investigation. The empirical results show that the information-based innovation of Chinese enterprises can't promote the technique absorbing ability, can't support the enterprise decision function efficiently, and can't improve the internal marketing. IT innovation development has not encouraged the development of organization learning as well as knowledge management. But information-based innovation system can provide foundational theory platform for all China's enterprises so as to promote IT innovation efficiency.

Key words: Technique innovation; Information-based innovation system; Internal marketing; CFA

1 Introduction

The information technique is a kind of technique which regards the calculator technique and the communication technique as core content and may realize the information function. There are twice leaps in 60's and in 80's of last century for information technique development. The one takes place under the environment of industry activity, whose influence is partial; the other takes place under the environment of the information technique and communication technique, and has descended the efficiency of network environment while it brings the profound influence for economy society including industry, government and family^[1].

The so-called "information-based paradox theory" holds the phenomenon which information-based construction can no longer produce direct economic efficiency and even descend the economic efficiency in partial realm. The "information-base paradox theory" is the inevitable phenomenon in the information-based construction process because the information technique and enterprise operation mechanism cannot blend each other deeply^[2]. These six stages include beginning stage, spread stage, control stage, integrated stage, data stage and mature stage. The "information-based paradox theory" usually appears in control stage.

The information technique innovation is the valid means to release the bad affection of "information-based paradox theory" according to experience of west flourishing nations. Chinese enterprises should strength the information technique innovation to get rid of the simplicity of traditional investment which obtain economic performance only by the method of annexing capital, and should put the information technique innovation and all enterprise operation including production, management and marketing together to develop the revolution of information technique function and to deeply dig potential of information technique result by which the enterprise performance and core competence of Chinese enterprises can be improved as highly as possible.

The information technique innovation is a kind of process which enterprise integrates the production constituent and production environment by means of applying information technique result to acquire high economic valuation^[3]. The information technique innovation in China's enterprises include various situation: implying new technique craft, exploring new production with information technique constituent, encouraging the production request related with information technique, acquiring the raw material supply including information technique content, adopting a new thought of information technique change. The system design of information-based innovation is the premise for China's

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enterprises to carry out information-based innovation strategy.

2 The System Design of Information-Based Innovation in Chinese Enterprises

2.1 The demand analysis of system design

The information-based innovation system can resolve 5 elements: information-based technique innovation, information-based management innovation, information-based market innovation, information-based production innovation and information-based environment innovation^[4].

The information-based management innovation element includes 4 measure indexes: decision ability innovation, performance ability innovation, encouragement innovation and human resource management innovation.

Information-based market innovation element includes 4 measure indexes: marketing outlet innovation, customer demand innovation, internally marketing innovation and CRM innovation.

Information-based production innovation element includes 4 measure indexes: quality management innovation, production adjustment innovation, warehouse management innovation and equipment maintenance innovation. Firstly, the quality management is a kind of important management activity of modern enterprise, which includes quality examination, product examination etc. The modern quality management generally asks for help from precise instrument and complicated process while had to handle with a great deal of data, so it must be supported by information technique to realize the task. Secondly, production adjustment is a kind of complicated project especially for big enterprise, which includes artificial arrangement, allotment, raw material supplying etc. Thirdly, warehouse management is an important content of modern enterprise. A precise or complicated production often contains thousands original parts, and the imperfection of an original material may cause the whole failure of production project. So the warehouse information system usually takes a great role in MIS of enterprise. Lastly, the equipment maintenance is also related with information technique because the important equipment contains information technique more and more and the maintenance and examination of equipment have already completely been placed in automation appearance.

Information-based environment innovation element includes 4 measure indexes: organization structure innovation, entrepreneur spirit innovation, organization learning innovation and knowledge management innovation. Firstly, the IT innovation certainly would incur the reformation of organization structure, and the organization structure would conversely promote the IT innovation. Generally speaking, the organization structure in network ages would gradually become the pyramid form of flat type because the rapid information deliver make many middle levels lost existence condition. Secondly, the entrepreneur spirit provides valid terrace for technique innovation of enterprise. The radical talent of entrepreneur isn't the management to daily business of enterprise, but innovation, namely innovation is the root profession of entrepreneur. Therefore IT innovation is an important mission of entrepreneur in information-based ages. Thirdly, organization learning has become an important target of modern enterprise management and the IT provides the valid means for organization learning because the IT raises the circulated speed of enterprise information and the exchange effect of team members. Lastly, IT also provides valid terrace for knowledge management. Knowledge management is a basic management activity of modern enterprise, which includes knowledge collection, knowledge filtering, knowledge classification, knowledge saving, knowledge conversion, knowledge sharing and knowledge innovation^[5]. The completion of every link cannot get away from the support of information technique.

2.2 The establishment of research system

The information-based innovation system may be established in Table 1 according to the theory analysis.

Table 1 The Information-Based Innovation System

Factor	Indexes name	Indexes content
Information-based technique innovation	Technique exploring (X1)	The IT research achievement promote the technique exploring ability of enterprise
	Technique absorbing(X2)	The IT research achievement promote the technique absorbing ability of enterprise
	Technique application (X3)	The IT research achievement promote the technique application ability of enterprise
	Technique integration (X4)	The IT research achievement promote the technique integration ability of enterprise
Information-based management	Decision ability (X5)	The IT research result improve the decision efficiency of high level managers

innovation	Performance ability (X6)	The IT research result improve the operation efficiency to management directors
	Encouragement ability (X7)	The IT research result improve the encouragement efficiency of enterprise employees
	Human resource (X8)	The IT research result improve the management efficiency of human resource
	Market outlet exploration(9)	The IT research achievement has strengthened the exploration of marketing outlet
Information-based market innovation	Customer demand (10)	The IT research achievement has strengthened the customer demand
	Internal marketing (11)	The IT research achievement has strengthened the function of internal marketing
	CRM innovation(12)	The IT research achievement has strengthened the CRM function
	Quality management(13)	The IT research achievement has strengthened the product quality management ability
Information-based production innovation	Product adjustment(14)	The IT research achievement has strengthened the production adjustment ability
	Warehouse management(15)	The IT research achievement has strengthened the warehouse management ability
	Equipment maintenance(16)	The IT research achievement has strengthened the equipment maintenance ability
	Organization structure innovation(17)	The IT research achievement has optimized the organization structure
Information-based environment innovation	Entrepreneur spirit innovation(18)	The IT research achievement has initiated the entrepreneur spirit
	Organization learning innovation(19)	The IT research achievement has improved the efficiency of organization learning
	Knowledge management innovation(20)	The IT research achievement has improved the efficiency of knowledge management

3 Model Certification

3.1 Data collection

This paper adopts 7 points measure form to collect data for 20 observe indexes, and choose 200 sample from the database of a consult company. All samples should carry out consultation behavior concerning information-based innovation aspect in the last years or once attend the public training public of the consulting company about the IT innovation activity. The sample totality distributes in 13 provinces or autonomous regions so may represent the total circumstance of information-based innovation in Chinese enterprises. This research seeks for data support for these 200 sample enterprise by means of electric questionnaire, mail questionnaire, telephone interview and talking. All visited persons are the CEO, CIO or CKO etc. This inquisition totally takes back 180 valid sample data, and valid recovery rate is 90% satisfying the investigation rule that the recovery rate of valid sample is no lower than 20%.

3.2 Certification results

This paper can certify the validity of measure model of information-based innovation system by the certification factor analysis (CFA). The CFA is a kind of special formation of structure equation model (SEM). The SEM is a kind of mathematics model to analyze the complicated relations of many variables according to the covariance matrix. The SEM may be called CFA when it used for the match certification of theory model to sample data. The ratio of sample number to observer indexes should be more than 5 in the process of SEM.

Table 2 Factor Load

Factor	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
Load	.37	.08	.22	.34	.11	.38	.17	.12	.24	.67
SE	.07	.07	.10	.12	.08	.06	.06	.07	.08	.12
T	5.2	1.1	2.2	3.1	1.3	5.4	2.9	1.4	3.0	5.4
Factor	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20
Load	.13	.46	.39	.45	.44	.78	1.0	.41	.14	.11
SE	.07	.09	.13	.08	.11	.16	.08	.08	.09	.07
T	1.8	5.01	3.0	5.4	4.0	4.8	1.30	5.0	1.5	1.60

The basic certification implement is the SPSS11.5 and LISREL8.7, and acquires factor loading table such as Table 2 shown. Those load of index in shadow isn't notable. The factor square matrix may be drawn on Table 3.

Table 3 The Factor Square Matrix

	ξ_1	ξ_2	ξ_3	ξ_4	ξ_5
ξ_1	1.0				
ξ_2	0.23	1.0			
ξ_3	0.27	0.30	1.0		
ξ_4	0.31	0.33	0.21	1.0	
ξ_5	0.11	0.19	0.13	0.17	1.0

The match index table can be drawn on Table 4.

Table 4 Match Index

Match index	df	CHI-Square	RMSEA	NNFI	CFI
Current value	150	227	0.054	0.903	0.991
Superior value	—	---	<0.08	>0.9	>0.9

4 Conclusions

Based on factor loading parameter table, we can know that the information-based innovation of Chinese enterprises can't promote the technique absorbing ability, can't support the enterprise decision function efficiently, and can't improve the internally marketing, while the IT innovation development has not encouraged the development of organization learning as well as knowledge management. These problems have high realistic character in the process of IT innovation of enterprise so that enterprise leaders should pay attention to the correlating profession departments.

According to the factor square matrix, we can know that the relativity among elements of information-based system is lower commonly, which express that elements lacks valid support function each other. So the information-based innovation system has obtained certain achievements in Chinese enterprises. Furthermore, the information-based innovation has better match affection, so this system has high usefulness and credibility, and can provide foundational theory platform for all enterprise so as to promote the IT innovation efficiency.

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Direction and Principles Research of Risk Transmission in Business Finance System

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Abstract: The paper discusses the risk of enterprise financial management system along with the business process chain, interests chain, value chain and fund supply chain to transmit, showing a feather of obvious directions; reveals its transmission is accordance with the principle of unidirectional transmission, bidirectional transmission principle and multi- transmission principles and other characteristics. The paper applies the application of modern financial management theory and methods to predict and control the risk of enterprise financial management system and its transmission by offering guidance for enterprises.

Key words: Business Finance System Risk; Unidirectional transmission principle; Bidirectional transmission principle; Principle of multi-directional transmission

1 Introduction

Business finance system risk transmission principle refers to the direction of enterprise financial management system has some risk of transmission directivity, the risk of enterprise financial management system along with the business process chain, interests chain, value chain and fund supply chain to transmit, showing clear direction and corporate financial systemic risk transmission path dependence. It has unidirectional transmission principle and bi-directional transmission principle and the multi-directional transmission principle.

2 Unidirectional Transmission Principles

From the time series of enterprise finance phases, the uncertainty affects unidirectional transmission from front to back with a role that the uncertainty of the previous phase easily to transmit the risk of enterprise financial management system to the following phases. The fundamental goal of business is to survival, development, the ultimate goal is profit. No matter which level objectives, all require enterprises must have adequate funding. Sufficient amount of money is the basic prerequisites for the enterprise production and business activities, so the fund raising phase will be the corporate finance process cycle starting point. The risk generated in the fund raising phase will be transmitted sequentially along through the following phases. That is, in the fund raising phase, the finance system risk will transmit to the investment phase, and generate the investment risk. Similarly, the uncertainty of the investment phase will affect the uncertainty of liquidity phase and profit distribution phase; the uncertainty of liquidity phase will affect the uncertainty of profit distribution phase. According to the assumption of financial phases, the last phase is profit distribution phase; meanwhile, the profit distribution phase is the end of a funding cycle, but also the starting point for the next funding cycle. According to the direction and principle of the enterprise financial management system, the risk generated from the profit distribution phase may be directly transmitted to the next funding cycle of fund raising activities.

The unidirectional transmission of business finance system risk is not just the sequential transmission from the financial management process, and the risk hopping transmission directionality of the enterprise financial system (as shown in Figure 1). Such as the business finance system risk of fund raising phase may not only generate investment risk, and can be directly transmitted to the liquidity phase by producing liquidity risk, and transmitted to the profit distribution by generating profit distribution risk. Such as, business financing through issuance of shares to raise long-term funds, because of the insufficient and shortage predict from the factors of the macroeconomic environment, industry environment, the issue of time, the issue price, the amount of funds from the market, will fail in issuing shares, funds can not be full mobilization, resulting in the corporate finance systemic risk of fund raising phase, the risk of this enterprise financial management system will not only be directly transmitted to investment phase, and will be directly transmitted to the liquidity phase and profit distribution phase, resulting in a reduction of total project investment, inventories fund funds to reduce the production and profit distribution plan and changes.

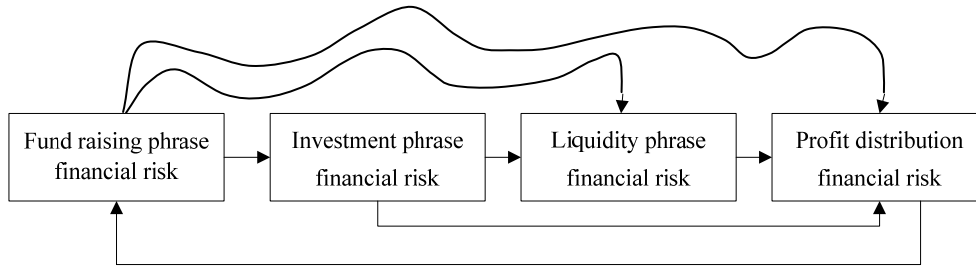


Figure 1 Sketch Map of Unidirectional Transmission Principle of Business Finance System Risk

Note: In this figure, \longrightarrow represents the unidirectional transmission of business finance system risk
 \curvearrowright represents the unidirectional hopping transmission of business finance system risk

The unidirectional transmission of business finance system risk presents a unity direction, the direct transmission influence, a regressive strength and the limitation of transmission range.

- ① Transmission direction unity. Business finance systemic risk starts from a risk source, along established pathways, through a certain carrier transmission to the finish.
- ② Direct influence of transmission. Typically, the two nodes adjacent phase enterprise risk financial systems directly accessible, has a direct impact resistance.
- ③ Transmission strength regressive. In general, the risk transmission of its unidirectional transmission path will not be complicated interference and oscillation nodes affected all aspects of the intercept and obstruct its strength with a monotonically decreasing resistance.
- ④ Transmission range limitation. Bidirectional or unidirectional transmission business financial system risk to the enterprise local area affected by the limited transmission range of business processes in unique business process chain, interests chain, value chain and fund supply chain, has limited its scope.

3 Bidirectional Transmission Principles

In a risk existence financial system, a risk generated from one certain phase is not all risks arising from the previous phase, which is conduct from a previous financial phase to the following financial phase. From the two perspectives of financial management phases, the risk transmission of corporate finance system is reciprocal, that sometimes the risk generated from the next financial management phase may transmit the risk to the previous financial phase, at this time, the risk of corporate finance management system presents bidirectional transmission behavior, as shown in Figure 2. Figure 2 means that, in a time node, fund raising phase fails in raising sufficient funds, resulting in business finance system risk, which may directly transmit to the investment phase, generating investment risk; node at another time, the absence of the expected investment income (especially cash flow) leads to the corporate financial system risk, which bring the failure in producing more incremental cash, resulting in a funding risk. For example, due to the investment in the Giant Building in decision-making, the formation of investment risk is made in the Giant Groups. The result of risk transmission of business finance system is the serious influence in fund hematopoietic function, the Groups had to move more money from the biotechnology industry to the construction of the Giant Building, and finally, resulting in a shortage of funds in the core business.

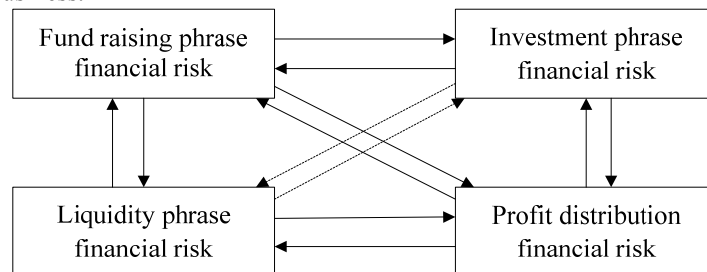


Figure 2 Sketch Map of Bi-directional Transmission Principle of Business Finance System Risk

The risk bidirectional transmission of business finance system is due to the formation of corporate financial systemic risk between phases with interactive nature of the impact, when the corporate financial system risk transmits to the next phase with a certain impact and losses, meanwhile, the next phase

negative effects immediately feedback on the previous phase, and bring negative effects. Therefore, the bidirectional transmission of corporate finance system risk has four feathers, like reflective transmission direction, convective transmission effect, various transmission intensity and transmission range of expandability.

(1) Reflex transmission direction. Business finance systemic risk starting from a risk source, along with the established pathways, through a certain part of the carrier transmission to the next phase, the result of the next phase is immediately reflected on the previous phase, resulting in mutual influence.

(2) Convective transmission effect. If the risk transmission of business finance system between phases is direct, then the transmission impact is direct, whereas, if it is an indirect transmission, then the transmission between the phases is indirect, with convective.

(3) Various transmission intensity. In general, corporate finance systemic risk is a two-way transmission between phases, the node on the previous phase is the risk source of the next phase, while the next phase node is the risk source of the next phase node, because the thresholds of various risk sources are different, the intensity oscillations are different, it may also be larger or smaller, and therefore the transmission strength is of variability.

(4) Transmission range of expandability. For the bidirectional transmission of business finance system risk between phase nodes, the transmission scope is expanded to the reverse phase nodes than unidirectional transmission range.

4 Principle of Multi-Directional Transmission

In fact, corporate finance systemic risk often presents a complex multi-directional transmission. In corporate financial management system, the financial systemic risks arising from one financial sector may cause some possible simultaneous transmission in various financial sectors (or department). In the interests of corporate financial relationships within the network, one node business enterprise financial system risk may transmit to its multiple financial relationships. Because the corporate financial activities are of recycle financial continuity and the continuous start after the previous cycle. For example, in fund raising activities, the raised funds that are unable to meet basic production operations, foreign investment or the needs of financial structural adjustment funds, will generate a corresponding liquidity risk, investment risk, or profit sharing risks. In the large market environment, the company's financial activities always plays a variety of roles, as investors or creditors or the debtor or other roles. When an enterprise comes across corporate financial systemic risk, it will also transmit to its multi stakeholders, and the stakeholders system risks arising from financial companies will transmit to the outer round network of its own, as shown in Figure 3. Therefore, corporate finance system risks present a rendering complex multi-directional transmission characteristic. This complex multi-directional characteristics of the conglomerate in the performance is particularly evident, because there exists the complex relationship among ownership and the member companies, such as cross-shareholdings between the parent companies, subsidiaries, holding each other, etc., when one related transaction member of the network generates enterprise financial management system risk, the corporate finance systemic risk will naturally be transmitted to the other member companies.

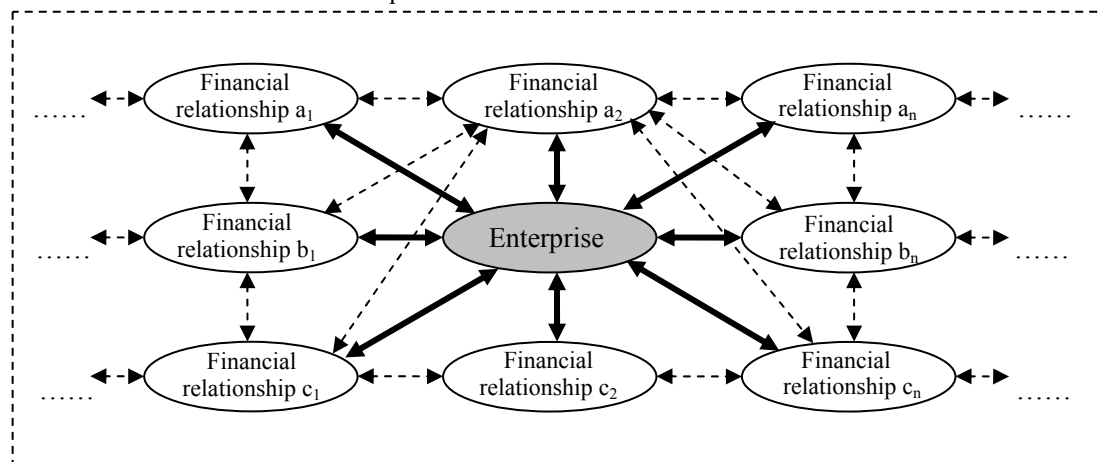


Figure 3 Sketch Map of Multi-directional Transmission Principle of Business Finance System Risk

As Figure 3 shows, corporate finance systemic risk has four characteristics like the multi-dimension of multi-directional transmission, an extensive transmission effect, the non-equilibrium of transmission intensity, and the complexity of transmission range.

(1) Multidimensional transmission direction. Business finance systemic risk starting from a risk source, through staff or business, technology, information and other carriers, at least transmit along with the two or more paths like the business process chain, value chain, supply chain or financial interests chain or capital supply chain, or through people, business, technology, and information transmission carrier, in the business processes, value chain, or financial interests chain or capital supply chain transmission, forming a multidimensional transmission direction of corporate financial systemic risk.

(2) An extensive effect of transmission. Multi-directional risk transmission refers to many pathways, plenty of transmission carriers, with parallel transmission, which makes the impact scope and the influence is much wider, broader and stronger compared with unidirectional or bidirectional transmission.

(3) The non-equilibrium of transmission intensity. As the risk transmission carriers of business finance system are various, the transmission paths are multi-directional, among the transmission carriers, the abilities are quite different to undertake corporate financial system risks, the resistance between transmission paths, and the thresholds are not the same, and thus the intensity of the business finance system risk is non-equilibrium, there is a difference.

(4) Transmission range complexity. Business finance systemic risk starting from a risk source, through diverse transmission carriers, and through multi-directional transmission paths, the operational risk transmission is divergent, uncontrollable, leading to a complex transmission range.

5 Conclusions

(1) The risk transmission of business finance system is of obvious orientation, and follow the principle of unidirectional transmission, bidirectional transmission principle and multi-directional transmission principle.

(2) Unidirectional transmission principle refers to the uncertainty of corporate finance from a previous phase node backwards to the next phase according to a unidirectional transmission, which presents a unity direction, which has the direct transmission influence, a regressive strength and the limitation of transmission range.

(3) Bidirectional transmission principle refers to the enterprise financial management system, a certain risk from the previous phase transmits to the next phase nodes, have been affected and losses, at the same time, the negative effect from the next phase immediately fed back to the previous phase and bring negative effects to the other direction, which have reflective transmission direction, convective transmission effect, various transmission intensity and transmission range of expandability characteristics.

(4) Multi-transmission principle refers to the corporate financial system risks may be transmitted simultaneously to multiple nodes of stakeholders, and the risk brought from the related stakeholders will spread to the outer financial network surrounding itself, and the transmission has a multi-dimensional transmission direction, an extensive transmission effect, the non-equilibrium of transmission intensity, and the complexity of transmission range.

Based on the analysis and command of the direction and principles of risk transmission of business finance system, we can use modern financial management theories and methods from the perspective of the risk transmission of business finance system, to predict and control of business finance system risk, in order to achieve the objective of corporate financial management system, and to improve the purpose of corporate economic efficiency.

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Why Is a Bitten Apple: Thinking on Non-Perfectionism Corporate Culture*

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Abstract: The LOGO of enterprise reflects corporate culture. What kind of corporate culture does the Apple Corp's LOGO show? What is worth Chinese enterprises especially the small and medium-sized enterprises to learn from? In this paper, through the analysis of the Apple Corp's management to interpret the idea of the LOGO design, the author find that the Apple Corp's corporate culture is a kind of non-perfectionism culture. Combined with the present situation of the enterprise culture construction of China, the author put forward the essence of enterprise brand idea should not be the pink of perfection but should be getting more and more perfect, the essence of enterprise market ideas should not be completely occupying but should be to divide a cup of a thick soup, the essence of thought of business management should not be to let the perfect people do perfect things but should be to let the flawed people do right things, and the essence of business development ideas should not be to walk out after perfection but should be walk to more perfect on the road. On Chinese enterprises especially the private small and medium enterprises, the essence of management thought should be this kind of non-perfectionism, which basing on the imperfect situation, standing on solid ground, works steadily towards the perfect.

Key words: Business Management; Corporate Culture; Perfectionism; Non-perfectionism

1 Introduction

On the corporate culture, few of business are not in pursuit of perfection as the ultimate value pursuit. On the Apple Crop's enterprise culture, few of people don't consider it is a kind of perfectionism corporate culture. The LOGO is the external performance of corporate culture, which underlying design concept reflects the thought of the enterprise management, including brand management, market management, talent management and development strategy management. The Apple Corp's LOGO is a bitten apple.

Although on the interpretation of this LOGO design concept, there are a number of versions, which involves a lot of personages, such as Eve (who is a myth in the Holy Bible), Alan Turing (who invented of the Turing machine), Isaac Newton (who was the most famous classical physicist in history) etc., but most people still are the opinion that it is the performance of perfectionism ideas. These points of view, reflected in many books of studying on Steve Jobs, such as the *iCon Steve Jobs: The Greatest Second Act in the History of Business* by William L. S. and Jeffrey S. Y., (William L. S., 2005) the *Les 4 Vies de Steve Jobs* by Daniel I. (Daniel I., 2011), the *Apple's Philosophy* by Yili, L. (Yili, L., 2011) etc.

It is because of either the Apple Crop's products are too perfect, or Steven Paul Jobs' personal perfectionism, although neither the Apple Crop's products nor Jobs is really the pink of perfection.

This paper will analyze the themes on the opposite perspective. At the same time, combining with the reality of Chinese enterprises especially small and medium-sized private enterprise, to elaborate it is worth learning and reference, and how to learn and use for reference.

2 The Enterprise Brand Idea: Not Perfect, but Gradually Perfect

No product in the world is the pink of perfection. Apple Crop can have today's brilliant achievements, not because of its product is really the pink of perfection, but are constantly in pursuit of perfection. The Apple Crop's products are really very human, very practical, and very beautiful now, which are based on imperfection but gradually improved.

The birth of a brand originally is based on a kind of design concept. Usually, there be gap between the idea and reality. The Apple Crop's most famous brand is certainly the series of Apple mobile phone. From iPod to iPhone4, its products although win in humane, intelligent, and powerful, but the defects

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also exist at the same time. For example, in the pursuit of their intelligent functions, the basic users asking for the telephone function have been ignored. This resulted in many users attracted by the intelligent function began to use the traditional mobile phone after a period of using it. Another example, until the iPhone4, its EXIT keys for closure procedures is designed hardware return, and this design concept is convenient for the user, as far as possible to make the operation of a fool. However, practice proves, used repeatedly this key by users will cause failure of the key, which has become the major defects reflected by users generally. Therefore, this key will be officially changed to touch soft return in the upcoming iPhone5.

Business create a kind of brand, there are usually some ideas initially. The creation of their brands implies usually that ideal elements are a lot, also problems are a lot. Many enterprises especially small and medium-sized private enterprises completely consider brand as a kind of tool of opening up markets, only in order to protect their existing customers. Operating own brand, to protect and accumulate their own market share. This is a very simple idea, it is nothing wrong, but a series of problems will make the brand survival problems highlighted, on the quality of products, market access, and customer acceptance etc. At this time, many enterprises can't hold on, which either get disheartened, or attempt to transcend the actual strength of the enterprise to work fast, to crash the perfect. It is wrong to do so.

We usually say 'the hundred years brand road', which is not just emphasis on the vitality of the brand, is more on the hard course of brand survival and development. This is a kind of realism thought and culture on brand management. The growth of the brand is like the growth of people. It takes a hundred years to educate people as it takes a hundred years to cultivate brand. In production, in the market, in the business management, to find problems gradually and to solve the problem gradually too, to seek survival firstly and to make development plans then, it is the growth of enterprises, and also is the growth of brand.

3 The Enterprise Market Idea: Not to Completely Occupying but to Divide a Cup of a Thick Soup

The market slogan of many Chinese enterprises, including small and medium enterprises, usually are completely occupied a certain market in their market strategy. For example, the Li-Ning Corp's market positioning is the "winner-take-all in segment market". (Li Chen, 2012) In fact, under the condition of market economy, a kind of product never can occupy fully a certain market in the world. The idea itself of "winner-take-all" violated the market competition concept, which is a kind of monopoly thought in essence, at least is one non-market strategic thinking.

While Chinese society is being in the transition of the economic system, only state-owned enterprises can occupy the system advantage and resource advantage, can make full use of non market strategy in the market monopoly, and make so-called "winner-take-all" finally. This is their habit. However, the private enterprise can't do so. In china, "Compared with state-owned enterprises, private enterprises are faced with more serious discrimination of system of ownership and scale discrimination. This is having private enterprises to be faced with very serious non market environment discrimination." (Wang Fan-jun, 2012) In China, we can say, the market is only a crack in economic society, and private enterprises can only survive in the cracks. In this context, private enterprises should especially carefully consider their market ideas. Before to make own brand, Chinese private enterprises most are intermediate traders, whose philosophy is acting brand of others, fumbling own market. After having mastered the core technology, having owned a certain customer groups, they will be going to make own brand. Both of middle traders and independent brand owners should gradually develop customers, in order to divide a cup of a thick soup in the market in the fierce competition. If the market or client is also seen as an apple, their aim is to try to bite off a piece of apple.

Many private enterprises in intermediate trade have this kind of train of thought in fact originally, but once they begin to do their own brands, immediately forget this idea. During trade, they think it is very happy that, when the others fight for their meat, they can drink a cup of soup by themselves. This is because those brands are not their own, they did not and also could not completely occupy the market. Once they begin to do own independent brands, it seems that they were ambitious about, and they couldn't remember who themselves are. Not consciously, they begin to try to fully capture the market and to treat it as their marketing idea. This is a kind of emotional marketing thought, which is extreme and not practical, easy to toss out own business.

From the middle of the trade to manage own brand, there is no difference about the marketing and sales. All is but to have a little soup in the market, to take a bite of the apple from customers. As for how

much the bite is, this is not a problem, which all is the target, depending on customers and their own ability to decide. But don't want to eat the whole apple, or to drink a bowl of soup alone.

In reality, almost all the customers are not possible using products of only one brand. Is very simple, customers will ask to compare products quality and price. If your customers are individual citizens or the private enterprises, they have to consider the products quality and cost, it is no doubt. Even if your clients are the state-owned enterprises or government administrative institutions which not care about the price and the quality, and even if your non-market resources and capabilities are extremely strong, they are unlikely to only use products of a certain brand, decided by the internal complex network of relationships and the background of national anti-corruption efforts have been stepped up, unless the leaders want to expose corruption insider by themselves. Inside the state-owned enterprises, the leaders whose levels of leadership are high usually know how to balance the internal and external relations, which external appearance is to balance the use of various brands. This also is able to be called "to do something of market by a kind of non - market way".

No matter how strong the Apple Crop under the background of free market is, nor may occupy all of the mobile phone market, not to mention the small and medium-sized private enterprises under the background of non-free-market.

4 The Enterprise Management Idea: Not to Let the Perfect People Do Perfect Things but to Let the Flawed People Do Right Things

Jobs is not be the pink of perfection, as a famous "No. zero employees", who were fired by board meeting once upon a time, although he himself was a perfectionist. It shows the Apple Corp don't pursue the perfect concept in respect of choose and employ persons that he was able to return to the Apple Crop, and to take the reins of the company to brilliant, until died. (Walter Isaacson., 2011) This is a kind of non-perfectionism concept, don't seek perfection, but to the right.

The internal management of enterprises especially the small and medium-sized enterprise, doesn't pursue to reach a pink of perfection, because it can't be done. Nobody is perfect. It is the only reflection of the management level to enable each person to develop his talents, to enable problems to be solved eventually, and to enable efficiency to be improved. Both of Complaining about the strength of the company and complaining about the employee's ability have no meaning. We should do is one thing, to find flaws and shortcomings, immediately try to make up for, to solve the problem, to complete the task. This is the kingcraft of enterprise management.

The enterprise management should allow and inclusive employee's mistakes, because it can only lead to progress, improvement and development that mistakes can expose problems, and problems can be solved. Of course, tolerating mistakes of employees are not let them slide or drift. Cultivating rule consciousness through system education is the best teacher. Employee's behavior is to rely on a system to restrain and regulate, and correcting error is based on rules and regulations. No provisions of the system, we should draw up and improve the system. The improvement of management is embodied through the improvement of system finally.

To ascertain where the responsibility lies also rely on a system. Inside many enterprises, especially state-owned enterprises, the atmosphere of rule by man is very strong. The staffs only are afraid of the curse of leaderships, not afraid to break the rules. This is because after the problems and mistakes have been exposed, the managers deal with not according to the system but according to the views of the leadership. The inevitable consequence is that the system exists in name only, the staffs fear leadership, the public attitude for or against, a sheet of loose sand, and the end result is unmanned responsible. Since employees defer to leadership advice, he will be naturally in the right and self-confident to ask leadership to be responsible. The leader liking what I say goes usually is not willing to be responsible person. So, finally everyone is without any responsibility. In any place, whether a country or enterprise, rule by man always is inefficient and failure. The enterprise must be the rule of law. No matter how uneven is the quality of the staff, as long as everyone observes discipline, freely acts in the frame of system, gives full play to the initiative and creativity of individual, the management will be efficient. So, what we should pursue is not the people are perfect, but the system is perfect.

It is surely the essence of the enterprise human resource management that let non-perfect employees do his best in a perfectly reasonable regime.

5 The Enterprise Development Idea: Not to Walk out after Perfection but Walk to More Perfect on the Road

From computer to the intelligent mobile phone, the Apple Corp always works steadily forward, and its' brilliant is on the way not at the end of the road. In term of the series of Apple mobile phone products, from iPod to iPhone5, although the quality always is being improved gradually, and is heading for perfect gradually, even the telephone function of the new iPhone5 still exists defects, which the call quality less than professional mobile phone, but the Apple Corp always adheres to the improvement of product quality, to pursue more perfect.

The development of enterprises is not and can't be in one step. Especially the small and medium-sized private enterprises which not share policy dividends and system dividends, do not have resource advantage, which result to shortage of funds, lack of talents, technology is weak, must have a right and pragmatic view of development. For them, it is the essence of development to discover and solve problems step by step, gradually go to perfect.

The confidence and patience of enterprise development is not reflected by go to extremes. Dare to invest, dare to employ non-perfect employee, dare to let them make mistakes and correct the mistakes, dare to face and solve problems, dare to overcome all difficulties to promote the product development and market development, it is the embodiment of confidence and patience. On the contrary, such as go back as soon as encountering difficulties, complain about the actual strength of the enterprise as soon as encountering difficulties, change established policy as soon as encountering perplexity, these extreme thought and practice is the performance of no confidence and no patience.

To overcome the thinking of perfection in one step or hesitating to go forward, only so can the enterprise go to developing. The scenery is on the way, not necessarily in the end. The improvement is a process, no end. Therefore, we should learn from the Apple Corp's operating philosophy, which the apple is bitten, we must walk on the road to bite new apples.

6 Conclusion

Many people believe that the essence of the Apple Corp's enterprise culture is perfectionism. But through the analysis of this paper, we can see clearly, the bitten apple is not perfect in fact. Neither Jobs himself nor his apple products' design is the pink of perfection, neither the Apple Corp's idea of management nor its' products is the pink of perfection, just as neither anybody nor anything in this corporate is the pink of perfection. Non-perfectionism is an inexhaustible source of Innovation. Not perfect, but will be more perfect, just as there is no best, only better in the world. So, it can be called non-perfectionism corporate culture.

The pink of perfection is the target, non perfection is the process. Perfectionism would be realized based on non-perfectionism.

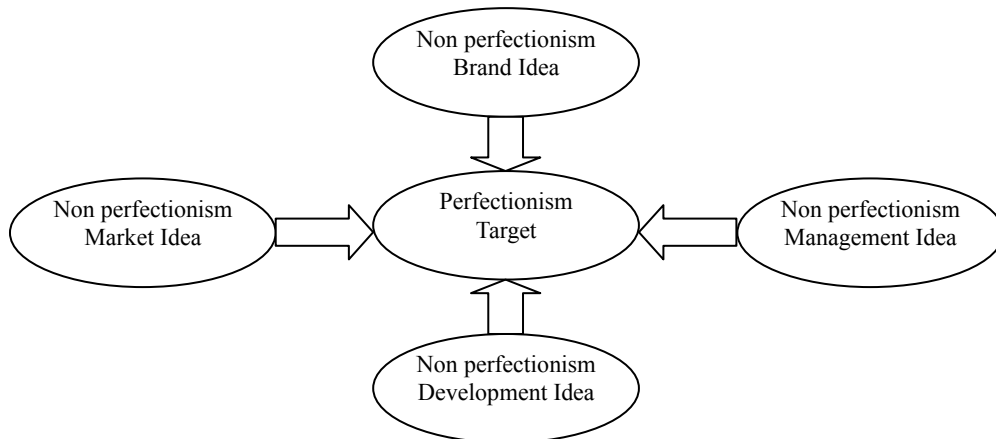


Figure 3 Perfectionism Target and Non-Perfectionism Process

The essence of the underlying design concept of the bitten apple's LOGO is non-perfectionism, and the essence of this kind of non-perfectionism is a kind of realistic corporate culture, and also a kind of free market economy culture, different from the majority of Chinese enterprises, which corporate culture have usually no real value pursuit, would be more like empty slogans or would be more like the government's declaration.

So, on the Chinese enterprises, especially the private small and medium enterprises with no resources, no capital, no brand quality advantages, with discrimination and extrusion of system and

policy, to be worthy of study and reference is not only the non-perfectionism idea but also the realistic culture and the free market economy culture particularly. Away from the state-owned enterprises' non-market thinking, standing in a free market perspective to design culture strategy of own corporate, it is especially important.

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Study on the Mechanism Analysis and Long-Effect Countermeasure of Misappropriation of Public Funds as Private Department Coffers

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Abstract: Misappropriation of public funds as private department coffers has become a serious and intractable corruption phenomenon in China. The enormous losses are caused by misappropriation of funds, the mis-administration of assets, the mis-regulation of the regulator and so on. In this paper, behavior motivation and game theory will be applied to analyze the mechanism of the misappropriation behavior. The analysis suggests that it should construct Long effect mechanism frameworks to restrain the violation of misappropriation actors, on the basis of effective countermeasures discussed.

Key Words: Misappropriation; Behavior motivation; Game theory; Long-Effect mechanism

1 Introduction

The misappropriation refers to the fraudulent appropriation of public funds as private department coffers and not listed in accounting book by regulation, but actually owned by group and should be charged to an account. The misappropriation behavior will seriously debase standards of social conduct, trigger the duty crime and disrupt the market economic order, causing the loss of state assets. In fact, it has become a conservatory for corruption and economic crimes.

In developed countries, because of fairly complete management mechanism, misappropriation behavior is not a prominent social issue. Many of the domestic scholars have studied the reasons of the misappropriation formation, but few on the mechanism analysis of the issue, consequently the countermeasure proposed is not systematic and long-term. China has launched nationwide campaigns to govern the misappropriation behavior, respectively in 1989, 1995 and 2009. From the effects of these activities, the regular governance is effective over the short term, however good times would not last for long and go back to the same situation. Therefore, it is very necessary to analyze the mechanism of misappropriation behavior and construct long-term control system of it.

2 The Mechanism Analysis of Misappropriation Behavior

2.1 The mechanism of misappropriation behavior based on behavior motivation

Misappropriation of public funds defines an intentional action to establish misappropriation in violation of financial control system and relevant regulations. Any activity has certain motives, and the establishment of misappropriation is no exception (Michaelson, Christopher, 2005). We use the motivation theory of Victory Vroom, who is a famous psychologist and behavioral scientist, to illustrate the misappropriation behavior as follows: the motivational force (M) of taking an action depends on the valence (V) of the action target and the expectancy (E) to reach the target. The formula is shown below:

$$\text{Motivational Force } (M) = \text{Valence } (V) \times \text{Expectancy } (E)$$

Valence refers to the value of establishment of misappropriation for the violators meet personal requirement. The larger the requirement is, the higher the valence is. Expectancy is the possibility of misappropriation action subjectively, which is decided by individual and environment factors, but mainly the subjective judgment of actors. Motivational Force interrelates the subjective effort of the individual work on their goals, or other the direct driving force for people to take certain action. Specific to misappropriation behavior, it refers to the extent of the individual's willingness to take misappropriation action.

Motivation Theory shows that the higher the valence of misappropriation behavior (V) and the expectancy (E), the larger the motivational force (M). Under the force, people are more likely to act misappropriation behavior. Therefore, following options can drive people to take misappropriation action: 1) intensify the expected value of violation of misappropriation actors (V); 2) increase the expectancy of establishment of misappropriation (E).

2.2 The mechanism of misappropriation behavior based on game motivation

Misappropriation behavior, not only has relationship with self-motivation of establishers, but also

has something to do with the game of its regulators. Therefore, it is necessary to further study the interaction between the regulators behavior and the fund misappropriation behavior based on the game model.

1) Basic assumptions

Assumption 1: Regulators and the misappropriation actors are rational actors, and pursue the maximum of their own interests.

Assumption 2: The game is between regulators and the actors of misappropriation. Regulators' strategy space is {regulatory, non-regulatory}, misappropriation actors' strategy space is {violations, non-violations}. A mixed Nash equilibrium exists between the two.

Assumption 3: Information asymmetry exists between the regulators and the misappropriation actors, as misappropriation actors know their behavior trends, but regulators rely on subjective judgment to estimate the violation of misappropriation actors.

Assumption 4: the actions taken by the regulators and the misappropriation actors are testable, and the gains can be measurable.

Assumption 5: As long as the regulators execute their supervision, they will find the violation of misappropriation actors, otherwise, the violation can't be found.

2) The establishment of the game model

Assume that the utility is -R if misappropriation is found and is subject to a fine; the utility is S if regulators don't supervise and violation does not exist; if regulators execute their supervision and violation still exists, regulators have a negative effect - C, and misappropriation actors have the utility of U; if violation of misappropriation does not exist, then no gains or losses are recorded for regulators and misappropriation actors. As shown in Table 1.

Table 1 The Game Payoff Matrix of the Regulator and the Misappropriation Actors

		Regulators	
		Not Regulatory	Regulatory
Misappropriation Actors	Violation	U, - C	- R, 0
	Non-violation	0, S	0, 0

3) Solving the game model

There is no pure strategy of Nash equilibrium, but only mixed strategy of Nash equilibrium for the game showed in table 1. And neither can make self-beneficial choices based on opponent actions, so that the balance is achieved when they choose two alternative strategies based on random probability distribution (Malueg, David, 2010).

Let's assume that the probability that regulators choose not regulation is p_1 , and select regulation is $1-p_1$; the probability that misappropriation actors choose violations is p_2 , and select not violations is $1-p_2$. Mixed strategy equilibrium is calculated as follows:

Regulators expect to benefit

$$\begin{aligned} \pi_1 &= p_1[p_2(-C) + (1-p_2)S] + (1-p_1)(0+0) \\ &= p_1[p_2(-C) + (1-p_2)S] \end{aligned}$$

Regulators' goal is to maximize the expectation value, so derive the above formula:

$$\frac{d\pi_1}{dp_1} = [p_2(-C) + (1-p_2)S]$$

Setting it to zero, we have:

$$p_2^* = \frac{S}{S+C} \tag{1}$$

Misappropriation actors benefit

$$\begin{aligned} \pi_2 &= p_2[p_1U + (1-p_1)(-R)] + (1-p_2)(0+0) \\ &= p_2[p_1U + (1-p_1)(-R)] \end{aligned}$$

Misappropriation actors maximize their expectation value, so derive the above formula:

$$\frac{d\pi_2}{dp_2} = [p_1U + (1-p_1)(-R)]$$

Setting it to zero, we have:

$$p_1^* = \frac{R}{R+U} \tag{2}$$

4)The analysis of the game model

Equations 1 and 2, respectively, shows that a mixed equilibrium of the game is achieved when the probability that regulators select dereliction of duty is p_1^* and the probability that misappropriation actors violate the rules is p_2^* . This conclusion shows that the best strategy of one player depends on the other's benefit. The following Figure 1 and Figure 2 further analyze the interaction between the main game players.

Figure 1 indicates a mixed strategy of misappropriation actors. The vertical axis from S to-C is the expected value of violation of misappropriation actors. As corresponding regulatory supervision probability p_2 , p_2^* is the best probability for violation.

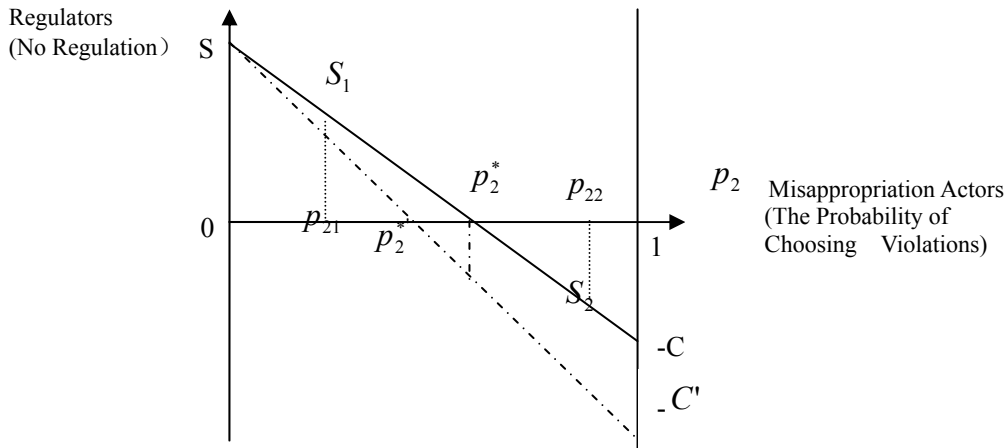


Figure 1 The Mixed Strategy of Misappropriation Actors

In order to evaluate the result of punishing the undutiful regulators, the regulators' negative effect should be increased from C to C', equivalently the distance from -C to -C' in Figure 1. Assume that violation probability p_2^* is fixed, the expected utility of regulators is negative, then regulators must execute their supervision and find violation of misappropriation actors, the utility is -R. Provided the regulators fulfil their duty, it would reduce the probability that misappropriation actors violate the rules to p_2^* , constituting the new mixed strategy of Nash equilibrium for the game. It illustrates that increasing penalties for delinquent regulators would make them hardworking for a moment, meanwhile in the long run, the violation probability of misappropriation actors would truly reduce without more dutiful regulators.

Same method can be applied to analyze the probability distribution of dutiful and delinquent regulators. Figure 2 indicates a mixed strategy of regulators.

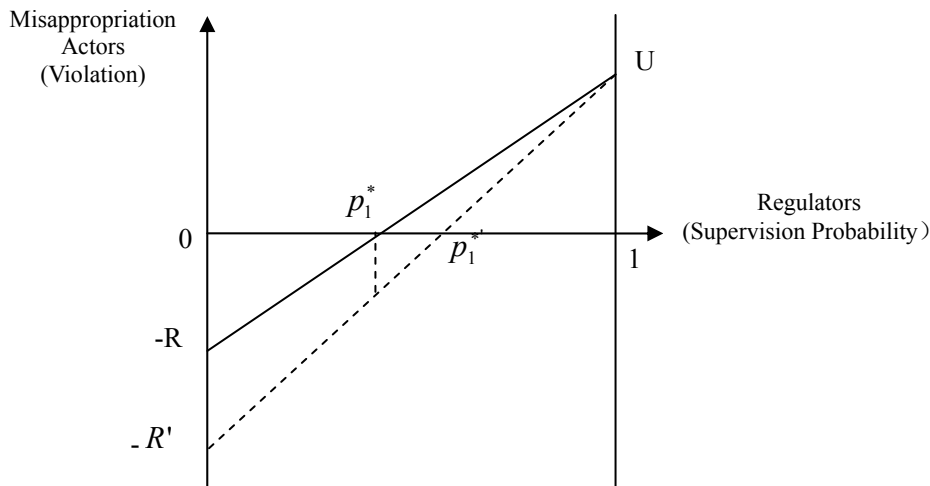


Figure 2 The Mixed Strategy of Regulators

Aggravating the punishment of misappropriation actors, the negative utility of them should be increased from R to R' , equivalently the distance from $-R$ to $-R'$ in Figure 2. Assume that the probability that regulators select dereliction of duty p_1^* is fixed, the expectancy of misappropriation actors is negative, and then in the short term there will be no violation. The probability distribution of misappropriation behavior is shown in Figure 1 and has no relationship with R . Therefore in the long term, aggravating the punishment of misappropriation actors can do nothing but make regulators slack, until the probability of dereliction increases to p_1^* . The new mixed strategy is constituted.

3 The Long Effect Mechanism of Misappropriation Behavior

3.1 The countermeasure of misappropriation behavior based on behavior motivation

With converse thinking, we can apply the motivation theory to restrain a certain behavior. That is to say, lower the valence (V) or the expectation (E) to restrain the relevant behavior. For this reason, to lower the motivational force of misappropriation should begin with two aspects: valence and expectation.

1) Reduce the valence of misappropriation behavior in the following ways: enhance the education and training for related people; improve the consciousness of laws and disciplines; reward the observer; make leading cadres and staffs realize the seriousness and perniciousness of misappropriation problem.

2) Increase the cost and difficulty of misappropriation behavior. The root-cause of misappropriation behavior is the faulty system and inappropriate implementation. The loopholes increase the valence and expectation of violator to a large extent. For this reason, to eliminate the private behavior form the source, a sound financial system must be established to reduce the assets operation space; then, strengthen the execution of system to make the misappropriation owners accomplish nothing.

3.2 The countermeasure of misappropriation behavior based on game theory

The analysis based on Game Theory shows that tougher punishments can only get a short-term effect, but make regulators slack in the long run, which leads to the rebound phenomenon of misappropriation. So, the punishment for regulators' slack works on the real Long effect, rather than the misappropriation actor's violation. Therefore, to have both a long-term effect and a short-term effect, we need punitive measures for both misappropriation owner and the regulator. The specific countermeasures are as follows:

1) Establish and improve the internal control system. No matter the punishments for misappropriation actors or regulators should based on a sound system. Otherwise, it will lose the basis of supervision and authority of punishment. Therefore, establishing a thorough internal control system is the foundation of effect mechanism.

2) Constructs a system of monitor from internal supervision to the superior supervision, financial supervision, disciplinary supervision and mass supervision. For internal supervision, the regulators may slack result from self-orientation. And in consider of the cost, superior supervision, financial supervision, disciplinary supervision can not reach every aspect of the problem. However, mass supervision has the advantages of universality, publicity, specificity and diversity. It not only can be a complementary supervision, but also can monitor the other mode without a break. In conclusion, building such a supervision monitor plays a pivotal role in the long-term mechanism of misappropriation behavior.

3.3 The long effect mechanism frameworks of misappropriation behavior

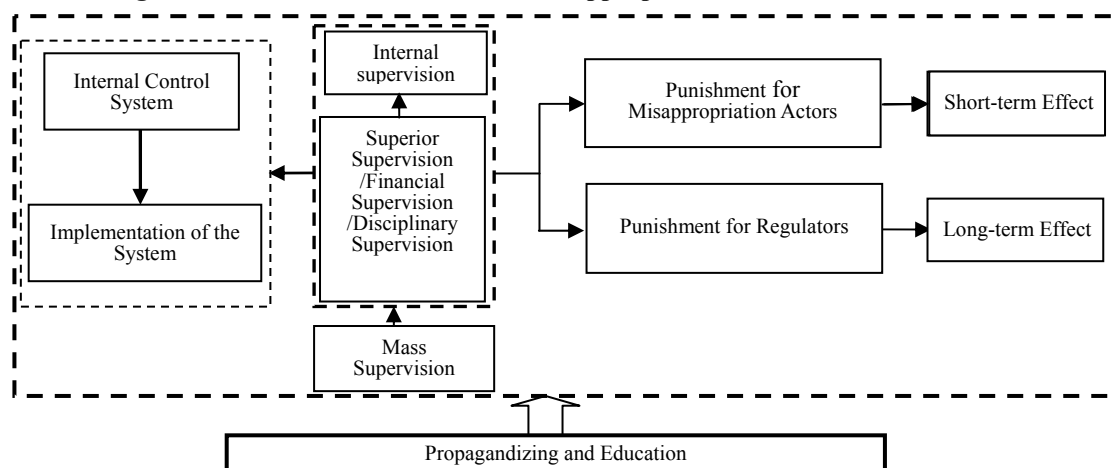


Figure 3 The Mechanism Framework of Misappropriation Behavior

The effective mechanism of misappropriation behavior should build a sound internal control system as a basis, strengthen the supervision as main point, and be supported by resentful propagandizing and educating work(Ma Guoxian, 2011). The long-effect mechanism framework is shown in Figure 3.

4 Conclusion

From the perspective of individual behavior, to lower the motivational force of misappropriation should reduce the valence and expectation of misappropriation actors. Meanwhile, the punishment for regulators' slack can really work for long-term governance in game perspective. Punitive measures for both fund misappropriation actors and the regulators are respectively integrant factors for short-term and long-term governance of misappropriation of public funds as private department coffer.

In conclusion, the effective mechanism for governing misappropriation actions should be built on a sound internal control system, a forceful supervision system as well as propagandizing and education.

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A Debate on the Influence of National Culture in Organizations

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Abstract: This paper deals with the different concepts of culture and its impact in organizational management, based on the classical worldwide survey of social cultures and management by Geert Hofstede at the IBM a decade ago. Although, the paper discusses different concepts of organizational culture and social. The work concludes that more and more investments in training and development of the employees will be required, as a matter of survival for global companies. This paper represents a contribution updating the Hofstede's idea and discussing new alternatives.

Key words: Culture ;Organizational Culture; Social Culture

1 Introduction

The evolution of organizations to an organic model instead of the mechanistic model places individuals as the key to business success. The people are the essence for positive results in different processes, because they have the ability to reflect, learn and interact, which means that they create, acquire, transform, and share knowledge.

We know that each individual carries a rich cultural background, from the social environment and different life experiences. Science demonstrates that culture is acquired, excluding the hypothesis of genetic inheritance (HOFSTEDE, 2003).

Cultural difference of the individual manifest in different ways. The concept of culture can be categorized into four types: symbols, heroes, rituals and values (HOFSTEDE, 2003). Just as people have different cultures also organizations and their departments have different cultures. Thus there will be so many cultures as so many organizations in our society.

For at least 30 years ago, the culture is no longer a specific theme of anthropology or sociology, became subject of business schools, economics and management (MIGUELES, 2003). Thus it is understood that "culture is complex. It is not limited to an artistic, economic or social perspective. It is the combination of all these vectors" (BRANT, 2009). In the same way, Skinner (1965, p. 15) notes that "the behavior is a difficult issue, not because it is inaccessible, but because it is extremely complex. Since it is a process, not a thing, cannot be easily immobilized for observations. It is changeable, fluid and evanescent".

The study of culture has been a fruitful field for the understanding organizational phenomena, especially in the modern environment, with increased competition between companies and the emergence of complex processes, such as organizational change, internationalization, mergers and acquisitions and succession.

This article aims to discuss the different concepts of culture and its influence in organizations, analyzing the impact of local culture in internationalized companies, through literature review, relying on renowned authors as Hofstede (2003), Morin (2009), Migueles (2003), Santos (1998), Schein (2009), Brant (2009), among others.

2 The Culture and Its Organizational Influence

The culture has a large impact on the behavior and development of organizations. However, before discuss the concept of 'organizational culture', we need a better understanding of 'culture'. Thus, emphasize the argument of Lacerda (2011) which reinforces that the "*culture only makes sense in a collective and not individually*".

On this point we highlight the understanding of culture by the renowned researcher Schein (2009): "The culture may be defined as a standard of basic shared assumptions, such that has been learned by a group as they solved its external adaptation problem and internal integration. This pattern has worked well enough to be considered valid and therefore to be taught to new members as the right way to perceive, think and feel in relation to those problems."

It is clear, then, the connection between culture and the sense of community, representing the characteristics of a particular group, a locality or a population. The writer Brant (2009) points out that "*the cultural identity of a people is generally recognized for its unifying elements such as territory,*

language and religion".

Therefore, it is clear that culture defines everything that is produced from human intelligence. It is present from primitive peoples in their customs, systems, laws, religion, arts, beliefs, myths, moral values, turning and changing until today, present in everything that affects the feeling, thinking and acting of people .

In this sense, the philosopher Morin (2009) provides three interdependent dimensions to the word culture: the anthropological, or "*everything that is socially constructed and that individuals learn*"; the social and historical, which may be understood as the "*set of habits, customs, beliefs, ideas, values, myths that are perpetuated from generation to generation*"; and the last related to the humanities, which "*covers the arts, letters and philosophy*".

Therefore, it is clear that the 'culture' is derived from a mental programming. Hofstede (2003) argues that mental programs vary as much as the social environments where they are purchased. Given this, placing the focus on organizations, the said author notes that organizational culture can be defined as a "*collective programming of the mind which distinguishes the members of one organization from another*", or similarly, a "*collective mental programming that distinguishes one group or category of people from another*" (Hofstede and McCrae, 2004, p.58).

The referred author Schein (2009) supplementary characterizes the organizational culture into three levels: 1) artifacts - understood as visible organizational structures and processes, 2) values- which are the strategies, goals and philosophies; 3) assumptions - that refer beliefs, perceptions and thoughts, often unconscious.

In this scenario, it is clear that the knowledge of an organization comes from the integration of knowledge of different individuals. Therefore, it is known that one of the biggest problems companies relates to the articulated way to manage this tangle of knowledge to the company to obtain competitive advantages. In other words, "organizational knowledge by itself does not exist, because it arises from the sum of the knowledge of the individuals in the organization" (TEJERA OF RE et al., 2007, p. 2).

It should be emphasized that the organizational culture has different levels of intensity, as argued by Santos (1998): "Cultural force is defined in this study as the extent to which the values and beliefs that permeate the organization are broad and intensely shared by its members. The model estimates that the strong culture is one which incorporates the features over all four types of cultural"

From this point, develops instruments aimed for the organizational culture and the knowledge management, so that organizations resolve bottlenecks and obtain success.

Dealing with instruments, highlights the valuable work of Quinn and Kimberly (1984), which define a cultural typology that aims to organize the different patterns of behavior, values and shared beliefs that define the culture of an organization. Using the juxtaposition of its two main dimensions, emerges four types of culture which characterize the 'Quinn's Culture Type', also known as model of Competing Model Value (C.V.M). The diagnosis is translated by means of an instrument for defining the four types of organizational culture - group, innovation, rational and hierarchical. With these four types of culture can be interpreted attributes and studied the culture of an organization in comparative terms.

Below, it is described a brief explanation of each one:

Group culture: it is based on norms and values associated with affiliation, emphasizing human resource development, valuing the participation of members in decision making and facilitating interaction through teamwork.

Culture of innovation: characterized by assumptions of change and flexibility where the key factors for motivation consist in growth, in the stimulus, in diversification and in the creativity in the task. Leaders tend to be entrepreneurs and idealists, to assess the risk and forecast future, worrying about obtaining resources and the external image.

Hierarchical culture: it is rooted in the values and norms related to bureaucracy, where the basic assumption is the stability and individuals accept the authority of enacted rules and regulations imposed. The motivation is derived from security and order. The leaders are conservative, cautious and targeted to the problems of a technical nature.

Rational culture: it is permeated by assumptions of achievement, based on the belief that the rewards are related to the results. The motivating factors derived from the competition and achieving predefined results. Leaders to drive guided to goals and encouraging productivity.

Finally, it is clear that each of these variables has its blind spots, but also its benefits. Manager shall diagnose and implement the changes necessary to reach the goals and plans outlined by your organization.

3 A Debate on Social Culture

Nowadays, with the evolution of globalization through the heavy flow of people and information, the regional boundaries, physical and cultural are diluted quickly. The process of globalization has established integration between countries and people around the world. Through this process of internationalization world, governments and businesses, exchange knowledge, conduct business transactions and disseminate cultural influences to all corners of the planet. Like any other social phenomenon, globalization has brought positive and negative results for the world, but of this article will be focused on the cultural theme.

One of the risks of the culture globalization is the influence and domination of the richest cultures on the poorest, implying in a possible homogenization of organizations and society. Brant (2009) points out that: "The culture increasingly homogenized, results from a certain cultural hybridism of the global society, able to act with the same intensity and strength of command in societies as diverse as Brazil and Iraq, for example. In this global environment, the question of identity assumes other characteristics"

However, initiatives of international agencies seek to protect cultural identities, as the Convention on the protection and promotion of diversity of cultural expressions within UNESCO, which consolidates the historic struggle against cultural homogenization promoted by a North-American oligopoly formed by business groups, which gather media conglomerates and electronic equipment manufacturers (BRANT, 2009).

On the other hand, cultural differences can facilitate or obstruct business transactions, imposing managers the need to know the differences between people and their cultures. "The cultural differences, which were perceived in commercial situations or travel, for example, now have larger implications. These implications are amplified according to the growth of multinational companies (Brazilian or not) and are expressed in business activities that involve different cultures (in the broad sense, between countries, companies and regions, for example). Although differences exist, the ways in which organizations can treat them, on one hand, be a factor in the creation of a competitive advantage or, on the other hand, make impracticable the international operations, the industrial operations or other organizational activities." (Lacerda, 2011)

After the construction of this synthesis on globalization and its implications we bring to light the influence of local cultures in organizations with internationalized operations. Even with well-defined policies and guidelines pre-established at its headquarters, the question is whether or not there variation in the organizational culture in the different countries where the organization operates. In this sense, the sociologist Inazawa (2009) reports that: "Organizational culture is a very broad and complex topic, which influenced as much the culture of the individuals who work in organizations, as the culture of the country in which organizations are. Without exhausting the subject, we tried to emphasize the issue of organizational culture itself and its relationship with the success of Knowledge Management. Regarding the organizational learning, that was presented as an alternative to flexible organizational culture and facilitates processes of knowledge management."

In the same way, the author Lacerda (2011) emphasizes that: "The distinction between the organization and the country is apparently necessary because, in the current context organizations have transnational character with different types of shareholders and employees. Thus, although physically located in a region, the organization can present distinct characteristics of that place."

At this point we highlight the research of the renowned psychoanalyst Geert Hofstede, portrayed in the book *Culture and Organizations*. In his work, the author demonstrates that national cultures differ from one another in five dimensions¹, which impacts on the culture of organizations depending on the country where they operate.

The cultural dimensions defined by Hofstede originated in a survey research conducted at IBM and its subsidiaries in different countries (Hofstede, 2003). The survey covered 71 countries and was conducted between 1967 and 1973, and all 117 000 remarks (questionnaires) were obtained. Different validation stages of the research were carried out. At this point, as briefly discussed, Hofstede (2003) has shown that national cultures differ according to five dimensions:

Power distance: is the tolerance level of the less powerful members of organizations and institutions to accept this situation, the power is distributed unequally. Thus, it is clear that power and inequality are fundamental facts of any society.

Uncertainty Avoidance: deals with the tolerance of a society in relation to the ambiguity. Indicates the degree to which a culture feels comfortable or uncomfortable in unstructured situations.

¹ After this work, Geert Hofstede came to what he called sixth dimension, available in www.geert-hofstede.com.

Unstructured situations are unknown, surprising and different than usual. Cultures that try to minimize the uncertainty avoid the possibility of such situations by strict laws and regulations. On the one hand, to avoid the uncertainty cultures are emotionally nerve. On the other hand, the cultures that accept the uncertainties are tolerant to different views; attempt to respond as far as possible, are generally more relativistic and enable schools of thought flow freely. The resistance to the uncertainty is related in level of cultural anxiety or neuroses.

Individualism/Collectivism: refers to the degree to which individuals are integrated into groups. In individualistic societies, people dispense little attention to those who are not directly related to your circles. Now in collectivist societies, people are since the creation to maturity, integrated into strong groups, often to extended families. In summary, measures how people turn and engage in groups, how they look after themselves first instead of the collective;

Masculinity/Femininity: is the distribution of emotional roles between the sexes, this is a fundamental issue for any society. Masculinity is related to competition, positioning affirmative. Femininity approaches to a modest and thoughtful behavior toward others. Another factor that distinguishes cultures with features “masculine” and “feminine” is the level of difference or distance between people by sexual gender. Societies where there are underlying differences are considered as “masculine”, the reverse is considered “feminine”.

Long-Term Orientation: is the acceptance of the legitimacy of hierarchy, the evaluation of perseverance, without emphasizing itself and based on tradition and social obligations. It is based in the teachings of Confucius and has a profound influence for most Asian countries. Confucian values are based on the persistence with slow results, in the adaptation of traditions to a modern context, in the acceptance of unequal relations, in concern with virtue. These features make Asians become different in terms of management and labor.

The Hofstede's research is the largest case study reported so far, and through a quantitative approach interviewed over a hundred thousand people. The cultural dimensions established by him show that even organizations establishes cultural standards with strict guidelines, these will tend to dissipate, in varying degrees, depending on the different locations that will make their operations.

4 Conclusion

Culture is a crucial issue for the success of organizations in a globalized world. Managers must be prepared to deal with cultural diversity, since this can lead an organization to success or failure. We realize that investments in training and languages will be increasingly needed by companies, it is a matter of competitive strategy and market survival.

The organizational culture represents the system of behavior, norms and social values accepted and shared by all members of a particular organization and that somehow makes it unique. Thus, it is clear that there are many cultures as different individuals.

The companies, in their great majority, depend on its human capital to create, innovate and differentiate them in relation to the market, so it's essential to investment in human resources policies, in order to qualify and motivate your employees and identify variations of climate and organizational culture. Currently there are various methods and instruments with quality validated.

The knowledge management in organizations is still a challenge, however, initiatives such as the creation of corporate universities already established in several companies. The purpose of the corporate university is to provide technical courses for the employees of a specific corporation. Therefore, it customizes the courses in exact accordance with the policies and strategies of companies, reduces training costs and gains speed in conventional training of manpower.

Finally, it is concluded that the theme of 'social culture' still possessed a theoretical scarce, since we used the main platforms for academic research in search of bibliographic material in this article and modest information's was found. Thus, it is expected that this paper will contribute to the enrichment of the subject.

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Analyzing In-Store Shopping Paths from Indirect Observation with RFID Tags Communication Data

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Abstract: This paper presents in-store customer behavioral model gathered from RFID (Radio Frequency Identification) tags communication data. Although this kind of research has been made by various methods such as interviewing or tracking behind customers, Conventional research methods are made by with the existence of customer tracking research, so far. For collection of natural customer behavior, we made a customer in-store behavior research with RFID tags in a real retail store. In a conventional store design theory, it has been thought that increasing the length of staying time can raise the amount of money per person. Therefore, the store has been designed in the form that goes inside of a shop around. The experimental results suggest that there is a correlation between the spent of time and the length of customer walking path.

Key words: Shopping Path; Customer Behaviors; Point of Sales (POS) data; Radio Frequency Identification (RFID); Retail Store; Services Sciences and Management and Engineering

1 Introduction

In Japan, deflation overlaps with a long-term slump in consumer money spends and the regulatory policies for the retail businesses have occurred in the competitive market. Some leading companies utilizing the benefits of business scale fierce price competition to the mid and small companies and make engaging in price competition among the market area. Price competition is a capital oriented method, and it is necessary to compete for the small and medium-sized retail store in another way with the major ones. Therefore, it becomes important for efficient store management to do following activities; Research of customers' Purchase items to prevent from both of the stock out and the surplus of the items and arrange the layout that customers easily find and buy. Service management of retail business in a super-market requires investigations for store operations including the shop layout, sales promotion, and control of customer flows. So far, such investigations have cost very much to examine in real situations. In this study, we propose a handy method for gathering customer walking paths with the RFID tag, and it reports on the result of the experiment in the retail supermarket. We carry out a data gathering experiment for the purpose of the customer-walking path in the store through the RFID tags. The rest of the paper is organized as follows: Section 2 discusses the background of the research and related work; Section 3 briefly explains the field study of the target supermarket; Section 4 describes the basic principles presents experimental results; and Section 5 gives some concluding remarks and future work.

2 Backgrounds and Related Work

A retail store performs many sales promotions in order to make sales increase. One of the conventional methods of the evaluation is with ID (Identification)-POS (Point Of Sales) data analysis^[1]. There have been many researches concerning to consumer behaviors and their decision analysis systems in marketing science literature^{[2],[3]}. They are both based on statistical analysis of Purchasing items and attributes of consumers. On the other hand, several data mining techniques have been used for the analysis^{[4],[5]}. They have been also utilized customers' movement data in a real shop using technologies of RFID (Radio Frequency Identification) tags and video camera tracking^{[6]-[9]}.

In our country, in addition to competing intensification by the regulation, the declining birth rate and the growing proportion of elderly people is advancing at the speed at which the example is not seen in the history. The competition in the domestic market intensifies more along with this population decrease. The method of sales promotion that uses the Reward Card is in common in the Japanese retail business. For instance, it aims to enclose the customers and gathering customers excluding price

attractiveness to double the point of a Reward Card to Purchase more items as usual. Moreover, the store layout has been regularly changed for the sales promotion. So far, the layout change had been understood to affect customers' flow in the store in the rule of thumb up to now. Therefore, the most efficient method of understanding the customers' flow in the store is required.

We are conducting a research project to develop a decision support system to increase the service productivity on retail store management including ordinary super markets ^{[10]-[14]}. In the current situation, however, to measure the individual customers' behaviors in real time is very difficult because of the measurement costs and decision algorithms of customer behavior. This is a part of the research report.

3 Experimental Setup in the Target Store

This section explains the setups and results of field study with RFID tags in the target store. The condition of target store and setups of field study is shown in Table 1.

RFID is one of the individual recognition technologies using a radio antenna and an IC tag. This device is mainly used for logistics inventory so far, and an indoor location estimation method is focused with RFID, recently ^{[15], [16]}. Since RFID is comparatively small, its influence that it has on a customer is small under the research. Figure 1. indicates the RFID antenna location and layout of the store, Figure 2(a). indicates the RFID tag position attached a shopping cart, and Figure 2(b). indicates the RFID tags mounted on a fixture, respectively.

Table 1 Condition of Target Store and Setups of Field Study

Store Location	Shimane Prefecture, Japan
Operating Hour	9:00 – 21:00
Daily Average of Customers	2,000
Experimental Period	March 3 – March 5, 2011
RFID Antennas	10 on display fixture, 6 on each register
RFID Tags	53 on shopping cart(Half of shopping cart)

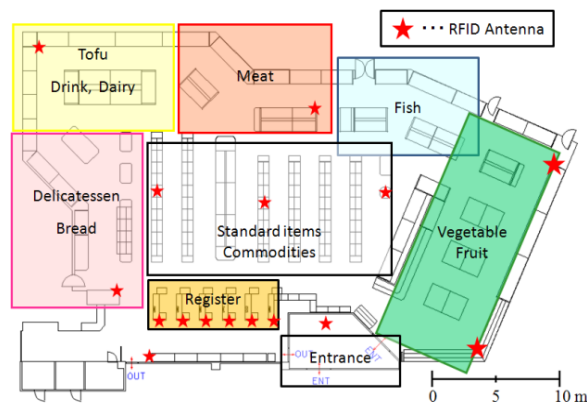


Figure 1 Store Layout and RFID Antennas Position



Figure 2(a) RFID set on a Shopping Cart



Figure 2(b) RFID set on a Display Fixture

As for the shopping path, we assume the shopping path from the entrance to the register. We consider the path as an edge and the fork as a node to estimate the customer shopping pass. Figure 3 indicates nodes and edges in the target store. Since we can trace the position of fixture from POS data, we assume that the customer passed through the path in front of the fixture of Purchase items.

As for the staying time, we assume the staying time as between from the time received radio wave from the antenna tags in the vegetable section to the time received the radio waves in the cash register.

If we synchronize POS data with RFID tag set on a shopping cart or a shopping cage, we can estimate both the staying time and the position of passed fixture for shopping path calculation. Figure 4. indicates the communication range of antenna. The communication ranges of RFID tag set on fixture indicate surrounded by blue respectively. From the preliminary experimental results of RFID communication range, it is determined whether passed through the path in which signal strength and antenna tag number of the communication destination.

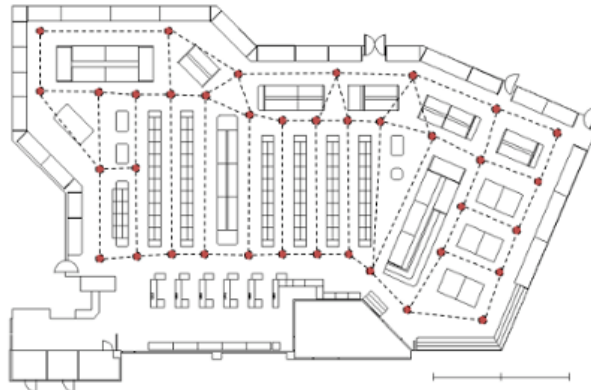


Figure 3 Nodes and Edges in the Target Store



Figure 4 Communication Range of the Antennas

4 Analytical Results from Gathering Data

The shopping paths from POS data and RFID communication data with fifty transactions issued on March 4, 2011 are analyzed. Table 2. indicates the result of the statistical results. Table 3. indicates the relation of shopping path, staying time, number of Purchase items, Purchase volume. As for the shopping path, it turned out to be less relation with number of Purchase items or Purchase volume.

Table 2 Results of Gathering Data

	Walking Path (m)	Staying Time	Number of Items
Average	174.07	14':45"	12.38
Std Dev.	83.28	11':06"	8.04
Median	157.44	10':26"	10.00
Min.	42.55	03':44"	2.00
Max	425.11	47':51"	39.00

Table 3 Relation of Gathering Data

Elements	Correlation
Shopping Path – Staying Time	0.8284
Shopping Path – Number of Purchase Items	0.4341
Staying Time – Number of Purchase Items	0.2598
Number of Purchase Items – Purchase Volume	0.8921
Shopping Path – Purchase Volume	0.4346
Staying Time –Purchase Volume	0.2894

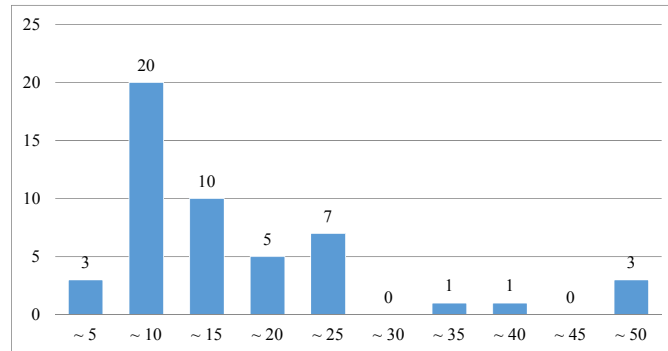


Figure 5 Histogram of Staying Time (Method: Sturges)

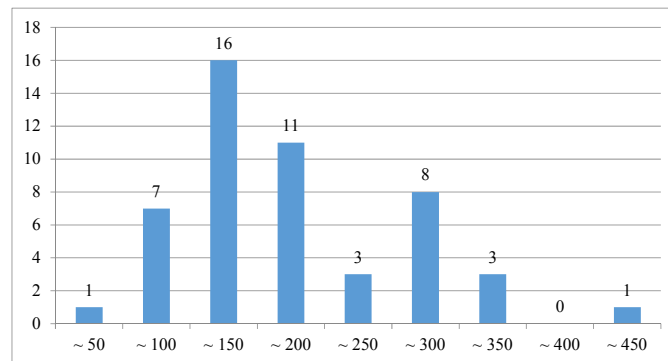


Figure 6 Histogram of Shopping Path (Method: Sturges)

Figure 5. indicates histogram of staying time. The horizontal axis in figure 5 shows staying time with 5 minutes interval. Figure 6. indicates histogram of shopping path. The horizontal axis in figure 6 shows shopping path with 50 meters interval.

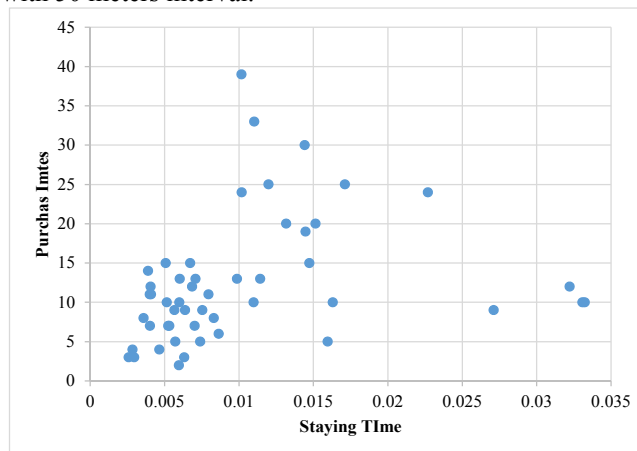


Figure 7 Staying Time and Number of Purchase Items

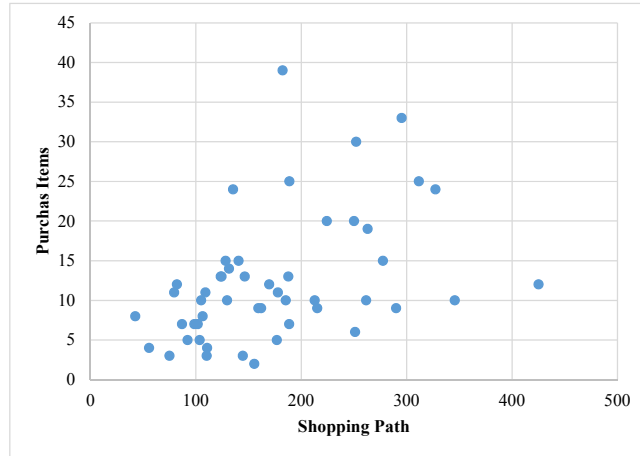


Figure 8 Shopping Path and Number of Purchase Items

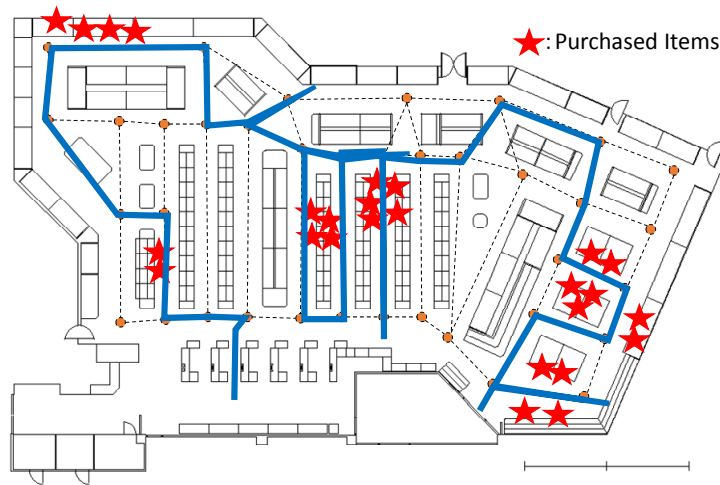


Figure 9 Example of Short Shopping Path with Large Purchase Items

Figure 7. indicates the relation of staying time and number of purchase items. Figure 8. also indicates the relation of shopping path and number of purchase items, respectively. From the analysis, the staying time extends, the shopping path get longer. Even if the shopping path or staying time gets longer, the number of Purchase items does not increase.

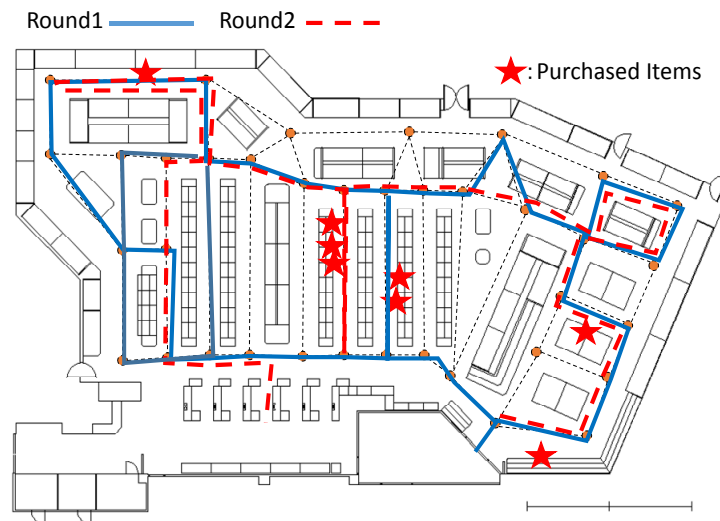


Figure 10 Example of Long Shopping Path with Small Purchase Items

Figure 9. indicates example of short shopping path with large purchase items. This customer took items with same category intensively and might be seen well understand the item position in the store for shopping around efficiently. Figure 10. indicates example of long shopping path with small purchase items, respectively. The blue line shows first round in the store and the dot line in red shows second round in the store, respectively. This customer made two rounds in the store and went back and force in the same place. It is impossible to figure out which round might be put in the basket from this result. According to the real observation in the target store, Most of the customers look around in the store in the first round for the preliminary research and take target items in the second round.

5 Concluding Remarks and Future Work

This paper has presented investigating for analyzing customer shopping path in a supermarket which aims at developing a marketing decision support system for retail management. We have described the research background, research setup, and experimental results of field study. Before executing studies, we have carried out intensive field survey and POS data analysis to uncover the current situations of the targeted super-market. The experimental results have suggested that the staying time in the store extends, the shopping path get longer. And even if the shopping path or staying time gets longer, the number of purchase items does not increase. Our future work includes 1) analysis regarding customer information base on a reward card and product categories, 2) analysis of customers' branching probability in a real store to ground walking flow, 3), and 4) mounting the results of customer behavior data with the simulation. These work will require practical experiments and further survey studies. We wish to express our gratitude of the cooperation to our experiment.

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Research on Real Estate Regulation Measures under the Supply and Demand Models

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Abstract: With the continuous improvement of the level of economic development in China, the scale of the real estate industry shows the trend that continues to expand. However, due to various reasons, the real estate industry is gradually emerging in the sustained and rapid development, while the supply and demand imbalance, prices have skyrocketed, and other issues, causing a hazard to the healthy development of China's economy. In order to control the real estate industry, the state implemented a number of macro-control measures, but ineffective in recent years. This article will use the supply - demand model elaborated the real estate supply and demand changes under the Under the Government macro-control measures. Through analyzes, Government should take tax to buyers, imply the price ceiling and construct a number of affordable housing and other measures, those can effectively regulate the current situation of imbalance of supply and demand in the real estate market.

Keyword: Real estate; Supply and demand; Tax; Price ceiling

1 Introduction

The real estate industry is an important force to drive economic development in our current society, real estate supply determines the trend of real estate prices continue to rise. In particular, real estate prices rapidly rising in most cities in recent years. In order to maintain normal real estate development environment, the state has introduced macro-control policies, but not achieve the desired results. Due to various reasons, prices rise continuously. Implying effective real estate tax system not only can coordinate the operation of the national economy, but also increase the national income. In this paper, the demand - supply model is used to study the condition of the real estate market, Analyze respectively market conditions, real estate market demand, supply and balanced relationship in a perfectly competitive. At the same time, we analyses that supply demand and price changes under the condition that the government take demand-side tax and imply price ceiling. It can be draw that if the Government take demand-side tax and provide affordable housing, the contradiction between supply and demand of the real estate market can effectively easy.

2 The Supply-Demand Situation of Real Estate Market in China

Judging from the development trend of supply and demand, demand will be influenced by high price in short term. The possibility of house prices falling down is very small in long term. As mentioned earlier, the demand of real estate market can be sorted into life demand, improving demand, investment demand and speculative demand. Both life demand and improving demand are rigid, their change is also a pattern. Under the new situation of Macro-control, some consumers expect house prices to fall, and maybe wait for housing price further going up.^[1] But in long term, this part of demand is an objective reality and it's quantity is very huge, those demand is also bound to be released. To demand for investment and speculative, under the macro-control policies, investors will be more rationally analyze investment income, this part of demand will significant decline in the short term. But view from long-term, when interest rate policy and exchange rate policy have not big change, investment channel keeps also single, where to use the withdrawal funds from the property market is still a big problem. If there is no better investment channel, these funds may also return to the property market, which will continue to push up house price in the next wave of market.

Supply situation in short term is difficult to have a big change. In long term, with China's second-hand housing market gradually standardized, the further development of the real estate market and other factors, the housing market in China will increase effective supply.^[2] But the real estate market's supply comes mainly from real estate development. At the premise that the scale of investment in real estate development is still too large and housing prices soar, real estate development and investment further accelerate is unrealistic. Therefore, judging from the trends of supply and demand, the huge shortage of demand and supply of residential housing in recent years will last. Under the regulate of Strict macro-control policies, the growth rate of real estate prices will go down but the rate of

decline will not be too much in the short term. However, real estate prices will show a continued slight rise in long term.^[3]

3 Analyse on the Demand - Supply and Price of Real Estate

3.1 The relationship of supply, demand and price under perfectly compete

Perfectly competitive market structure means there are a large number of enterprises in an industry, the market share of any enterprise is very small, what is more ,they all produce homogeneous product .So, any one of the enterprise lack the ability of control market price. In this case, the point of intersection of the line determines the market price of the product, and the price is called the equilibrium price in economics. Figure 1 shows the situation.

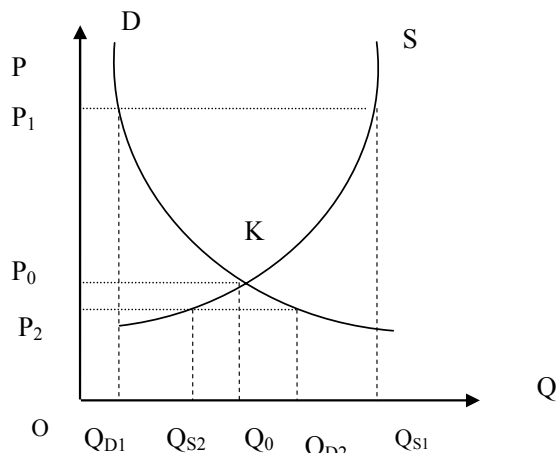


Figure 1 The Relationship of Supply, Demand and Price in Perfectly Competitive Market

As mentioned above, all the points in the demand curve represent the quantity of certain products that consumers are willing to buy at particular price. Each point in the supply curve indicates the quantity of a particular product that the seller is willing to provide at certain price. The point that Supply and demand curves intersect denotes that demand quantity is amount to supply quantity, it also means that the transaction at this price enables both parties Satisfy. In Figure 1, the intersection K of the two curves is equilibrium point, at the same time, the transaction amount Q_0 is called balanced trading volume and the price P_0 is called the equilibrium price. Why it is called “balance”? Because if the price is higher than P_0 and become P_1 ,at this time, the supply quantity is greater than demand quantity($Q_{S1} > Q_{D1}$), so the seller can not find enough buyers, and it will cut the price down. If the price down below the P_0 and is P_2 , when the demand is greater than supply ($Q_{D2} > Q_{S2}$), the buyer can not buy the desired amount of what he wants, and the price would be much too high. So, when the price is not P_0 , there will be a trend that price tend to P_0 ,the price towards the direction of P_0 in the prices until it eventually becomes P_0 , demand and supply are equal, the amount buyers want to buy equal to the seller wants to sell .As long as there is no new factors in the intervention, the price will not change. So, at this time, this market reaches equilibrium.

3.2 The implementation of Price ceiling

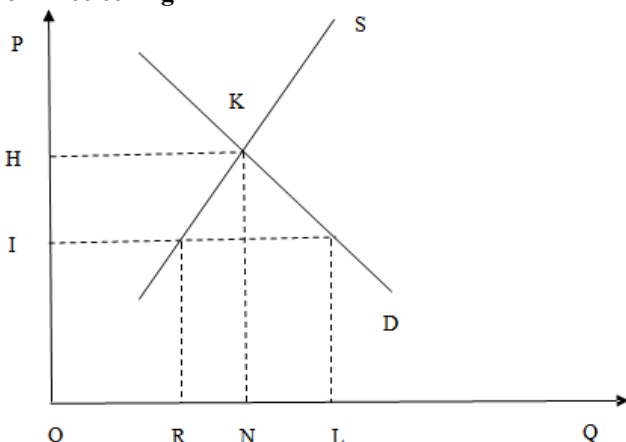


Figure 2 The Government Limiting Price Affects Supply and Demand

In the current real estate market, due to the insufficient supply and inflation, the house price have been rising .At this time, the government in order to get the goal that meet the normal housing demand of our people, often take the measures of price ceiling.

As shown in figure 2, assume that under normal market conditions, the supply curve is S, the demand curve is D ,the equilibrium point is K, the balanced price is OH ,and the balanced trading volume is ON, Now Government think balanced pricing is too high, making the maximum price for OI. if the market price exceeds the OI, then it is illegal. From Figure 2, you can see the results of such a requirement. If the price is set at OI, the supply will be reduced to the OR, and the demand will increase to OL, therefore, there will be supply shortage. The shortage number is OL-OR= RL, this part of the shortage requires the Government to provide or carry out the countermeasure of macro-control. Supply shortages may cause a series of bad phenomenon in the real estate market, such as the purchase is difficult, the decline in the quality of the housing. ^[4]Therefore, the Government implying the price ceiling of real estate industry can combat high prices, and can protect the normal interests of the people .However, in order to make up the reduced supply that lead by the price ceiling and satisfy the normal housing needs of people, the government should construct promptly a number of houses or encourage enterprise to build affordable houses by providing subsidy or carrying out tax-free policy.

3.3 Government consumption tax levied on the supply and demand, prices

Under the conditions of market economy, the government consumption tax levied on commercial housing will lead to higher prices, partially offset by decreases. Now assume that the government levies excise taxes on commercial housing, per unit square meter levy a certain amount of tax^[5] Although, this will not affect the taxation on the demand curve. Because the tax is paid by the consumer or real estate business to the country, buy for the price includes taxes does not care; they care about the level of prices. If the price increases, the demand will be reduced; conversely, on the increase. So, no effects of taxation on the demand curve.

However, the tax effect on the supply curve, the market mechanism, the number of commodity supply and demand as well as changes in market equilibrium price depends on many factors. This article only based on the static principle of market supply and demand and the price mechanism analysis. Three tax policy measures on the providers we have taken, namely direct sellers who charge sales tax, personal income tax and VAT on land for real estate development enterprises. Its effect is analyzed theoretically: When the governments increase tax to the seller, this will increase directly the cost of providers. ^[6]In the case of other conditions remain unchanged, in order to obtain the same profit as not be taken tax by the government, the provider will add tax cost to the sale price, which means that buyers will be demand to pay higher prices than before. This lead to the supply curve to the left and form a new market equilibrium point. This led to the supply curve to the left to form a new market equilibrium point: The new market equilibrium in supply and demand, equilibrium price under the assumption that the same demand curve improving the market-clearing reduction in the number.

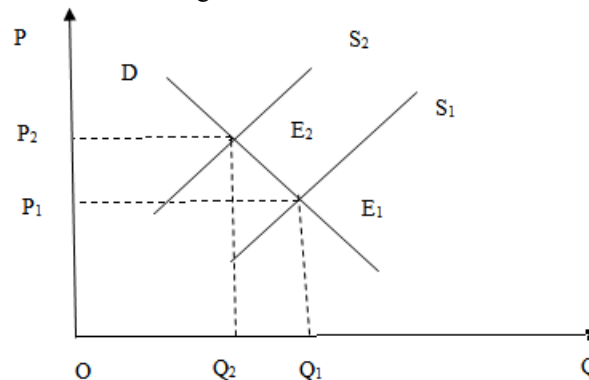


Figure 3 Government Imposing Taxes Affect the Supply and Demand

Therefore it can be concluded that: The most likely outcome of the effects of taking supply-side tax in the residential real estate will cause house price further improvement, the quantity of residential real estate supply may reduce. As it is Shown in the figure 3: D stands for the demand curve, S1 stands for pre-tax supply curve, and E₁ is the equilibrium point of supply and demand before tax. At this time, the equilibrium price is P₁, and the equilibrium quantity is Q₁.If the government take taxation on the supply side ,then the supply curve will moved to the left S₂ and form a new equilibrium point E₂ of

market supply and demand. In this equilibrium point, the market price will rise from P_1 to P_2 , the quantity of supply will reduce from Q_1 to Q_2 .

As the above figure shows, we can draw the preliminary conclusion that: the effect that the government take the tax policy of real estate to curb price growth is limited and is likely to promote house prices more higher, especially in the situation that supply quantity is less than demand quantity, the effect is more smaller. At the same time, these measures may control the expansion of the scale of residential real estate. In the idea, further improving tax policies achieve the target that the government is able to control the excessive growth of house prices and suppress the scale of real estate expansion. The extrapolation of the theoretical analysis is: If the government take tax on the supply side in a competitive market, the tax burden will be often passed on to the consumer, especially in the situation that the supply quantity is less than the demand quantity, then the transfer is relatively more easy to achieve.^[4] However, if government takes tax on the demand side, it is almost impossible to transfer tax, and house prices will not rise as a result of taking tax on the demand side. What the tax burden increase in demand side may lead to a drop in demand, achieving the goal of Suppress price and demand.

4 Conclusions

Seen from the related analyze of the supply and demand curves, we can draw the conclusion that some of the macroeconomic policies adopted by the government play certain inhibited effect on the price, but not solve the house bubble from the source. Existing contradictions in the prices of supply and demand in China, we should look at several aspects to improve.

4.1 Set reasonable property taxes and increase difficulty of purchase the second suite

Although the supply amount of housing is increasing in China, but many people still do not have a house to live. Part of the reason is that rich people sometimes has several upscale house and idle the houses there, which crowd the poor people living space, these finally cause housing resources waste or can not be effective configured. The government should improve the system of real estate price appraisal, real estate tax assessment policies and property registration. It is especially emphasized that the government should make laws and regulations to strictly crack down on speculation in the real estate market, For example, the government can take the measure that the second suite are not permitted to be bought by down pay and improve the tax levy proportion of the second suite property.

4.2 Transfer taxation objection to improve the costs of holding multiple sets of real estate

In my opinion, We strongly advice that the Government should shift gradually the taxation objection of the real estate from tax on the supply side to tax the demand side tax in the future. Taxation on the demand side means taking tax in the link of holding the real estate. Although China have real estate tax, urban real estate tax, urban land use tax and other taxes at present, but our government take no tax on the part of holding personal residential real estate. Therefore, as long as the person who possesses the real estate make no transfer transaction, this part of real estate is still not bear the tax burden. Therefore, the cost that possess residential real estate so as to save the cost of wealth is still very low. So that the current tax policy will not be able to suppress real estate speculation and can not make a big different in the protection of people normal needs. Taking tax on the holders of real estate taxation, especially taking tax on the holders who have several sets of real estate, can effectively suppress real estate speculation.

4.3 Increase the supply of affordable house through constructing or implying subsidies

Developers are economic man who pursuits of maximized profit, they supply only high-end house, all these lead to the supply of low-profit affordable house reduce, and caused Cheap house vacant. This requires government to take Macro-control measures to improve the situation: To the vacancy market of weak profit in the real estate market, the government can build larger numbers of affordable house, cut tax and provide subsidies, by which increase the supply of affordable house.

4.4 promote the development of small and medium-sized cities

At this stage, the Government has repeatedly limit for housing prices of second-tier cities, but the majority of people still poured into these bustling cities as flood. Because the modernization of major city is high and have many developing opportunities, so people are not willing to stay in small town. Therefore, the government price regulation can Only ease the tension of supply and demand in real estate market in short-term. In order to tackling the problem, we need to speed up the construction of small and medium-sized cities, which can narrow towns gap. This can disperse population pressure and alleviate housing stress in major cities. This is a long-term strategy of balance the supply and demand of

China's housing market.

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Analysis on Informal Finance Risk Conduction Effect under Asymmetric Information Condition *

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Abstract: Based on the asymmetric information, the informal finance system is easy to generate the risk conduction effect and has certain hazards. It is necessary to conduct scientific research on it, and propose effective management and control measures. This paper analyzed asymmetric information incentives of informal finance risk conduction from three aspects, including macroscopic reasons, macro reasons and micro reasons. Then studied the informal finance risk conduction effects, such as Domino Effect, Broken Window Effect, Butterfly Effect and Coupling Effect, and put forward the control measures of informal finance risk conduction.

Key words: Asymmetric information; Informal finance; Informal finance risk; Conduction effect

1 Introduction

Informal finance plays a significant role in resolving the financing problems of small and medium enterprises, promoting the development of finance-ecology system and so on. The inside and outside scholars from the research founded that, the cause of informal finance was that it had advantages than Formal Financial Institutions in the aspect of asymmetric information. Hoff and Stiglitz(1994) believed that because the main transaction subjects was always individuals or businesses related by blood or geopolitical relations, the lenders was very understanding of the borrower's private information, such as operating conditions, repayment abilities, credit, moral quality and so on, the almost free information settled for a long time made folk loan have a lower transaction costs, what was the premise of folk loan^[1]. William F. Steel, et al(1997) argued that informal finance took advantage of the local private information so as to have a comparative advantage in solving asymmetric information, this was the important reason informal finance generated^[2]. In our country, with the rapid development of informal finance, informal finance has no longer limited to the single mode which is established between relatives and friends, but cross the existing orbit to do credit behaviors through the cross-people, cross-region, or intermediary agent, the problems caused by asymmetric information is highlighted. Zhou Hongyan, Zeng Liping and Li Wenzheng(2008) described the four new characteristics of informal finance risks, one of which was that with the informal finance scope became larger, asymmetric information would lead to institutional risk^[3]. Ma Hongman (2011) analyzed the hidden danger existing in informal finance as the example of Wenzhou city informal finance events, and warned people to beware of the domino effect of informal finance risk^[4]. Therefore, with the rapid development of informal finance, it presents the characteristics of diversification of involved subjects, complexity of business types, asymmetric information between suppliers and demanders and so on. In particular, under the real financial management environment of poor supervision, legal bug, and lacking of credit, informal finance risk conduction effect caused by information asymmetry is increasing day by day. It is necessary to study the related problems of informal finance risk conduction effect under asymmetric Information.

2 Asymmetric Information Incentives of Informal Finance Risk Conduction

According to the different levels, the incentives of asymmetric information in informal finance risk conduction could be classified into three categories: macroscopic reasons, macro reasons and micro reasons (as shown in figure 1). Macroscopic reasons mainly refer to the factors which exist beyond the scope of informal finance system so as to cause asymmetric information of the informal finance risk conduction, such as national policies factors, national laws and regulations factors, social culture factors, economic environment factors and so on. Macro reasons mainly mean the factors of asymmetric information of informal finance risk conduction caused by the informal finance operating environment condition and the system of itself, such as informal finance industry management system, business regulation, pricing model and so on. Micro reasons mainly come from the direct interest subjects in

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informal finance, such as capital demanders, intermediaries and capital suppliers. In all the reasons, the macro reasons are easier to lead to the informal finance risk conduction directly.

Microscopic reasons are also known as internal reasons, namely the direct factors cause asymmetric information of informal finance risk conduction. However, the macro and medium levels are collectively referred to external reasons, they are the indirect factors which like catalyst in chemical reactions and promote the asymmetric information of informal finance risk conduction to occur. As in the external environment of the economic and social development, informal finance has no longer limited to the loan modes between relatives and friends, but loan relations from high information transparency to low information transparency. It has formed loan modes through the cross-people, cross-region, or intermediary agent. In order to obtain the capital suppliers' fund, some disqualified capital demanders try to make every attempt to find loophole in informal finance system (simple operation, no project risk assessments, etc.) by fabricating false information, to obtain the capital supplier's trust, all of which finally lead to serious information asymmetries, and result in occurrence and transmission of adverse selection and moral hazard in informal finance. Meanwhile, under the lack of the laws and regulations protection, some legal-loophole-seeker informal finance intermediaries use every possible means to keep their own interests. They use high interest rates as bait to cheat public funds. All of which disrupt the normal development of the financial industry and the social stability seriously.

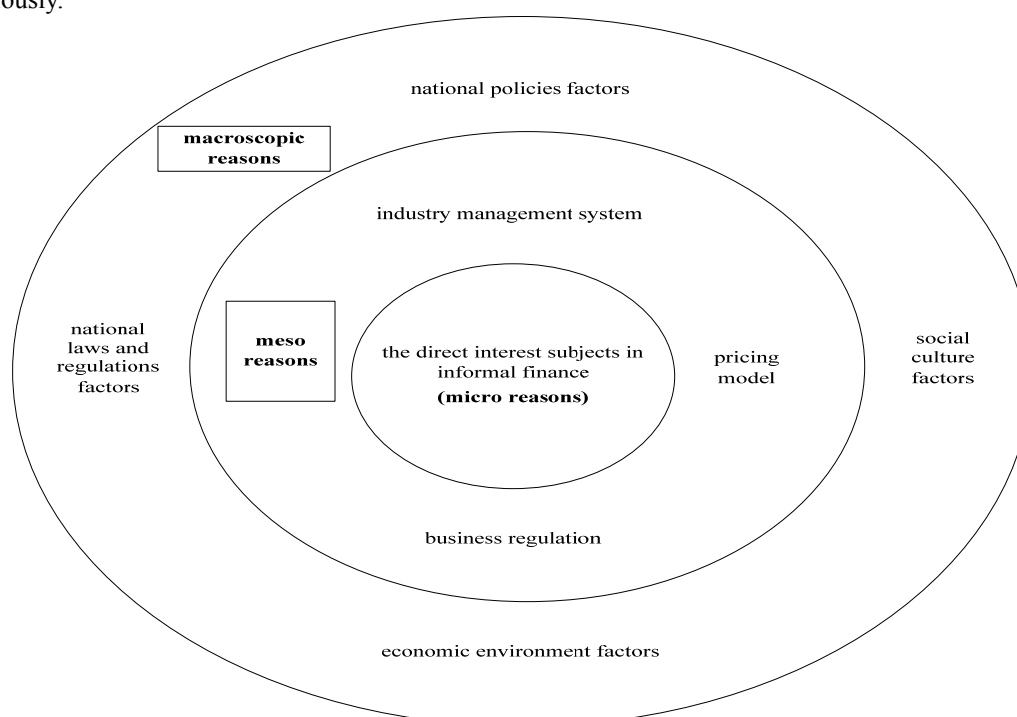


Figure 1 Asymmetric Information Incentives of Informal Finance Risk Conduction

3 Informal Finance Risk Conduction Effect

3.1 Domino Effect of Informal Finance Risk Conduction

Heinrich found that the happening of the risk had the characteristics of dominoes from the study, once there was a problem happened in a small link of the interconnected system, it would cause a chain reaction. Take the informal finance incidents happened in recent years for example, under asymmetric information, the cases about domino effect of informal finance risk conduction are too numerous to be mentioned. For example, since 2009 the “fund chain” in Wenzhou in Zhejiang province and Ordos in Inner Mongolia had been broken, which led to some bosses run away or committed suicide. Because the simplicity of operation process in folk loan provides convenience for the small and medium enterprises to raise funds. In order to get high interest, the capital suppliers invest their funds for these small and medium enterprises or personal under the huge false temptation. Eventually, because the market is recession, these small and medium enterprises hardly afford the high rates of folk loan, and then the risk happen, which conduct the risk to all of capital demanders and other enterprises, making capital

demanders suffer huge losses, all of which form the domino effect of informal finance risk conduction(as shown in figure 2).

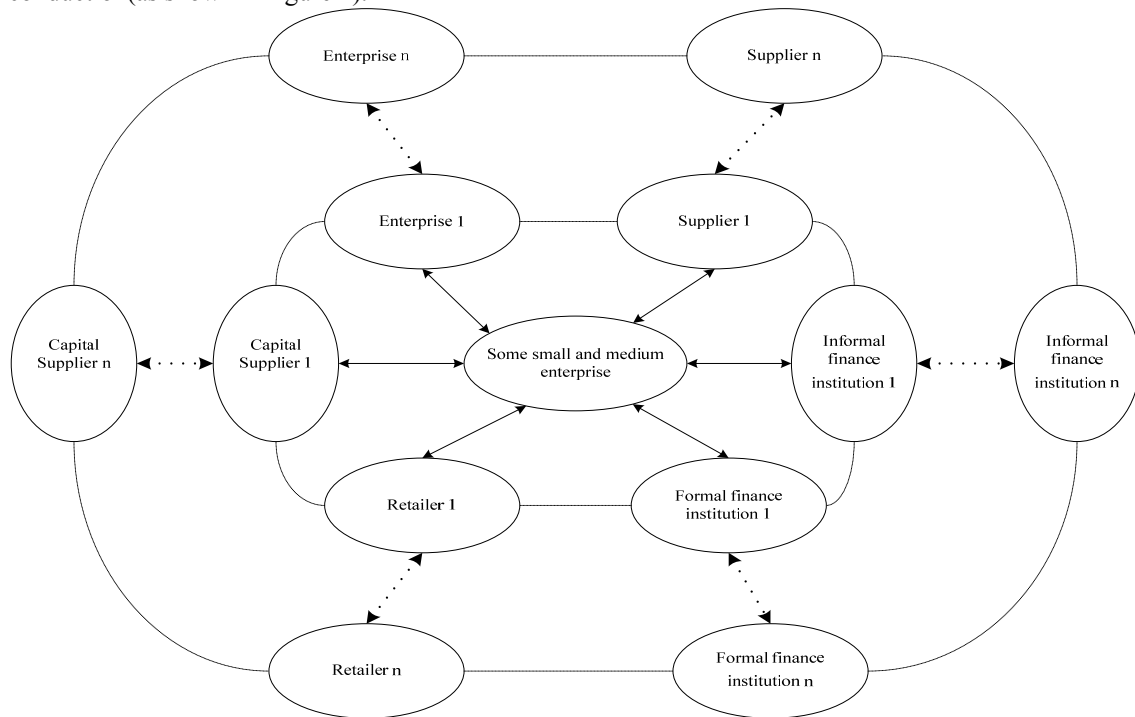


Figure 2 Domino Effect of Informal Finance Risk Conduction

3.2 Broken Window Effect of Informal Finance Risk Conduction

The broken window theory believed that considering a building with a few broken windows, if the window are not repaired, the tendency is for vandals to break a few more windows, eventually, they may even break into the building, and if it's not unoccupied. This effect also exists in informal finance risk. Under asymmetric information, capital suppliers of informal finance have no effective and strict economic evaluation for capital demanders, and have weak consciousness of risk control and prevention. In order to pursuit the high-risk benefits, they blindly lend funds to capital demanders in the poor credit conditions, especially to the small and medium enterprises. When one of the capital demanders can't stand high interest debt so as to give up repayment, and lenders don't contain this kind of behavior in time, it will give other capital demanders a psychological suggestion. Finally, everybody will imitate the "broken window" behavior, deliberately not be eager to pay off debt, finally it makes more bad debts to the capital suppliers, resulting in serious losses. As the event of Wenzhou enterprises shareholders collective evaporation happened in recent years, since the capital demanders can't be able to repay high interest of informal finance, few small and medium enterprises bosses "run road", which caused much more bosses hidden themselves to evade payment of debt.

3.3 Butterfly Effect of Informal Finance Risk Conduction

The father of Chaos theory--Edward Lorenz believed that a slight variation in the initial conditions could lead to the long huge chain reaction in the whole system. For example, a butterfly fluttering occasionally can cause a tornado. This effect also exists in the informal finance risk conduction. Under asymmetric information, any small link in the informal finance system goes out of control, if it dose not timely be controlled or guided, it will cause a serious of adverse reaction in the retire informal finance network. For example, when the country implements tight monetary policies, tightening bank and estate policies, finance institutions limit for small and medium enterprises' credit support strictly, the borrowers will choose the informal finance institutions to raise funds. Under asymmetric information, some social capital flow into those enterprises or personal which have poor performance and low qualification naturally. This not only hinders the stable and healthy development of social economy, but also disturbs the normal financial order.

3.4 Coupling Effect of Informal Finance Risk Conduction

Coupling refers to the phenomenon that two or more system or two motion forms combine by

influencing each other^[5]. Coupling effect is a phenomenon that two or more systems through the intermediate link between correlation and mutual relationship, under the way of action and reaction, attract and repel each other and then form larger effect .

Under the informal finance risk conduction process of information asymmetry, the stakeholders or every link of operation have directly or indirectly relationship with each other in the informal finance loan relation. By the influence of reaction, the nature and intensity of informal finance risk may be changed in the conduction process of reaction. According to whether the intensity of informal finance risk conduction changed, the coupling effect of informal finance risk conduction is divided into pure coupling effect, weak coupling effect and strong coupling effect. If the effect of informal finance risk conduction is $1+1=2$, it is pure coupling effect. For example, under asymmetric information, the flow rate and intensity of formal finance risk do not change greatly, which will fluctuate in a small range. If the effect of informal finance risk conduction is $1+1>2$, it is strong coupling effect. Such as asymmetric information, capital suppliers lend money through intermediaries to different capital demanders (such as small and medium enterprises) in the pursuit of huge interest. The risk effect of flow rate and intensity of informal finance risk can be enlarged under the influence of internal and external factors through multiple paths. If the effect of informal finance risk conduction is $1+1<2$, it is weak coupling effect. Under asymmetric information, capital suppliers can select the capital demanders strictly and make risk prevention, the risk effect of flow rate and intensity of informal finance risk will gradually diminish or disappear in the conduction process.

4 Control Measures of Informal Finance Risk Conduction under Asymmetric Information

4.1 Control Measures of Informal Finance Stakeholders

4.1.1 Capital suppliers

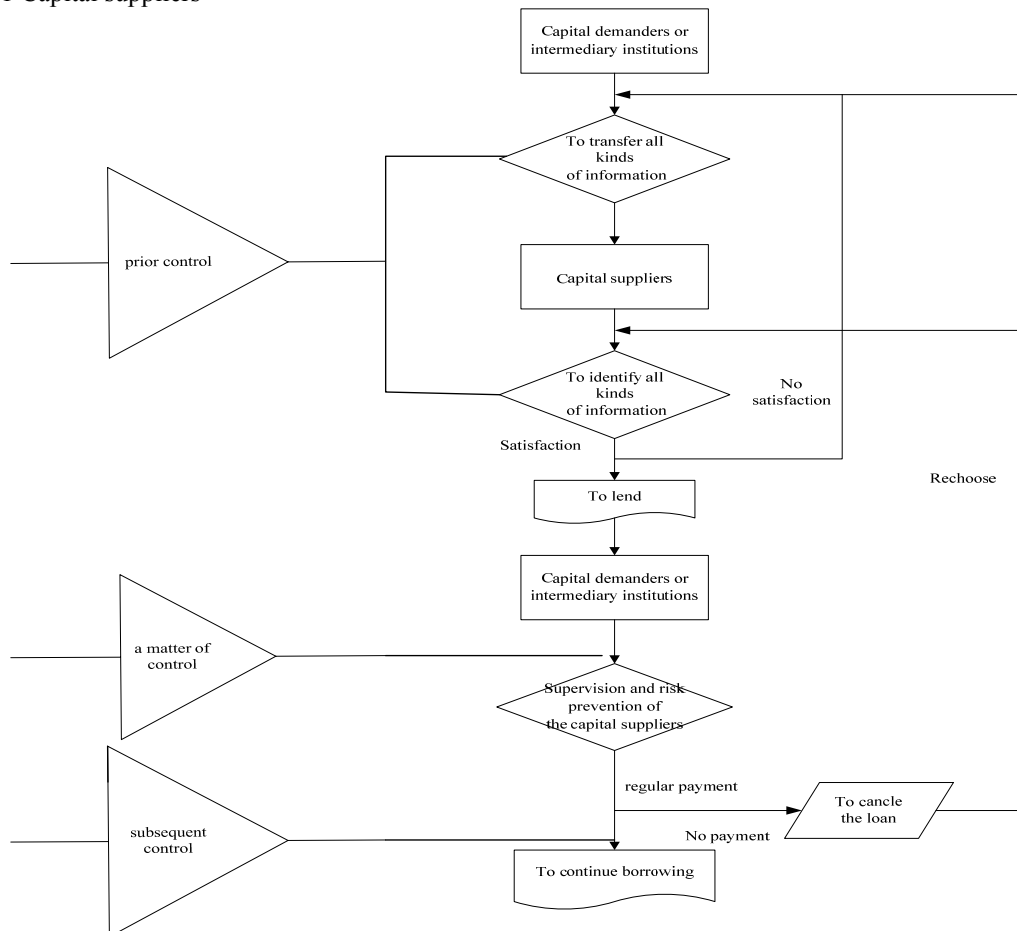


Figure 3 Informal Finance Risk Conduction Control Model for Capital Suppliers

In the informal finance loans behavior, the capital suppliers belong to information disadvantage. In the informal finance risk conduction control, the capital suppliers should take the effective measures to truncate the risk transmission path before and after lending, to prevent transmission of risk (as shown in figure 3). Capital suppliers could choose the ideal borrowers according to the signals from capital demanders or intermediary institutions before the loans happen. Firstly, the suppliers can make a preliminary investigation to the capital demanders and intermediary institutions, and be fully prepared to choose the appropriate borrowing candidates or institutions. Besides, distinguish the information of alternative borrowers and intermediary institutions, and let borrowers or institutions make a loan guarantee if possible. Finally, choose the appropriate borrowers or institutions. At the same time, they should track and focus on the important information of borrowers and intermediary institutions regularly, taking follow-up effective measures prevent bad loans. By a series of effective control measures before and after loan, it is possible to reduce or block the risk conduction effect in informal finance.

4.1.2 Capital demanders

Under asymmetric information, compared with informal intermediary institutions, capital demanders are in the advantage of information, some intermediary institutions will use the attitude that capital demanders are eager to raise money but can't get from formal finance institutions to raise the loan rates. It makes capital demanders suffer serious losses eventually. Therefore, in order to prevent the risk transmission, capital demanders should make an effectively investigation and understanding to the capital suppliers and intermediary institutions, especially to the intermediary institutions, such as whether the agencies have formal business license, or are consist with the pricing of intermediary institutions in the market before borrowing money. Only in fully understanding of capital suppliers or intermediary institutions can they raise money. Meanwhile, effective risk prevention measures after the event can reduce the high rate and fraud risk. Through a series of measures, the informal finance risk conduction effect under asymmetric information could be control.

4.2 Control Measures of Informal Finance Supervision

4.2.1 Accurate the law construction of informal finance

Under asymmetric information, the external reasons of informal finance risk conduction effect are lack of legal protection and have supervision gaps. Therefore, the States as the informal finance supervision should enact laws to protect the informal finance stakeholders, making informal finance become legal and establish a legal platform of folk loan. Firstly, establish lending standards according to own actual situations for capital suppliers or intermediary institutions, and register in relevant department. Secondly, after the registration, capital suppliers or intermediary institutions should be qualified license according to the relevant materials they provided, then they can implement loan. Thirdly, draw up a set of folk loan process procedures, and regulate the money-lending business, improve the link and process of folk finance loan transaction. Such as capital suppliers can implement rational and scientific evaluation in advance before the transaction, including the basic situation of the capital demanders, the purpose of the money, interest rate and whether contracts are normal, or they have the risk of collateral or not, their mode of payment and payback period. Fourthly, the funds should be classified, and strictly stop the use of funds which conflict with national policies or laws and regulations. Fifthly, set corresponding interest rates range according to capital uses and limits, to prevent capital demanders' foreclosure because of high interest rates. Sixthly, standardize capital suppliers or intermediary institutions and make clear rules for them, which can protect the legitimate and reasonable capital suppliers or intermediaries, combat criminal individual and institutions activities by using the folk finance loan. Lastly, supervise capital demanders' behavior strictly, prevent them from cheating capital suppliers or institutions.

4.2.2 Strengthen the supervision and management of the informal finance

The informal finance activities have the characteristic of wide range and strong degree of freedom, if you don't take charge of it, the risk conduction effect triggered by low degree of information will happen from time to time. Therefore, in order to control the risk conduction in informal finance under asymmetric information, it is necessary to carry out effective supervision management for informal finance loan, and establish the corresponding risk prevention measures. Firstly, the state should set up the specialized informal finance supervision departments, record and track the loaning information, update it regularly, stop the source risk timely, all of which can prevent the risk transmission. Secondly, encourage all capital demanders to register loan information in supervision departments actively; the large amount of credit should be consulted about the risk prevention measures in the departments, in order to guarantee the safety of the funds. At the same time, we should set up a cross-country informal financial supervision network, establish a unified informal financial supervision network system, control

a serious of processes and punish the illegal procedures strictly.

5 Conclusion

Under asymmetric information, informal finance risk conduction effect happen from time to time, analysis on the domino effect, broken window effect, butterfly effect and coupling effect generated by informal finance is a new topic, and has a certain practical significance on the informal finance management. This paper analyzed asymmetric information incentives of informal finance risk conduction from three aspects. Then studied the informal finance risk conduction effect in depth and put forward the control measures of informal finance risk conduction. This paper studied the informal finance risk conduction effect in theory, the next research direction will be to collect relevant data and prove the correctness the above theory from the quantitative aspects.

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Evaluation of Public Satisfaction Towards Governmental Public Sectors Based on SEM

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Abstract: With the deeply development of government performance evaluation, the research of evaluation of public satisfaction towards governmental public sectors draws more and more attention. By using structural equation modeling, this paper investigates the factors which affect public satisfaction and the relationship between them. The research results show that: public expectations directly influence public satisfaction, and through the mediating variables, public satisfaction, public expectations indirectly affect the behavior of the public. Meantime, public expectation will affect public satisfaction through the mediating variables, perceived value, ultimately affecting public behavior and proposing the management mode of governmental public sectors, in order to improve public satisfaction.

Key words: Governmental public sectors; SEM; Public satisfaction; Factor analysis

1 Introduction

Government performance evaluation is the result which is jointly promoted by the development of western society, new public management and public administration theoretical research. As the government is regarded as an agency that provides public goods or services entrusted by the public, the subjective criteria of performance evaluation is to check whether the public is satisfied or not. Therefore, when evaluating government performance, we should not only inspect how many costs and resources the government has put in and how much work is been done, but also investigate how large the extent that all it has done can meet the needs of society and the public, and receive public recognitions. Only has the government gets public recognition and satisfaction, its behavior can be considered to be the most performing. Based on this concept, since the 1970s, the value orientation of western governments' performance evaluation has gradually shifted from the pursuit of economy, efficiency and effectiveness to the pursuit of the quality of public goods or services provided by the government and the citizen's satisfaction (Qi, 2011). This paper takes public satisfaction as the starting point, to build the causal relationship mode of public satisfaction and do empirical research, putting forward the corresponding countermeasures and suggestions.

After a review of literature from home and abroad, the author finds that the related research of the evaluation of public satisfaction towards governmental public sectors at abroad is more mature. Welch (2005) studies the relationship between government information construction and public satisfaction, pointing out that the transparency and interaction of government information construction are the important factors which have an impact on public satisfaction. From the perspective of the public, Hao (2013) holds the view that the improvement of public satisfaction is the important method and vector of government management, and an open, transparent, efficient and information sharing government management mode needs to be built. In order to improve public satisfactions, Hsu thinks that we should effectively enable and expand the construction of public sector information technology and improve the efficiency of government public sectors and people's satisfaction towards the government through social influence and perceived performance. Because of the successful use of customer satisfactions in the enterprises, since 2000, domestic scholars began to use the satisfaction in government departments, and conduct extensive related researches, obtaining a wealth of research results. Zeng (2006) considers that evaluating government performance by regarding public satisfaction as the orientation is the inevitable requirements to build a modern and efficient government. In our country, because the assessment model is oriented to public satisfaction, the content, subject, objectives and principles of the performance evaluation of the government public sectors will suffer the obstructions from awareness, institution and technology in reality. In regard to the difficulty of public satisfaction of the government's public services, Liu (2008) uses the fuzzy multiple attribute decision making method which is based on the expectations and the interval evaluation matrix combining quantitative indicators with qualitative indicators to measure public satisfaction of the government public services, providing a more scientific and feasible mode for quantitatively evaluating public satisfaction of the government public services. Xin (2008) builds a government evaluation index system

based on the public from five aspects which are information disclosure, online work, public participation, website design and customer awareness. And she evaluates the government website performance from the perspective of public satisfaction by using F integral comprehensive evaluation model. Taking public satisfaction of Shenzhen municipal government information opening as the evaluating object, Duan (2010) collects information about public satisfaction, obtains various structural correlation coefficients between the variables and overall satisfaction towards government information opening of the public in the mode of public satisfaction of Shenzhen municipal government and its departments' information disclosure, and he puts forward the corresponding countermeasures. Through the literature from home and abroad, we can find that most of the present studies are descriptive researches but lack of targeted researches, and there are few empirical studies of the relationship between the factors which will influence public satisfaction. Even though Jiang (2009) studies the relationship between public satisfaction and public behavior, his research is only from the perspective of public psychology, starts to study the behavior intention from negative emotions, and does not contain the study of specific public expectations, perception and the public perceived value. This study adopts the Structural Equation Model, conducting empirical analysis of the relationship between the factors of public satisfaction. What's more, from the relevant theory, this research has designed questionnaire survey and builds the structural equation modeling between the public satisfaction factors.

2 Data Collection

First of all, in order to guarantee the reliability of the questionnaire, the author conducts interviews with the relevant people to determine the main part and specific questions of the questionnaire. Subsequently the questionnaires are distributed to the experts in the related field. The experts are expected to propose amendments, then the author modifies and improves the questionnaire according to the feedback information. Second, the author conducts the pre-test questionnaire survey in a small-scale, to carry out work to further amend and improve the questionnaire. At last, the relationship scale of the relation between public satisfaction and behavioral intention is generated. The entire scale is divided into five subscales which are respectively named service expectations (4 questions items), service aware (5 questions items), perceived value (5 questions items), public satisfaction (5 questions items) and public behavior (3 questions items), total including 22 questions items. The questionnaire adopts Likert's standard five-point scale which shows that 1 for very dissatisfied, 2 for not very satisfied, 3 for ordinary, 4 for quite satisfied and 5 for very satisfied. Questionnaires are distributed to those objects who are government staffs and people who keep close contacting with government staffs. The questionnaires mainly focuses on government staffs, business executives, small private businessmen and so on. There are total 220 questionnaires being distributed, of which 183 questionnaires are validly collected, and the effective rate is 83.18%. From the gender of the research objects, it can be seen that the proportion is basically in 1:1. The objects' qualifications are in tertiary education level and above, and they are around the age of 40 years old. Overall, the samples of the survey are broad and representative, and the research results have strong reliability and persuasiveness.

3 Empirical Analysis

3.1 Exploratory factor analysis

Before analyzing the questionnaire survey data, we must first carry out the testing of reliability and validity of the scale. We can use SPSS16.0 for testing the reliability of the scale. The analysis of the entire scale's reliability shows that, the Cronbach's α value is 0.806, indicating that the scale has high reliability. The Cronbach's α values of subscales' are respectively that perceived value is 0.835, public behavior is 0.793, service awareness is 0.751, public satisfaction is 0.938, and service expectations is 0.829 which all meet the requirements of being greater than 0.70. What's more, the correlation coefficient of all the questions and potential variables is relatively high. Therefore, the scale has higher consistency and reliability. Because of the good reliability of measuring the latent variables, exploratory factor analysis needs to be further expanded. Exploratory factor analysis is aimed to identify the main factors affecting the number of observed variables as well as the relevance degree of each factor and each observed variable (Zhu, 2011). By using SPSS16.0, the author analyzes all the 15 factors. Through the statistical results, we can see that the value of KMO is 0.844 and the test of Bartlett's sphericity value is 1573 which reaches the highest point, indicating that there are common factors existing between the correlation matrix and it is suitable for us to conduct factor analysis. The author uses the maximum likelihood method as the factor extraction method, chooses the varimax rotation method to obtain a

clearer factor solution, and adopts the maximum variance orthogonal rotation. After rotation, the load intercept point of the factor is 0.5. The author removes the question items whose load on any factor is lower than 0.5 or whose load on multiple factors is more than 0.5. After analyzing the iterative rounds of principal component factor, the author finds that there are 5 eigenvalues that are greater than 1, and the cumulative contribution rate reaches 85.46%. The analysis shows that the remaining 15 variables can use these five common factors (respectively are the common factors of public perceived value, the common factors of public behavioral intention, the common factors of public service awareness, the common factors of public satisfaction and the common factors of public expectations) to explain, and the structural design between the variables of the questionnaire is reasonable.

3.2 Model hypothesis

After using the exploratory factor analysis to identify the factors, the author establishes the structural equation modeling, conducts confirmatory factor analysis and path analysis towards equation model, to obtain the equational analysis of model, validity, goodness of fit index and other indexes. When undergoing the structural model fit, the author takes the sample which is less than 500 into account. Because of the use of the method of generalized least squares (GLS) to estimate will obtain better results (Wu, 2009), the author selects GLS method to estimate and uses AMOS7.0 to conduct model parameter fitting towards hypothetical model. The results show that in the eight model fit indices, $\chi^2/\text{freedom}$ index is more than the standard (<3), SRMR index is slightly higher than the standard value (<0.05), RMSEA is greater than 0.05, and GFI is less than 0.9, indicating that the fitting of the model and observational data are in the general level, and the further model optimization and correction are needed. In order to get a better model, it is necessary for the initial model to be amended. What's more, the author finds that the public perceived value's influence to public behavioral intention is not very notable, so its path needs to be deleted. Considering that public expectations may affect the perceived value of public's expectations, the author, therefore, increases the paths from public expectations to perceived value. Furthermore, through the actual operation, the author finds that chi-square value is reduced a lot, and each fit index has also been improved, but there is still a gap between the current fit index and the ideal fit index. Further amending the model through modified index, in Amos, the author uses the maximum likelihood to estimate the running model's parameter estimates. The results are presented in Table 1 and the modified model is displayed in Figure 1.

Table 1 Revised Model Fitting Indicator Parameters

Indicator	chi-square	df	chi-square /df	GFI	AGFI	SRMR	RMSEA	CFI
Result	100.179	78	1.28	0.944	0.914	0.042	0.036	0.935

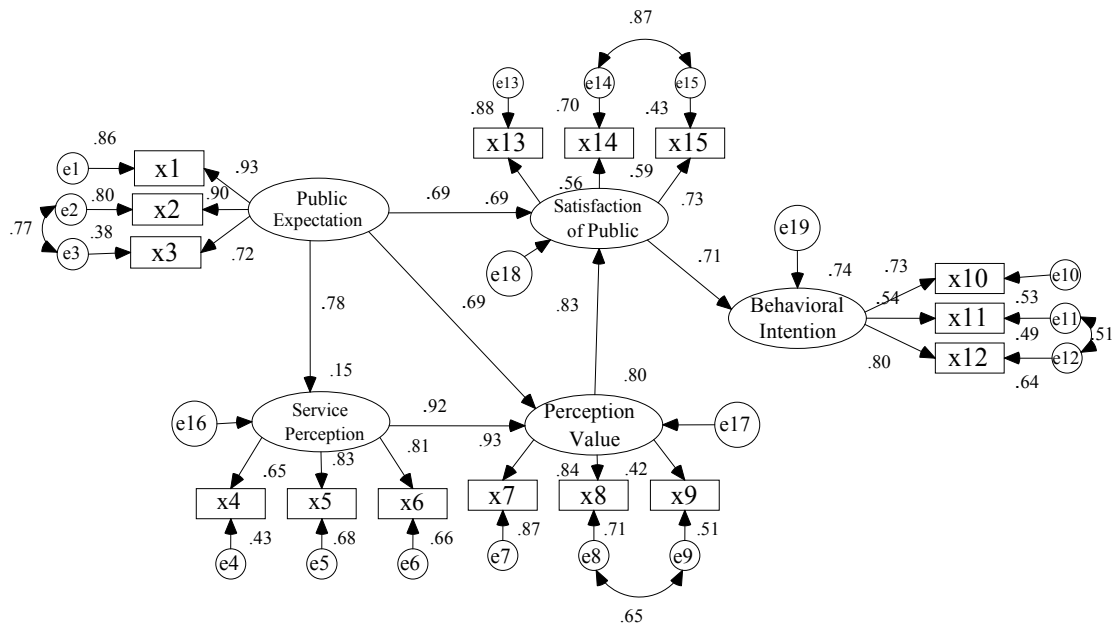


Figure 1 Modified Route Map of Public Satisfaction Structural Equation Modeling

From the results of the related fit index assessment, the modified model chi-square statistic is 100.179, freedom degree is 78 and chi-square / freedom degree = $1.28 < 3$, indicating that the model fit is good. The approximation error RMSEA is $0.036 < 0.05$; absolute goodness of fit index GFI is 0.944, and the relative fit index CFI is 0.935. All the modified model indicators have reached the acceptable range, indicating that the structural equation model fit is better. From Figure 1, we can see that in the information construction of government's public sectors, public expectations directly influence public satisfaction, indicating that public expectations are the foundation of public satisfaction, and public satisfaction is the embody and destination of public expectations. Meantime, through the mediating variables, public satisfaction, public expectations indirectly affects the behavior of the public, showing that in the information construction of the government public sectors, if the public have a high expectation of government staffs, but the staff's attitudes and behaviors do not satisfy the public, then the expectations turning into disappointment which will finally lead to the public's behaviors out of control. At the same time, the author finds that public expectations will also affect the value of public perception. Through the intermediary variables, the perceived value affect the public, and ultimately affect the public's behaviors. Public expectations also affect public's service perception, and then through the mediating variables, public perceived value and satisfaction will ultimately affect the public's behaviors.

4 Conclusions

As for the influencing factors of the satisfaction of the government public sectors, according to the research results, this paper proposes the service management model for the purpose of improving public satisfaction. On the one hand, because through the mediating variables, public satisfaction, public expectations indirectly affect the behavior of the public, the government should adopt the service management model that is consistent with public expectations. With the development of the process of political democratization, the values of the public own department will be more and more obvious during the government reform. The status of the public own department and the relationship between the public and government are undergoing profound changes. Therefore, the type of democratic and open government is becoming a basic requirement of the public. The democratic ideals of modern government is presented that government behaviors must reflect the public will. Embodying the public will is the basic connotation of democracy, requiring government activities to respect citizens' interests and needs. Therefore, public satisfaction will become the ultimate indicator of the performance of government public sectors.

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Research on Distribution Model Innovation of the Fresh Agricultural Products*

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Abstract: Within the fresh agricultural products distribution industry, it's an absolute trend that distribution model for fresh agricultural products have been constantly evolving from traditional ones to supply chain management style. Based on the analysis of the evolution mechanism of fresh agricultural products distribution model, differential models on those models have been constructed, the model evolution under government subsidies system has been analyzed and recommendations on policies for innovative development of fresh agricultural products distribution have also been made.

Key words: Fresh agricultural products; Evolution mechanism; Model innovation; Supply chain management

1 Introduction

With the development of urbanization, some big or media-sized cities suburb vegetable plots and retail outlets being running down steadily, increased links of commodity distribution and cost, “sells difficultly and buy dear” and so on the questions are going prominent. On December 13, 2011, the State Council office of the People's Republic of China has enacted a report about strengthening the fresh agricultural products distribution system^[1], which points out that China is the world's fresh agricultural products and consumption of power, so we must focus on strengthening the connection between production and marketing, strengthen the construction of infrastructure of fresh agricultural products distribution models, innovate the model evolution, meanwhile increase the degree of distribution organization, the distribution chain and market position must be perfected, further reduce the links of distribution, reduce the cost of distribution, through building the perfect, efficient, unblocked, safe and ordered fresh agricultural products distribution system, keep market supply and price stability of fresh agricultural products.

2 The Evolution Mechanism

With the development of modern logistics theory and practice, the practice of introduce the industrial product's new ideas and methods has been tried in the field of the fresh agricultural products logistics. In China, the fresh agricultural products' filed of production, distribution and consumption has undergone earthshaking changes, which pushing the economic development is being fostered and formed.

2.1 Practice of supply chain management

Logistics, as the third profit-point for enterprise, in order to achieve value-added logistics, it has cut the cost of logistics, improve customer care through various logistics rationalization. The practice of supply chain management is the most significant. By operating just-in-time strategy, rapid-response strategy, lean strategy and automation replenishment strategy and so on in the whole supply chains, it has advanced the performance of logistics, mean while minimized the cost of stock. The achievement of modern logistics in the filed of manufacturing industry and trade produced a profound effect on fresh agricultural products logistics, on one hand, it was perfectly possible that fresh agricultural products as the industrial stuff can integrate the manufacturing industry chain, on the other hand, fresh agricultural products as consumer goods start to try to supply chain management.

2.2 Specialization and commercialization of agriculture products

From the perspective of history, fresh agricultural products logistics promoted agriculture produce specialization and commercialization, meanwhile, the deepening of agriculture produce commercialization also raised higher requirements for fresh agricultural products. When the fresh agricultural products achieve commercialization, it must obtain value by realizing time and scope

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effectiveness created by the process of fresh agricultural products. Farmers who make a living on agriculture commercialization need not only to make their products shipped out, but also need to get accurate guidance from balanced and steady logistics activities, and get a steady income, so they need effective logistics activities.

2.3 Intervention of new retailing format

Supermarket chains have profound effects on fresh agricultural products management and fresh agricultural products management logistics. Based on the Supply Chain Management practice of other commodities, supermarkets are more accessible to the faith of fresh agricultural products management and put it into practice very quickly, such as the link between farmers and supermarkets model [2]. However the demands on fresh agricultural products’ standard, quality, levels and replenishment way managed by supermarkets become a new thing in fresh agricultural products logistics chain, which is being studied, delivered and applied in the whole chain.

2.4 Change of customer’s consumption structure and model

The changing of city consumption models make the tendency of current fresh agricultural products consumption packaging, super marketing, processing and ecological becoming more and more obvious, it creates conditions for fresh agricultural products logistics promoting to become modern, and provides a firm customers base for practicing fresh agricultural products logistics[3].

2.5 Application of the modern information technology

Because of the imbalance of the urban-rural dualistic structure, production and consumption matching shows a cyclical fluctuations for a long time, and information asymmetry, lags in information transmission, the whole fresh agricultural products logistics activities is habitual and traditional which is one of the reason why the fresh agricultural products distribution system’s coverage always be limited in a certain area. However the development of modern information technology completely changed this tradition, especially the application of Internet. Nowadays farmers can also view the international prices and domestic prices, so they could be confident to logistics market and have a support on measuring costs and benefits of logistics. The using of the modern information technology widens the range of logistics and promoted value added logistics formed. As shown in Figure 1:

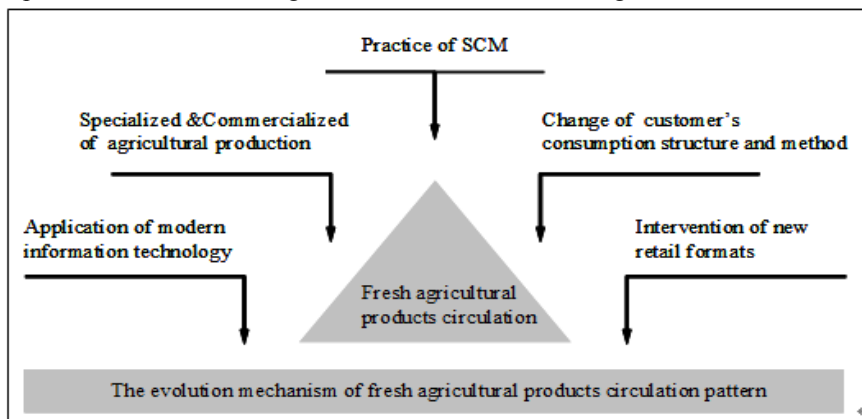


Figure 1 The Evolution Mechanism of the Distribution Model for Fresh Agricultural Products

3 Innovation of the Evaluation Model

3.1 Set up a model

In the fresh agricultural products differentiation market, A is the fresh agricultural products circulated through the supply chain management style, its safety degree is higher; B is the fresh agricultural products under the traditional style, its safety degree is lower. Supposing that consumers have different preferences for different degrees of fresh agricultural products safety, X is product security of consumer preference parameter, X in the interval [0, 1] obey uniform distribution. If the consumer only have the unit demand to the product, and dealers only have two options strategies: A and B. The definition of X for the consumer utility function is [4]:

$$U(x, s) = xs - p \tag{1}$$

Here s is safety, security refers to the products meet the food safety standards level, safety degree is high, the safety performance of fresh agricultural products is higher. Let A’s safety degree is s_1 , B’s safety degree is s_2 , $0 < s_2 < s_1$, and s_1, s_2 are fixed constant; p is price, let A’s price is p_1 , B’s price is p_1 (p_1 ,

p_2 are decision variables); x_0 is the preference parameter when consumers have no differences in consuming B and no consuming. So, $x_0s_2 - p_2 = 0$, then:

$$x_0 = \frac{p_2}{s_2} \tag{2}$$

Here x_1 is the preference parameter when consumers have no differences of A and B, so:

$$x_1s_1 - p_1 = x_1s_2 - p_2 \tag{3}$$

Then:

$$x_1s_1 - p_1 = x_1s_2 - p_2 \tag{4}$$

When $0 < x_0 < x_1 < 1$, we can get: the demand function of A and B is:

$$D_1(p_1, p_2) = 1 - \frac{p_1 - p_2}{s_1 - s_2} \tag{5}$$

$$D_2(p_1, p_2) = \frac{p_1 - p_2}{s_1 - s_2} - \frac{p_2}{s_2} \tag{6}$$

Supposing the relation between the fresh agricultural products safety and the distribution fixed costs is:

$C(s) = s^a, a > 1$, so

$$C'(s) > 0, C''(s) \geq 0 \tag{7}$$

This shows that the cost of improving fresh agricultural products' safety degree is increasing. This cost shows that quality and safety of fresh agricultural products is fixed costs, such as the equipment investment for fresh agricultural, technology investment and so on). Which have no connection with marginal cost, and without any consideration of the variable costs, so the profit function of A and B are:

$$\pi_1 = p_1 \left(1 - \frac{p_1 - p_2}{s_1 - s_2}\right) - C(s_1) \tag{8}$$

$$\pi_2 = p_2 \left(\frac{p_1 - p_2}{s_1 - s_2} - \frac{p_2}{s_2}\right) - C(s_2) \tag{9}$$

Combine:

$$\frac{\partial \pi_1}{\partial p_1} = 0, \quad \frac{\partial \pi_2}{\partial p_2} = 0 \tag{10}$$

We get the equilibrium price:

$$p_1^* = \frac{2s_1(s_1 - s_2)}{4s_1 - s_2} \tag{11}$$

$$p_2^* = \frac{s_2(s_1 - s_2)}{4s_1 - s_2} \tag{12}$$

The associated equilibrium quantity is:

$$q_1^* = \frac{2s_1}{4s_1 - s_2} \tag{13}$$

$$q_2^* = \frac{s_1}{4s_1 - s_2} \tag{14}$$

The corresponding maximum profit is:

$$\pi_1^* = \frac{4s_1^2(s_1 - s_2)}{(4s_1 - s_2)^2} - C(s_1) \tag{15}$$

$$\pi_2^* = \frac{s_1s_2(s_1 - s_2)}{(4s_1 - s_2)^2} - C(s_2) \tag{16}$$

Therefore, comparative profit between the fresh agricultural product distribution models and associated costs constitute the determinants of the distribution mode selection. In the course of the game, two kinds of distribution models between the profit margin larger, more conducive to the development of fresh agricultural product supply chain management mode, and vice versa.

3.2 The model evolution under government subsidies system

Considering the different product market, let:

$$y = \frac{s_1}{s_2} \tag{17}$$

Meanwhile assuming that the government paying subsidies to A according to its price, the subsidy rate is t , $0 < t < 1$, let $x=1+t$, right now profit function of the two models change to:

$$\pi_1^{**} = \frac{4xy(y-1)s_1}{(4y-1)^2} - C(s_1) \tag{18}$$

$$\pi_2^{**} = \frac{4s_1(y-1)}{(4y-1)^2} - C(s_2) \tag{19}$$

According to the first order conditions, dealers decide the standards of quality and safety for fresh agricultural products to obtain maximize profits. At the same time, in order to simplify the calculation process, take $\alpha=2$ (the different value of α depends on actual situation of fresh agricultural products distribution enterprises), so:

$$2s_1 = \frac{4xy(4y^2 - 3y + 2)}{(4y-1)^3} \tag{20}$$

$$2s_2 = \frac{y^2(4y-7)}{(4y-1)^3} \tag{21}$$

Depending equation 21, $4y-7 > 0$, divides the two postures we can get:

$$y = \frac{4x(4y^2 - 3y + 2)}{y(4y-7)} \tag{22}$$

With respect to X, one gets:

$$\frac{dy}{dx} = \frac{4(8y-3)(4y^2 - 3y + 2)^2}{y[y(16y^2 - 24y + 19) + 4y(4y-7)]} \tag{23}$$

$4y-7 > 0$, one gets as well:

$$\frac{dy}{dt} > 0 \tag{24}$$

This shows that the implementation of government subsidies for A will increase the differences between the two kinds of fresh agricultural products that is to say that the government subsidies help improve the enthusiasm of dealers for fresh agricultural product, to make them gain more profits, and then promotes distribution models for fresh agricultural products from traditional ones to supply chain management style^[5].

4 Results

Through the above analysis, we draw the following results: For one thing, the social and economic background, industry and Commerce in the field of modern logistics practice achievements and characteristics of fresh agricultural products logistics combination, provides analysis framework for these modern fresh agricultural products logistics strategy choice. Within the fresh agricultural products distribution industry, it's an absolute trend that distribution models for fresh agricultural products have been constantly evolving from traditional ones to supply chain management style.

For another thing, in the evolution of different distribution model of fresh agricultural products in the process, the government mechanism is positive and effective. Through the implementation of government subsidy mechanism can make the evolution process of fresh agricultural products distribution smoothly.

5 Conclusions

In view of the current practice of fresh agricultural products in China have channel disorder, delivery time, many links, high cost, high cost, low efficiency problems^[6], the traditional fresh agricultural product distribution is still mainly distribution models of households, we wish to make the following proposals and conclusions:

First of all, further improve the agricultural product distribution organization and modernization level, focus on cultivating a number of third party logistics enterprises engaged in large fresh agricultural products distribution.

Second, strengthen marketing docking, reduce the circulating link, actively try to take “farmers + company”, “agriculture super direct supply” of fresh agricultural products supply chain collaborative management mode.

Third, increase policy to the fresh agricultural product distribution system support, increase financial input, carry out targeted subsidies, encourage the innovation and development of the fresh agricultural products logistics mode.

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Coupling Mechanism Between Sports Industry and Ecological Environment in the Low-Carbon Economic Era

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Abstract: The double restraint of resource and environment has made low-carbon economy a global trend, which will become a new way of production and life style. As two independent systems, only the sports industry and ecological environment keep coordinated with each other can they ensure their own good operation and realize common development. Under the background of low-carbon economic era, this article comprehensively analyzes the relations between sports industry and ecological environment, studies the coupling mechanism between them, and gives some policy recommendations to improve their coupling, which has important realistic meanings.

Key words: Low-carbon economy; Sports industry; Ecological environment; Coupling mechanism

1 Introduction

Low-carbon economy is becoming a new trend of the global economy. Guided by sustainable development concept, it is a kind of economic mode which can be best characterized by low pollution, low energy consumption and low emission, using technological, institutional and organizational innovation to minimize the carbon emission. The ecological environment preservation is a global social issue in the low-carbon economy era; therefore, the relation between social development and ecological environment has become a hot topic that has been studied by different disciplines. Sport is a special kind of cultural phenomenon that lies in the whole sociocultural environment. It is a kind of subculture, playing an important role in coordinating society and environment. The sport industry affects the city environment and in turn, the city environment restricts the operation and development of sport industry. Therefore, fully developing the function and potential of sport, revealing its mediate function, and exploring a way of boosting the synergetic development of society and environment is a topic that has important theoretical significance and practical value, needed to be taken seriously.

2 Correlation Analysis between Sport Industry and Ecological Environment in Low-carbon Economy Era

Sport is an intermediate system, whose function of coordinating the society and ecological can be reflected in two ways: one is to improve health and the other is to promote the productivity. The coordinated development of society and environment is not a once-for-all thing but a dynamic process that conflicts constantly engender and get solved.

2.1 Influence of sport on ecological environment

During the process of sport, people would acquire goods and materials from the ecological environment directly or indirectly, such as the place or information that sport may need and those things have great impact on the development of sport. The ecological environment varies a lot between countries and regions, but the pursuit of sport and the use of ecological environment is the same.

(1) Influence of sport on natural environment. Natural environment means those natural conditions such as topography, location, climate etc. which can directly influence the life of people. During the process of development of sport, the choosing of specific items, contents and scales is restricted by the natural environment. In recent years, with the prosperity of large-scaled sporting events like Olympic Games, the status of sport in socioculture is rising; the passion of exploiting natural environment has been stimulated; emerging sports such as golf, bathing place, surfing, water items, and alpine skiing etc. are becoming popular gradually; and dramatic changes have taken place in sports and geographical features. In addition, the constant emerging of sport facilities, stadiums, advertising and logos is changing the human geography.

(2) Influence of sport on biological environment. All the outdoor sports get started under some certain kind of biological environment. Sport relies heavily on the spatial conditions that biological environment provides, such as green screen of physical fitness activities, and the grassland etc. In other words, if biological environment were to be spoiled, sports activities would be affected. So during the process of developing sports activities, biological environment should be protected properly. We should

ensure that people's subjective initiative be brought into fully play and in the same time, should not go against nature, which means sport should get as much coordinated with natural environment as possible. When carrying out activities like sport tourism, sport facilities and sport entertainment, we should fully consider the surrounding biological environment and prevent to seek quick success and instant benefits to develop sport activities by sacrificing the biological environment such as plants and lakes that we human rely on for living. Otherwise, modern sport activities can hardly get sustainable development. A case in point is that Denver (USA) gave up the opportunity of holding the 12th Winter Games in 1972 because of the strong resistance from the local ecological organization. And for the same reason, Vancouver (Canada) dropped out from holding of the 13th Winter Game in 1974 as well.

2.2 Influence of ecological environment on sport

Sport activities are restricted by natural environment such as climate, geography and locations, and the types and forms of sport differentiate because of the natural environment, therefore, the performance of sport competition relates closely to the natural environment. Besides, the constant pollution of air, water, earth and noise will endanger athletes' health as well. For instance, photochemical smog will stimulate respiratory mucosa and eyes, which cause great damage to those eyesight-required activities such as archery, shooting and ping-pong. Another case in point is that currently the water pollution is serious, in which there is phenol and oil that may cause damage to kidney, liver and nervous system, or even endanger health. In addition, the damage of noise should not be overlooked as well. It will harm the athletes' cardiovascular system, cause disorders of autonomic nervous system, lead to disfunction of energy supply system and nervous system, affect the rest and sleep quality of the athletes, and finally result in the disordered performance. As a result, here comes the concept of "green sport", which advocates the accord development of sport and nature—only a pollution-free environment can promote the sustainable development of sport.

Anyway, there is a correlation between the sports industry and the environmental protection in China. In one way, sports industry brings huge pressure and threat to environmental protection; in another, it spreads the green concept and environmental culture, promoting the continuous development of environmental protection. In the meanwhile, the improvement of ecological environment not only is the driving force and foundation of sports industry, but also provides resources to support it. Therefore, sports industry should integrate with environmental protection and finally we can achieve the harmonious development of both.

3 Coupling Mechanism Between Sports Industry and Ecological Environment in Low-Carbon Era

3.1 The connotation of coupling between sports industry and ecological environment

As one of the basic concept of physics, coupling is a phenomenon of mutual interaction of two or more modes of motion or systems. It is a dynamic correlation of inter-coordination, interdependence and mutual promotion by positive interaction of each system. Similarly, in low-carbon era, coupling apparently lies in sports industry and ecological environment. They affect each other, and form a good interactive internal relationship. Therefore, the coupling between sports industry and ecological environment is just the interaction between sports and environmental protection, meaning as followed:

(1) Emphasis on combination of sports and natural environment. When developing sports industry, we should guide people to gradually change the traditional psychology of seeking knowledge, pleasure and innovation to the psychology of returning to nature. Exercising is no longer the only demand of sports, but the pursuit of sports environment such as nature, comfort, spaciousness and brightness is more and more valued.

(2) Constant exploration of ecological value of national sports. Most of the national sports have inherent connection with nature, and they pursue the concept of "from nature" and "into nature". Therefore, in today's society whose sports industry is boosting, it is necessary to rebuild the national sports which are closely connected to nature, and actively build a coexisting ecological environment.

(3) Advocacy of ecological sports development concept. When developing sports industry, we should not only pay attention to the sports own functions and values, but also need to focus on the mutually beneficial coexistence and the harmonious development among "people- nature- society-sports", that is a comprehensive sustainable development of sports benefit, social benefit and ecological benefit. To advocate the concept of ecological development is a trend for human race's own development and perfection, and is also a necessity for harmonious development with nature.

3.2 The process of coupling between sports industry and ecological environment

The coupling between sports industry and ecological environment is a process of both systems from disorder to coupling to disorder and to coupling again and this kind of constant recycling has constituted a spiral movement of the social system. Actually it is an evolution and development of a large-scale complex system, which is altogether made up by slow and sudden changes, just as shown in figure 1.

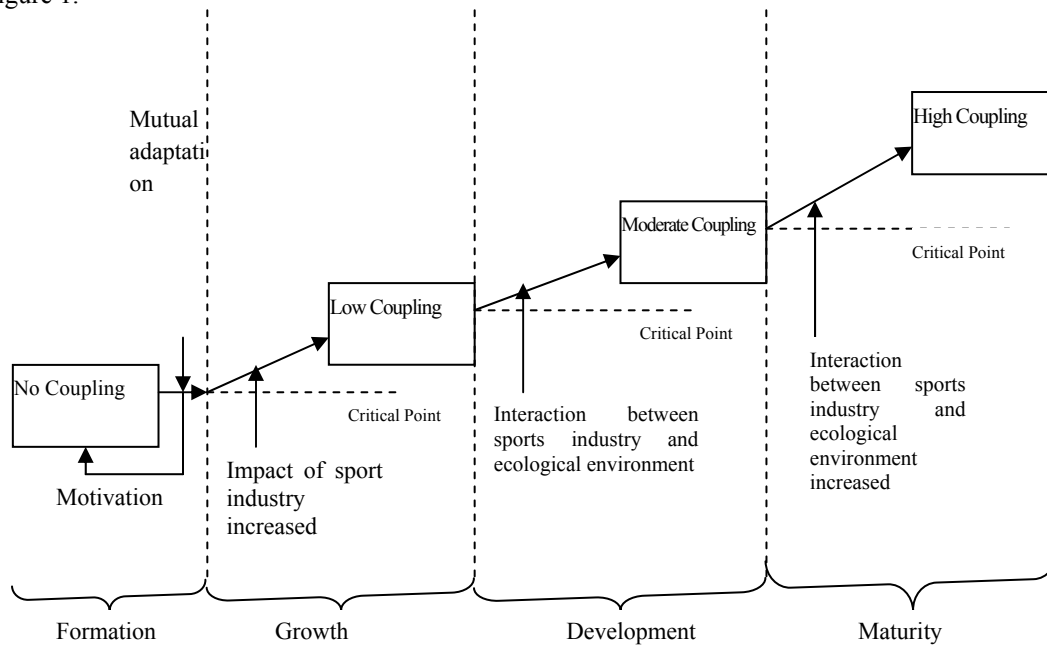


Figure 1 Coupling Progress of Sports Industry and Ecological Environment

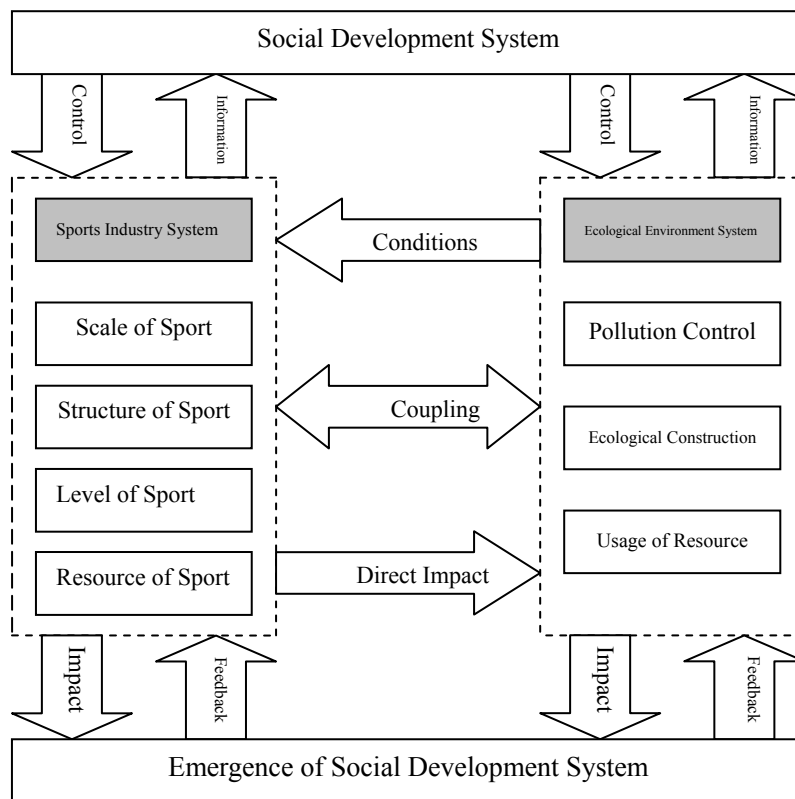


Figure 2 Coupling Model of Sports Industry and Ecological Environment

From figure 1, the coupling progress can see four stages: formation, growth, development and maturity. Every leap from to lower stage to the higher one requires some driving force to complete the transition from slow changes to sudden changes. Meanwhile, the coupling level of sports industry and ecological environment is rising and the relationship between them is becoming more coordinated. When the coupling system has reached a certain stage, there would be a sudden change of the system owing to a tiny disturbance; therefore, it would finally lead to a truly highly coupling stage. It is just because of this kind of sudden change that we need to establish a matching sports industry by using the operation rules of the social system. In addition, after the early coupling, by interfering with the related factors, we should create an ecological environment which is suitable for the high-degree coupling to finally achieve the emerging of the system and promote the sustainable development of sports industry, shown as in figure 2.

The system of sports industry and ecological environment can be divided into the following four parts: first of all, the coupling of the sports industry's scale and the endurance of ecological environment, that is the coupling of scale; Secondly, the coupling the structure of sports industry and the status quo of ecological environment, that is the coupling of structure; thirdly, the level of sports which can meet the requirement of the development and the upgrading of ecological environment, that is the coupling of ability; lastly, the facilities of sports which can adapt to the ecological environment, achieving reasonable allocation, that is the coupling of resources.

4 Conclusions and Policy Suggestions

4.1 Conclusions

(1) All the sports activities should start from the harmonious relationship between human and environment, looking for the balance between environment and development- only environmental protection can ensure the sustainable development of society.

(2) There is a close correlation between the development of sports industry and environmental protection. We should explore the function and potential of sport to improve the construction and development of ecological environment and in turn, make good use of environment to better develop the sports industry.

(3) In the low-carbon era, the coupling of sports industry and ecological environment is apparent. They affect each other and form a positive internal interaction between them. The coupling process needs to go through four different stages- formation, growth, development and maturity, which can be realized in the aspect of scale, structure, ability and resource.

4.2 Policy suggestions

(1) Establish the concept of ecological sports. Actively cater to the requirement of low-carbon, saving energy and reduce emission. Use the ecology awareness of people and the ecological construction around the facilities and during the events to evaluate the success of the events and the qualifications of the related administrative department.

(2) Optimize the structure. Pay attention to the upgrading of the structure and the mode of sports industry and highlight its advantages and characteristics, gradually achieving the reasonable allocation of industrial structure; attach importance to the ecological construction of the surrounding living area and its pollution governance.

(3) Pay attention to the guidance of function. Clarify the direction of sports industry according to the requirement of regional development and adapt to the impact that sports industry exerts on ecological environment, promoting each other.

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Organizational Forms for Collaborative Learning at Different Structures of Social Networks: China as an Example

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Abstract: To better understand how collaborative learning in social networks affects the performance of natural resource governance, different characteristics of different social network structures should be determined. However, prior findings related to the impacts of structural differences of collaborative learning on the performance of natural resource governance are limited and obscure at both the level of whole network and the level of individual actors. Suitable forms of organization for collaborative learning in social networks are critical to acquire and share information, percept and adapt risk, absorb and create knowledge, which has not been comprehensively addressed in existing research literatures. In order to challenge the vacancy, this paper modifies the triple-loop collaborative learning model based on previous studies and then finds the most suitable organization forms for collaborative learning at different structures of social networks after practical investigation.

Key words: Collaborative learning; Social network structures; Organization forms; Natural resources governance; MANOVA test.

1 Introduction

Previous studies show significant differences in performances and processes of natural resource governance when social networks go through structural differences in terms of density of relations (Little and McDonald, 2007)^[1], degree of cohesiveness (Borgatti and Foster, 2003^[2]; Moller et al., 2004^[3]), subgroup interconnectivity (Davidson-Hunt, 2006)^[4]. Specifically, identification of alternative strategies and actions to resolve specific problems and to improve certain outcomes such as improved incomes and higher yields are typical characteristics of single-loop learning (Armitage et al., 2008^[5]; Huntjens et al.,2012^[6]). On the contrary, double-loop learning involves challenges of existing worldviews and underlying values, such as a shared reconsideration of the goals of a management process, which also changes stakeholder behaviors. The transparency required to test and challenge embedded values, active engagement with civil society, a willingness to take risks in order to extend learning opportunities, and a high degree of citizen participation are characteristics of double-loop learning encouraged by institutional and organizational frameworks (Diduck et al.,2005)^[7]. The triple-loop learning starts to pay attention to the norms and protocols upon which single-loop and double-loop learning are monitored and learned. In order to stimulate the changes of the underlying governance system, learning provides a reflective mechanism when designing those norms and protocols (Keen et al.,2005)^[8]. Further study has found that relative credibility and legitimacy of information sources are the most important links between social network and perception of information, risk perception and adaptation (Frank et al., 2011)^[9].

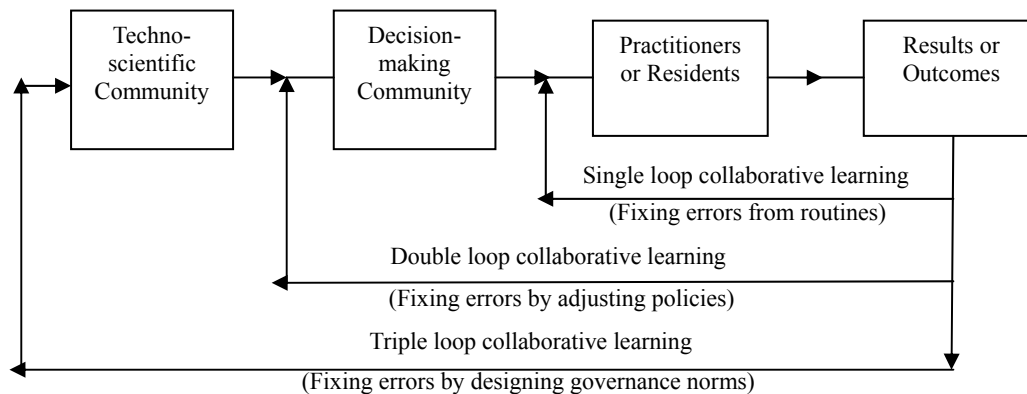


Figure 1 A Multiple-Loop Collaborative Learning Framework

From the mentioned above, Figure 1 describes the modified multiple-loop collaborative learning model within social networks for environmental and resource management. These outcomes are especially important because it consists of the intentions and actions which prompt changing routines, altering underlying policies, and developing innovative governance norms.

However, extensive studies have not discussed thoroughly about the suitable forms of organization for collaborative learning in social networks, which are critical to acquire and share information, percept and adapt risk, absorb and create knowledge (Dodgson, 1993^[10]; Song et al., 2006^[11]). In order to fill the gap in the existing literature, the rest of the paper is organized as follows: Section 2 makes some proposed hypotheses based on the modified triple-loop collaborative learning model. Section 3 analyzes the collected data and discusses results. Finally, conclusion is provided in section 4.

2 Proposed Assumptions

In general, the forms of organization for collaborative learning in social networks are divided into five categories including 1) a sequential function for collaborative learning: acquiring and sharing information, identifying and adapting risk, absorbing and creating knowledge within each stage, and then transferring knowledge to the next procedure automatically; 2) a central function for collaborative learning: a team of specialists headed by a chief officer is in charge of knowledge-related governance of natural resources in all development projects; 3) a project-decentralized task force for collaborative learning: a task force headed by a leader reporting to the project manager is in charge of knowledge-related governance of natural resources that are internal to each development project; 4) functionally located cells for collaborative learning: developing knowledge in support of projects development and disseminating knowledge to project groups, it is the responsibility of a cell within the specialized functional project; 5) a matrix function for collaborative learning: acquiring and sharing information, identifying and adapting risk, absorbing and creating knowledge automatically and simultaneously within all procedures (Brown and Duguid, 2000^[12]; Cooper et al., 2002^[13]; Chen and Pang, 2010^[14]). The interactive linkage among partners including scientists, policy-makers, and practitioners needs to be understood so as to effectively acquire and share information, percept and adapt risk, absorb and create knowledge, based on different stages. Thus, the following assumptions are carried out: Assumption (a), when building collaborative learning in social networks, the most suitable form of organization in the stage of scientific community is a central function. Assumption (b), when building collaborative learning in social networks, the most suitable form of organization in the stage of policy-making community is a project-decentralized task force. Assumption (c), when building collaborative learning in social networks, the most suitable form of organization in the stage of practitioners' community is functionally located cells.

3 Research Methodologies

3.1 Data collection

The purpose of questionnaire is to assess critical characteristics of social network for effective governance in the environmental change, and then select suitable forms of organization for collaborative learning. A self-administered questionnaire was distributed to scientific community (including researchers and scholars in research institutions and universities), policy-makers (including local and national development and reform commission, local and national environmental protection agency) and practitioners (including farmers, fishers and industrialists). Answered questionnaires were collected with a total number of 9348, including scientific community (23%), policy-making community (31%), and practitioners (46%). Meanwhile, the number of 5675 usable answered questionnaires reflecting a response rate of 60.71%. Respondents were from scientific community (32%), policy-making community (35%), and local practitioners (33%). After data collection, SPSS v19 software package was conducted to deal with multivariate statistical analysis.

3.2 Data analysis and discussion

In order to reduce the set of variables to a more manageable set of scales, this paper uses principal component analysis (PCA) to find out the underlying dimensions representing critical characteristics of social network. In the second step, MANOVA and post-hoc tests are adopted to compare different forms of organization with respect to scientific community, decision-making community and local practitioners at different structures of social networks.

3.2.1 Cluster analysis of the most important extracted factors:

9 questions about how important each named group of social networks for different network

structures, including low cohesive, high cohesive and core-periphery network structure, are asked using a 5-point Likert scale ranging from 1 = extremely unimportant to 5 = extremely important. Table 1 illustrates that respondents within different network structures have specific relationships with different characteristics of social networks. Except for “need to innovation”, “better enabling technology” and “improving performance” which show low cohesive network structure, high cohesive network structure and core-periphery network structure significantly differ at 5% level. In contrast, “dispersion” and “propensity to change” are the most important characteristics for network structure with low cohesiveness. The consequences are meaningful as actors who belong to this structure show low cohesion both in internal community and external communities. They hold different attitudes and pose challenges for joint action. Meanwhile, “regulation” and “minimizing uncertainty and risk” are the most important characteristics for core-periphery network structure. The results make sense because actors in the structure show high cohesion plus strong tying bond within internal actors, but high cohesion plus distant tying bond among external actors. So, they try to build regulation for governance of natural resources and transfer knowledge in order to reduce uncertain risk. Moreover, the most important characteristics are “mutual relationship” and “interdependence” for high cohesive structure. It is apparent that actors in high cohesive structure show high cohesion within internal and external actors. The results seem reasonable since subgroup is difficult to distinguish and the relational ties among groups are high in this structure.

The answered questionnaires are divided into three groups including low cohesive, high cohesive and core-periphery network structure for subsequent investigation. Then, 9 questions about suitable forms of organization for collaborative learning in different network structures also employed a 5-point Likert scale ranged from: 1 = ‘not highly recommended’, 3 = ‘no comment’, 5 = ‘highly recommended’.

Table 1 Respondents with Different Network Structures

The Most Common Structure & Most Important Factors	Low Cohesiveness	Core-periphery Structure	High Cohesiveness	F (or K)	
<i>Mutual Relationships</i>					
Cluster Mean	1.86 ^a (2,3) ^b	2.86(1,3)	4.08(1,2)	10.32 ^c	p<0.052
<i>Propensity to Change</i>					
Cluster Mean	3.86(2,3)	2.73(1,3)	1.83(1,2)	13.52 ^c	p<0.036
<i>Interdependence</i>					
Cluster Mean	2.09(2,3)	3.12(1,3)	4.23(1,2)	15.35 ^c	p<0.030
<i>Better Enabling Technology</i>					
Cluster Mean	2.41	2.63	2.92	5.52 ^c	p<0.103
<i>Need to Innovation</i>					
Cluster Mean	3.26(3)	2.98(3)	1.91(1,2)	7.32 ^c	p<0.076
<i>Regulation</i>					
Cluster Mean	2.40(2)	3.61(1,3)	2.51(2)	18.81 ^c	p<0.021
<i>Minimizing Uncertainty</i>					
Cluster Mean	1.93(2)	3.58(1,3)	1.86(2)	10.52 ^c	p<0.047
<i>Improving Performance</i>					
Cluster Mean	2.73(2)	3.47(1,3)	3.09(2)	4.39 ^c	p<0.128
<i>Dispersion</i>					
Cluster Mean	3.95(2,3)	2.81(1,3)	1.79(1,2)	12.27 ^c	p<0.039

Note a: Mean based on 5-point Likert scale comparing the data collected in the beginning of 2012.

Note b: Numbers in parentheses indicate the cluster groups from which this cluster is significantly different at $\alpha=0.05$ according to the Bonferroni, post-hoc pairwise comparison procedures.

Note c: F and corresponding p-values based on MANOVA test.

3.2.2 Cluster analysis of network structure with low cohesiveness:

Table 2 describes suitable organization forms for low cohesive network structure. In the first place, project-decentralized task force, followed by a central function, has been regarded as the best form of organization for scientific community. Although government in China has asserted that stricter environmental management is carried out, the actual situation is still far behind US or Europe countries. It is important for actors to improve the level of knowledge transfer among internal and external actors, and learn advanced knowledge from international leading scientific institutions. Therefore, suitable form with strong transferring of knowledge among actors and strongest alignment with the strategic policies can be regard as the most excellent one. Assumption (a) is proved to be partly held. Besides, project-decentralized task force is viewed as the best form of organization for policy-making community

and actors in this stage are required to transfer knowledge within internal and external actors actively. Thus, suitable form which provides the highest potential for supporting transfers and sharing of knowledge within internal as well as external actors is the excellent one. Assumption (b) is proved to be fully held. Furthermore, a project-decentralized task force followed by functionally located cells is the best form of organization for local practitioners. Experiences related to governance of natural resources equally come from external and internal actors. Then, the suitable form should be one which provides knowledge share among external actors, knowledge related to specific expertise and knowledge transfer within internal actors. Assumption (c) is proved to be partly held.

Table 2 Suitable Organization Forms for Low Cohesive Network Structure

Stages of low cohesive structure & Suitable Forms of Organization	Scientific Community	Policy-making Community	Local Practitioners	F (or K)
<i>A Sequential Function</i>				
Cluster Mean	1.76 (2,3)	1.97(1)	1.72(1)	3.79 ^c p<0.096
<i>A Central Function</i>				
Cluster Mean	3.34 ^a (2,3) ^b	2.39(1)	2.41(1)	10.37 ^c p<0.051
<i>A Project-decentralized Task Force</i>				
Cluster Mean	3.87(3)	4.04(1,2)	3.78(3)	11.49 ^c p<0.041
<i>Functionally Located Cells</i>				
Cluster Mean	2.33(3)	2.45(3)	3.43(1,2)	15.98 ^c p<0.024
<i>A Matrix Function</i>				
Cluster Mean	1.24(3)	1.80(3)	2.23(1,2)	3.82 ^c p<0.103

Note a: Mean based on 5-point Likert scale comparing the data collected in the beginning of 2012.

Note b: Numbers in parentheses indicate the cluster groups from which this cluster is significantly different at $\alpha=0.05$ according to the Bonferroni, post-hoc pairwise comparison procedures.

Note c: F and corresponding p-values based on MANOVA test.

3.2.3 Cluster analysis of core-periphery network structure:

Table 3 Suitable Organization Forms for Core-Periphery Network Structure

Stages of Core-periphery structure & Suitable Forms of Organization	Scientific Community	Policy-making Community	Local Practitioners	F (or K)
<i>A Sequential Function</i>				
Cluster Mean	2.36(2)	1.98(1,3)	2.73(2)	4.18 ^c p<0.095
<i>A Central Function</i>				
Cluster Mean	3.87 ^a (2,3) ^b	2.52(1,3)	1.94(1,2)	15.52 ^c p<0.031
<i>A Project-decentralized Task Force</i>				
Cluster Mean	2.41(2,3)	4.05(1)	3.79(1)	12.47 ^c p<0.043
<i>Functionally Located Cells</i>				
Cluster Mean	2.35(3)	2.31(3)	3.48(1,2)	10.46 ^c p<0.056
<i>A matrix Function</i>				
Cluster Mean	2.75	3.14	2.86	3.29 ^c p<0.107

Note a: Mean based on 5-point Likert scale comparing the data collected in the beginning of 2012.

Note b: Numbers in parentheses indicate the cluster groups from which this cluster is significantly different at $\alpha=0.05$ according to the Bonferroni, post-hoc pairwise comparison procedures.

Note c: F and corresponding p-values based on MANOVA test.

Table 3 illustrates suitable organization forms for core-periphery network structure. Firstly, it shows that a central function is the best form of organization for scientific community, and international leading scientific institutions have advanced knowledge for actors to learn from. Then, providing the strongest alignment with the strategic policies is the task for the suitable form. Assumption (a) is proved

to be fully held. Secondly, for the policy-making community, the best form of organization is a project-decentralized task force and actors in this stage need to actively transfer knowledge within external actors. After that, the suitable form is required to provide the highest potential for supporting transfers and sharing of knowledge among external actors. Assumption (b) is proved to be fully held. Thirdly, it points out that functionally located cells are the best form of organization for local practitioners. Exchanging knowledge with internal actors, they can obtain experiences related to governance of natural resources. Therefore, knowledge with specific expertise and strong transferring within internal actors are the key factors for a suitable form. Assumption (c) is proved to be held.

3.2.4 Cluster analysis of network structure with high cohesiveness:

Table 4 indicates suitable organization forms for high cohesive network structure. To begin with, it shows that the best form of organization for scientific community is a central function, followed by a project-decentralized task force. Actors in this stage need to learn advanced knowledge from international leading scientific institutions. Then, the suitable form should provide strongest alignment with the strategic policies. Assumption (a) is proved to be fully held. In addition, it shows that the best form of organization for policy-making community is a project-decentralized task force. The highest potential for supporting transfers and sharing of knowledge among external actors should be provided. Assumption (b) is proved to be fully held. Finally, it shows that the best form of organization for local practitioners is a project-decentralized task force, followed by functionally located cells. Experiences learning from external actors should be reinforced. Assumption (c) is proved to be partly held.

Table 4 Suitable Organization Forms for High Cohesive Network Structure

Stages of high cohesive structure & Suitable Forms of Organization	Scientific Community	Policy-making Community	Local Practitioners	F (or K)
<i>A Sequential Function</i>				
Cluster Mean	2.33	1.86(1,3)	2.27	4.29 ^c p<0.097
<i>A Central Function</i>				
Cluster Mean	3.79 ^a (2,3) ^b	2.83(1)	2.65(1)	11.27 ^c p<0.048
<i>A Project-decentralized Task Force</i>				
Cluster Mean	2.94(2)	3.54(1,3)	3.06(2)	10.04 ^c p<0.054
<i>Functionally Located Cells</i>				
Cluster Mean	2.46	2.32	2.86(2,3)	4.32 ^c p<0.092
<i>A Matrix Function</i>				
Cluster Mean	1.29	2.43	1.92	3.64 ^c p<0.108

Note a: Mean based on 5-point Likert scale comparing the data collected in the beginning of 2012.

Note b: Numbers in parentheses indicate the cluster groups from which this cluster is significantly different at $\alpha=0.05$ according to the Bonferroni, post-hoc pairwise comparison procedures.

Note c: F and corresponding p-values based on MANOVA test.

4 Conclusions

From a managerial point of view, a hierarchical structure of suitable organization form for collaborative learning in social networks should be proposed and shown in Figure 2 (modified from Chen and Pang, 2010^[14]). A hierarchical structure is important for the suitable organization form since actors may experience many projects related to governance of natural resources. In the first tier, the centralized structure provides the strongest guidance between strategic policy and collaborative learning initiatives, the best coordination and communication of collaborative learning activities, and the clearest understanding of responsibilities by actors. As to centralized structure, it not only offers a good overview of needs, but also has ability to quickly distribute knowledge about similar activities within internal actors and among external actors. In the second tier, with the executive and strategic needs, project-decentralized task forces enable rapid and pragmatic testing of the contributions of the collaborative learning initiatives. In the project-decentralized task, it shares inter-functional knowledge by providing the highest potential for transferring and sharing of implicit knowledge as well as explicit knowledge within internal actors and among external actors. In the third tier, the functionally located cells situated at the lowest level can focus on specific expertise and easily transfer knowledge within and between practical experiences. However, under the strategic alignment and operational management, the

functionally located cells may cause a vague vision and high uncertainty.

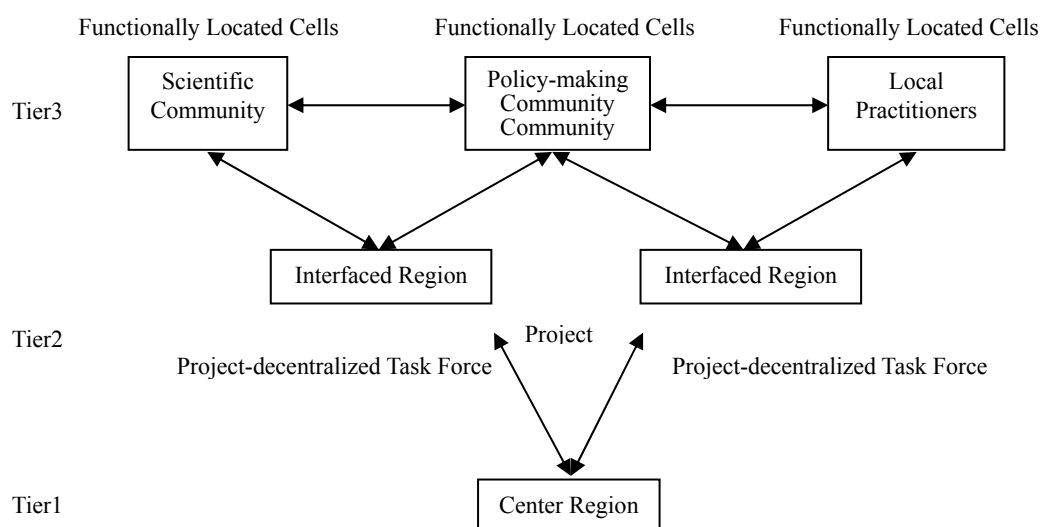


Figure 2 Suitable Forms of Organizations for Collaborative Learning

In fact, the hierarchical structure of suitable organization form for collaborative learning should be adjusted according to the change of environments actors may face. Specifically, characteristics of governance of natural resources like ecological threats, technological and scientific advancement, and social change are similar to the green area management. Then, in order to acquire and share information, percept and adapt risk, absorb and create knowledge, functions about the centralized structure should be reinforced in the low cohesive network structure, functions about project-decentralized task forces should be intensified in the core-periphery network structure, and functions about the functionally located cells should be reinforced in the high cohesive network structure.

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Study on the Key Indices of Government Emergency Management Capability of Major Public Health Paroxysmal Incident in China*

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Abstract: Perceiving the key elements and indices of emergency management capability properly is an important premise to government's ability building. This paper adopts literature method to summarize the key elements of Chinese government emergency management capability of major public health paroxysmal incident. Based on 168 responses from a survey distributed to five city of Hubei province of China, this study provides a confirmatory factor analysis. The findings suggest that the key indices of Chinese government emergency management capability lie in comprehensive decision-making, leading group command, resources allocation, diseases control and information-communication. In addition, the relations between elements and indices are discussed as well. This study provides theoretical references to the key contents of government emergency management capability building in China.

Key words: Major public health paroxysmal incident; Government; Emergency management capability; Key index; Confirmatory factor analysis

1 Introduction

Major public health paroxysmal incidents like SARS, the avian influenza and A (H1N1) have become a worldwide concern in recent years. Governments' role has long been considered a linchpin by acting as main subjects to respond to it, the strength of their emergency management capability is closely related to the control, relief and elimination of severe harm brought by public health paroxysmal incidents. As a result, perceiving the concept of government emergency management capability properly and figuring out its key elements and indices becomes significant questions.

The fundamental research on government emergency management capability of major public health paroxysmal incident mainly focuses on the connotation (George D. Haddow & Jane A. Bullock, 2003; Yang Qing, 2007), assessment indices (Bonnie Henry & Tomislav Svoboda, 2004) and ability building (Scott F. McClellan, 2004) of emergency management capability. However, there are two problems in the existing indices design: the lack of scientificness in the content of indexes; the challenge to the logicity of the framework. Research about measurement index based on elements is insufficient. This paper takes government emergency management capability as the object of study. According to the pertinent literature, it summarizes the key elements. Then a survey distributed to five city of Hubei province of China was conducted to collect data for refining the key indices of Chinese government emergency management capability by confirmatory factor analysis.

2 Elements of Government Emergency Management Capability

A number of scholars have discussed government emergency management capability of major public health paroxysmal incident from different perspectives. In the terms of decision-making, the decisions on emergency disposal need to be mainly made by departments in charge of the major public health paroxysmal incident, while others give assistance at the same time (JANIS I L, 1989). In addition, chief executive, as the commander, plays an absolutely important role in paroxysmal incidents. In the United States, Capability Assessment for Readiness put forward by FEMA consists of thirteen emergency management functions (James LW, 1997). Conducting is included. As for emergency resource, it is overall and adequate resource reserve that being the crucial foundation and element of emergency operation (Feng Baixia, 2006). Furthermore, different major measures should be taken to control the disease according to the different phases (Koji Wada, 2010), this paper summarizes it as diseases control capability. In these years, developed countries are attaching importance to the construction of emergency network. To increase network sustainability, emergency management collaborative networks should invest in information-communication technologies (Naim Kapucu & Vener Garayev, 2013). For international cooperation, with the deeper development of globalization, the

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cooperation between countries and international organizations tends to be mature. European Union, for instance, assessed the collaboration between its member states and international institutions during the period of A (H1N1) (Rory Watson, 2007).

In conclusion, on the basis of related literature on government emergency management capability, this paper takes Chinese government emergency management status quo into account and summarizes the six following key elements: comprehensive decision-making, leading group command, resources allocation, diseases control, information-communication and international cooperation capability.

3 Methodologies

To figure out the indices of the above key elements, a survey consists of blocks of questions which are measured on a 5-point Likert-type scale was implemented. Using project analysis, exploratory factor analysis and confirmatory factor analysis, this study got key indices of government emergency management capability.

3.1 Measuring tool

The government emergency management capability (GEMC) scale includes six constructs. There are five items belong to comprehensive decision-making capability, five to leading group command capability, eleven to resources allocation capability, five to diseases control capability, five to information-communication capability and one to international cooperation capability, thirty-two in total.

3.2 Data collection

Adopting convenience sampling, this study employs data derived from responses to the GEMC that was electronically mailed to agencies responsible for emergency management in Wuhan, Jinmen, Ezhou, Wuxue and Danjiangkou City, Hubei province of China. During the pretest, a total of 107 (130 total) responses were collected, among which 100 were eligible for analysis after data clearance. After the revise according to the pretest, 184 (200 total) responses were collected, 168 were eligible for analysis.

3.3 Project analysis

The first, all the indices passed through the descriptive statistics analysis, with no error value beyond 1-5. The second, in the confidence interval of 95%, the T value of government's taking advice from "the masses" (Sig.=0.144) and "others" (Sig.=0.326) were deleted for not reaching significant level. The third, during the homogeneity test with the total points, the correlation indices of taking advice from "the masses", "media comments" and "others", the existence of specialized command authority and good segregation and disinfection are less than 0.4, being rejected.

3.4 Exploratory factor analysis

Conducting exploratory factor analysis twice through different method, it extracted six common factors. After deleting the indices of "rapid information release" and "international coordination system", whose factor loadings are 0.447 and -0.404, respectively. This paper finally determined five common factors. The ultimate indices constructs utilized in the study have the Cronbach's alpha reliability values of 0.903, showing the high stability and consistency of the GEMC scale.

3.5 Confirmatory factor analysis

On the basis of the revised scale with five key elements and twenty-five variables, this study utilized confirmatory factor analysis through AMOS 21.0 to ensure the suitability between the data and model. As the estimate value less than 0.4 does not meet the standard, this paper deleted six items in sequence. Consequently, there are nineteen variables left for confirmatory factor analysis.

4 Findings

The analysis shows that the hypothesized model fit the sample data well. It not only indicates the relations between all the elements, but gives the key indices of government emergency management capability and their relevance.

4.1 Hypothesized model and sample data fitness

To modify the model, AMOS provides two kinds of solutions: modification indices (MI) for model extension and critical ratio (CR) for model trimming. As both of the CR value reaches significant level, this study chose to extend the model. Ranking MI value in descending order, this paper added path between e15 and e16, e7 and e9 successively. The improvements on model fit indices are reflected in Table 1. The value of CMIN/DF, NFI, PNFI and PGFI meet the standard, while CFI, RMR, GFI and RMSAE close to the standard. With half of the indices standard, the result of confirmatory factor analysis shows that the measurement model is relatively reliable.

Table 1 Model Fit Indices

Model fit indices	CMIN/DF	NFI	CFI	RMR	GFI	PNFI	PGFI	RMSEA
	548/142	.844	.878	.109	.757	.701	.566	.131
e15↔e16	530/141	.849	.883	.110	.760	.700	.564	.129
e7↔e9	516/140	.853	.888	.110	.763	.698	.563	.127

4.2 Relations of elements

Figure 1 shows that there are some relations between the five elements. To comprehensive decision-making capability, information-communication capability is the most dependent construct, with the estimate value of 0.32. Then it is leading group command and resources allocation capability, while there is no relation between comprehensive decision-making and diseases control capability. To leading group command capability, the order of influence is information-communication, diseases control and resources allocation capability. To resources allocation and information-communication capability, the estimate value is 0.19. And resources allocation capability is negatively associated with diseases control capability. In addition, the estimate value between diseases control capability and information-communication capability is 0.48.

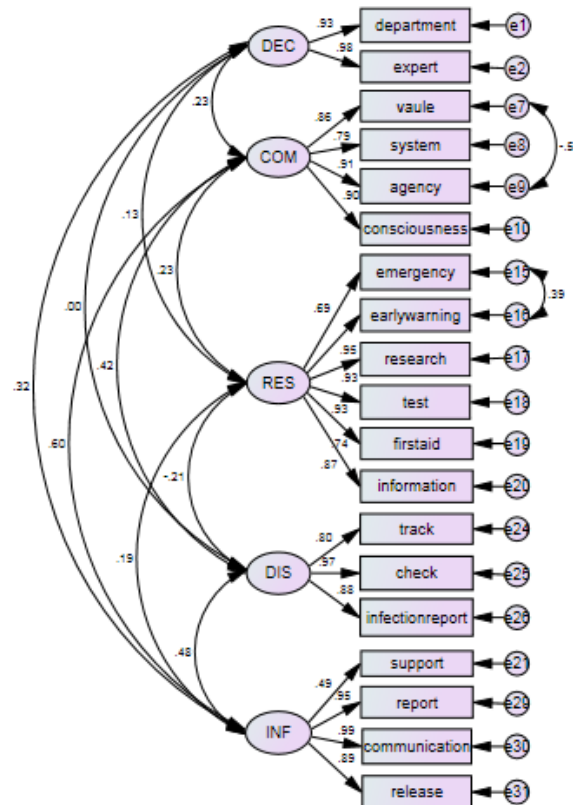


Figure 1 The Model of Confirmatory Factor Analysis

Note: DEC=comprehensive decision-making; COM=leading group command; RES=resources allocation; DIS=diseases control; INF=information-communication.

4.3 Key indices of elements

According to above analysis, the key indices of government emergency management capability of major public health paroxysmal incident in China are as follow, in descending order by factor loading: advice from the experts and departments in comprehensive decision-making capability; the agency and consciousness of coordination, leadership value and system in leading group command capability; the groups on the field of early warning, research, test, information report, first aid and emergency in resources allocation capability; morning check, infection report and tracking management in diseases control capability; communication, report and release of information, as well as resource support in information-communication capability.

4.4 Relations of measurement errors

The added path between e15 and e16, e7 and e9 has some implications. Training on groups of early warning and emergency is of great significance to the resources allocation capability building. The result shows the relation between early warning and emergency work, laying stress on their succession and intersection. Besides, leadership value is negatively associated with the coordination agency, which indicates if the government attaches importance to emergency management, the investment in specialized coordination agency as well as its workload will get relieved.

5 Conclusions

The study has several limitations, the most important of which is the sampling method would make the research result influenced by the sample size and public official's prejudice. Moreover, as the index of international cooperation capability failed to reach the statistical level, it was forced to be deleted, which should be taken into consideration.

This paper summarized five key elements of Chinese government emergency management capability of major public health paroxysmal incident from pertinent literatures, namely, comprehensive decision-making, leading group command, resources allocation, diseases control and information-communication capability, and analysed the relations of the elements. Furthermore, it got the indices of government emergency management capability by designing and verifying the GEMC scale empirically. The study contributes to the orientation of emergency management capability building in China. Future research will need to focus on the concrete suggestions to the government.

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Study on Influencing Factors of Business Model Innovation Based on Social Network Analysis

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Abstract: With the questionnaire survey, this paper obtained 108 valid questionnaires and generalized 839 words representing the influencing factors of business model innovation, and then the words were classified into 45 keywords. Based on this classification, every keyword was encoded and the keyword network was formed. The method of social network analysis (SNA) and the software of Ucinet6 were used to draw the network diagrams of keywords, and got the value of network centrality including degree centrality, betweenness centrality and closeness centrality. Finally, the author got the key influencing factors of business model innovation.

Key words: Business model innovation; Network of keyword; Social network analysis

1 Introduction

Recently, the business environment is changing rapidly. And the sustainable competitive advantage is often derived from the business model innovation (Voelpel, Leibold & Tekie, 2004)^[1]. Research literatures also show that business model innovation has become the research focus of scholars who focus on strategic managements. The interest in business model innovation is growing (Aspara, Hietanen & Tikkanen, 2010; Zott, Amit & Massa, 2011)^[2,3].

But currently there is little study about the factors which effect the business model innovation. Most researchers believed that globalization, deregulation and technological change system (Casadesus-Masanell & Ricar, 2010)^[4], the growth of the Internet and e-commerce (Teece, 2010; Zott, Amit & Massa, 2011)^[5] are the main factors, but de Jong & Vermeulen (2005)^[6] pointed out that the influencing factors of innovation include five levels which are countries, industries, organizations, groups and individuals. However, there is lack of quantitative research about the influencing factors of business model innovation. This paper will explore the factors that affect business model innovation through questionnaires and social network analysis to provide a basis for future research of business model innovation.

2 Research and Design

2.1 Research Questionnaire

Since the questionnaire about the empirical research of business model innovation has not been found, we designed the questionnaire based on the research purpose. The research questionnaire obtains an open topic, "Which factors do you think influence business model innovation? (Please use words or sentences, fill in the following blank line)."

2.2 The Research Sample

We selected four chemical companies as the research sample. In order to improve the recovery rate of the questionnaire, we first communicated with relevant department managers of the four companies, and released the questionnaire after received the managers' consent. The time of the survey is from December 16 to 19, 2012.

2.3 Method

This study used the software of Ucinet6 and the method of social network analysis to study the network of keywords of business model innovation. Through the centrality analysis including degree centrality, betweenness centrality and closeness centrality, we can identify important keywords, determine the key influencing factors of the business model innovation and lay the foundation for future research.

3 Results

3.1 Keywords Statistics of the Influencing factors of Business Model Innovation

This study recovered 108 valid questionnaires; each questionnaire extracts some words, the number is from 3 to 19, and finally received a total of 839 influencing factors words of business model innovation with an average of 7.77 words per questionnaire. At last, we get 45 keywords by adjusting and classifying. The 10 highest frequency words were showed in Table 1.

Table 1 The 10 Highest Frequency Words of Influencing Factors of the Business Model Innovation

No.	Code	Keyword	Frequency	No.	Code	Keyword	Frequency
1	C52	organizational culture	114	6	C16	self-motivation	50
2	C11	innovation legitimacy	83	7	C38	staff thinking	34
3	C41	staff absorption capacity	77	8	C40	external environmental pressures	34
4	C27	employee entrepreneurship	56	9	C33	personality traits	33
5	C54	organizational resources	56	10	C37	market demand	26

According to Table 1, the influencing factors of business model innovation basically are divided into two categories. One category is the organizational-level factors including organizational culture, innovation legitimacy, organizational resources, external environmental pressures and market demand; the other one is staff-level factors including the staff absorption capacity, employee entrepreneurship, self-motivation, staff thinking and personality traits.

The descriptive statistics can only test the frequency of each keyword, but could not verify the relationship of these high frequency keywords with other words, and can not analyze the effect of these high-frequency words in the overall keywords system. However, the method of social network analysis can test the effect of these high-frequency words in the overall keywords system. So, we constructed a network diagram of all of these keywords in order to reveal and analyze deeply.

3.2 Keywords Network of Influencing Factors of Business Model Innovation

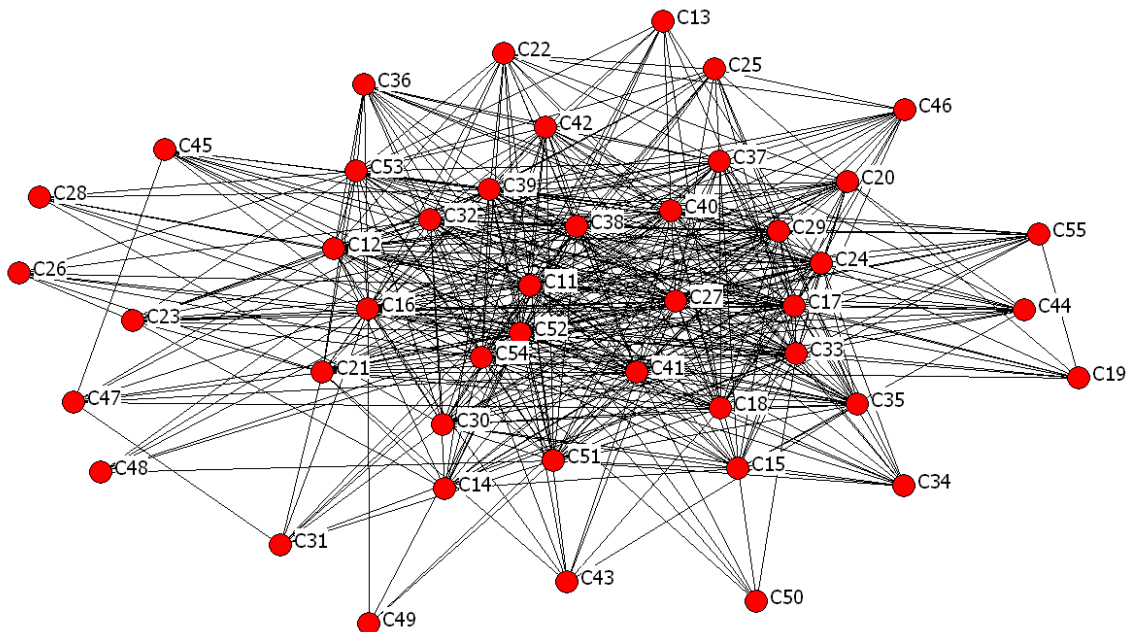


Figure 1 The Keywords Network of Influencing Factors of the Business Model Innovation

Firstly, coding the final 45 keywords and corresponds to the 839 words which were provided by 108 questionnaires. The keywords of each questionnaire constitute a small fully connected network, then 108 small networks connect into a large keyword network. The keywords network through the Netdraw in software Ucinet6 was drawn and showed in Figure 1.

The keyword network of the influencing factors of the business model innovation can determine the importance of each keyword by the analysis of degree centrality, betweenness centrality and

closeness centrality. Degree centrality is mostly used to measure the most important center of this group; and betweenness centrality is used to measure the ability of a keyword as the media (Luo Jiade, 2005)^[7]. According to the calculation of Ucinet6, the centrality of top ten keywords was showed in Table 2.

Table 2 Centrality of the Influence Factors of the Business Model Innovation Keywords Network(Top Ten)

Degree centrality			Betweenness centrality			Closeness centrality		
Coding	Keywords	Value	Coding	Keywords	Value	Coding	Keywords	Value
C52	organizational culture	100	C52	organizational culture	8.795	C52	organizational culture	100
C11	innovation legitimacy	90.909	C16	individual incentives	5.54	C11	innovation legitimacy	91.667
C16	individual incentives	86.364	C11	innovation legitimacy	5.005	C16	individual incentives	88
C41	employees' absorptive capacity	84.091	C41	employees' absorptive capacity	4.305	C41	employees' absorptive capacity	86.275
C54	organizational resources	84.091	C54	organizational resources	3.893	C54	organizational resources	86.275
C27	entrepreneurship	79.545	C27	entrepreneurship	2.285	C27	entrepreneurship	83.019
C32	enterprise strategy	75	C39	team cooperation	2.194	C39	team cooperation	80
C38	employees' thinking mode	75	C32	enterprise strategy	2.127	C32	enterprise strategy	80
C39	team cooperation	75	C33	Personality traits	1.834	C38	employees' thinking mode	80
C17	individual social capital	72.727	C38	employees' thinking mode	1.822	C33	personal characteristics	78.571

We can see from the Table 2 that, at the organizational level, the degree centrality values of “organizational culture”, “innovation legitimacy”, “organizational resources”, “corporate strategy” and “teamwork” are 100, 90.909, 84.091, 75 and 75; the betweenness centrality values are 8.795, 5.005, 3.893, 2.127 and 2.194; closeness centrality values are 100, 91.667, 86.275, 80 and 80. Centrality value is higher, which means these keywords are the important technical tool linking many research topics about influencing factors of the business model innovation.

We can also find from table 2 that, at the employee level, the degree centrality values of the “individual incentives”, “employees' absorptive capacity”, “entrepreneurship”, “employees' thinking mode”, “individual social capital” and “personal characteristics” are respectively 86.364, 84.091, 79.545, 75, 72.727 and 72.727; the betweenness centrality values are respectively 5.54, 4.305, 2.285, 1.822, 1.546 and 1.834; and the closeness centrality values are 88, 86.275, 83.019, 80, 78.571 and 78.571. The values are all high, and it means that the “individual incentives”, “employees' absorptive capacity”, “entrepreneurship”, “employees' thinking mode”, “individual social capital” and “personal characteristics” are in the core position of the keywords network, and they are the important technical tool linking many research topics about the influence factors of business model innovation.

4 Conclusion

This paper collects the influencing factors of business model innovation by designing the questionnaires. Based on word induction, keyword classification, encoding and network structure analysis, we obtained the front keywords which are organizational culture, innovation legitimacy, individual incentives, employees' absorptive capacity, organizational resources, entrepreneurship, enterprise strategy, employees' thinking mode, team cooperation, individual social capital and so on. These keywords can be divided into the level of organization (organizational culture, innovation legitimacy, organizational resources, enterprise strategy and team cooperation, etc.) and the level of employees (individual incentives, employees' absorptive capacity, entrepreneurship, employees' thinking mode, individual social capital and personal characteristics). The recognition of these factors is the important supplement of the research on business model innovation, and makes people know more about the factors of influencing the business model innovation.

In the practice, managers should focus on the multiple influencing factors of the level of organization and staff to promote the innovation of business model and to contribute to the development of enterprises. In future research, we not only need to further explore the influencing factors of business model innovation, but also need to test each factor's influence degree and mechanism so as to provide theoretical support for enterprise to carry on the business model innovation.

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International Marketing: Innovative Strategies for Entering Foreign Market

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Abstract: The current shift in the marketing strategy is working by international companies, nowadays, it is high-end rather than adaptive development that is being carried out by leading companies, and increasingly, other companies are finding themselves competing against or working with, new innovations, process and outcomes of globalization. Organization succeeds in a competitive marketplace over long run because they can create; do certain things their customer's value better than can their competitors. Strategy means planning and for me planning means getting ready to implement actions for our future, international marketing is a part of the process that keeping the benefit of international trade to the advanced sector at the top of the agenda and to keep its profile high and recognized. As the trend toward economic globalization increases, the internationalization of small and medium-sized enterprises (SMEs) has become an important topic. Research on the performance outcomes of foreign market entry strategies has been primarily considered from the perspective of the multinational corporations. However, a career in international marketing can be very challenging. Located far from their head offices, international marketing professionals have to make decentralized decisions, carry out different responsibilities, and deal with various risks. In fact they are frequently tasked to navigate political, economic, socio-cultural and technological conditions which they have never faced before.

Key words: International Competition; International Marketing; Strategies for Emerging Countries, Risks

1 Introduction

In recent years a number of economists have researched whether international trade has contributed to the ongoing rise in the U.S. relative price between more-skilled and less-skilled Labor. There is still no clear consensus, however, about how much international trade has mattered. Many people find this ambiguity difficult to reconcile with the large amount of anecdotal evidence that trade has been placing substantial "pressure" on labor markets. In this paper I look for pressure not in the prices for labor but rather in the elasticity's of demand for labor. I examine whether trade has been increasing firms' equilibrium own-price elasticity of demand for labor. In theory trade can change labor-demand elasticity's without changing labor prices. As will be discussed, trade can make labor demand more elastic in two main ways: by making output markets more competitive and by making domestic labor more substitutable with foreign factors. The global market has traditionally been the battlefield of large, multinational corporations (MNCs). However, the past 20 years has witnessed the evolution of a new global manufacturing environment, with firms of all sizes now competing globally in order to obtain new competitive advantages. Unfortunately, most global operational research has focused on the practices of MNCs and neglected the fact that small and medium sized enterprises (SMEs) and MNCs do not operate in similar ways. The global market has traditionally been the battlefield of large, multinational corporations (MNCs). However, the past 20 years has witnessed the evolution of a new global manufacturing environment, with firms of all sizes now competing globally in order to obtain new competitive advantages.

Unfortunately, most global operational research has focused on the practices of MNCs and neglected the fact that small and medium sized enterprises (SMEs) and MNCs do not operate in similar ways. Spurred by technological advances in transportation and communications, many strategists have used contingency theory to explain how an organization maximizes its alignment of strategy with its environment to achieve performance outcomes within a domestic strategy context ,the issue of strategic fit in an international context takes on additional complexities due to the problems of control and coordination, confounded by the actions of foreign market agents and the policies of foreign governments, particularly for SMEs. The theoretical precepts for a contingency model for SME international expansion therefore must consider the unique issues associated with resource commitment, as well as the relevant external factors associated with foreign markets. . . .

The Fair Trade movement seeks to transform international market relations, forging new

consumer/producer links based on trust, equity, and fairness. In the words of the major US Fair-Trade organization, “Our vision is nothing less than restructuring the relationship between producer and consumer—the trade inequalities between North and South”. Though the international trade in Fair Trade labeled products is quite young and represents only a minor share of the global market, this trade has grown dramatically in recent years...

2 Competing Internationally and Globally

As we know a company is international when just he selects one or few foreign market for his transaction either competing on a truly global scale comes later after a company established operation on several continents and is racing against rival willing to be a leadership. They opt to expand into foreign market cause that offers potential to increase them revenues, profits and long-term grown, sometimes to achieve lower costs and enhance the company competitiveness willing to sell more help and to capitalize on its core competencies and capabilities, to spread its business risk across a wider market base. Globalization is not a new phenomenon, it began in the late nineteenth century, but it slowed down during the period from the start of the First World War until the third quarter of the twentieth century. This slowdown can be attributed to the inward-looking policies pursued by a number of countries in order to protect their respective industries... however, the pace of globalization picked up rapidly during the fourth quarter of the twentieth century...

Managers must be conscious that markets, supplies, investors, locations, partners, and competitors can be anywhere in the world. Successful businesses will take advantage of opportunities wherever they are and will be prepared for downfalls. Successful managers, in this environment, need to understand the similarities and differences across national boundaries, in order to utilize the opportunities and deal with the potential downfalls. Essentially, globalization refers to growth of trade and investment, accompanied by the growth in international businesses, and the integration of economies around the world. The globalization concept is based on a number of relatively simple premises that I can mention as:

- Technological developments have increased the ease and speed of international communication and travel.
- Increased communication and travel have made the world smaller.
- A smaller world means that people are more aware of events outside of their home country, and are more likely to travel to other countries.
- Increased awareness and travel result in a better understanding of foreign opportunities.
- A better understanding of opportunities leads to increases in international trade and investment, and the number of businesses operating across national borders.
- These increases mean that the economies around the world are more closely integrated.

Managers must be conscious that markets, supplies, investors, locations, partners, and competitors can be anywhere in the world. Successful businesses will take advantage of opportunities wherever they are and manager in this environment, need to understand and look at the similarities and differences across national boundaries, in order to succeed. The globalization of business is easy to recognize in the spread of many brands and services throughout the world. For example, Japanese electronics and automobiles are common in Asia, Europe, and North America, while U.S. automobiles, entertainment, and financial services are also common in Asia, Europe, and North America.

Moreover, companies have become transnational or multinational—that is, they are based in one country but have operations in others. For example, Japan-based automaker Honda operates the largest single factory in the United States, while U.S. based Coca-Cola operates plants in other countries including France and Belgium with about 80 percent of that company's profits come from overseas sales. Unfortunately, this rapid growth was not without consequences the Seattle meetings of the World Trade Organization turned into a fiasco, with anti-globalization groups demonstrating against globalization on all fronts from animal rights to environmental concerns, poverty alleviation, and jobs for Americans.

In addition, the Asian Tigers suffered major economic setbacks in the late 1990s. In late 2002 Argentina's economy which had been one of the stars of the 1990s, crashed, when the country could no longer maintain its currency at par with the U.S. dollar. Further problems occurred in the Triad economies Japanese economy went into a severe period of recession and deflation in the late 1990s, and in 2001 both the European and the U.S. economies took a downward turn as well. In turn, the rest of the world was negatively affected by the economic situation in the Triad. The terrorist attacks in the United States in September, 2001, exacerbated this already negative economic situation. In developing appropriate global strategies, managers need to take the benefits and drawbacks of globalization into

account. A global strategy must be in the context of events around the globe, as well as those at home. International strategy is the continuous and comprehensive management technique designed to help companies operate and compete effectively across national boundaries.

Manager should perform some of these following processes to avoid troubles.

Study the political, economical, socio-cultural and technological situation of the foreign country. Also use strategies on segmentation, targeting and positioning the company, determining the international product life cycle at the same time branding the product in accordance with the country. Therefore should implement the marketing mix in accordance with the need of the foreign country by determining the price of the product on one hand set up the distribution system for the international trade and in the other hand study and follow the advertising standardization in the country. Some rudimentary aspects of international strategies mirror domestic strategies in that companies must determine what products or services to sell, where and how to sell them, where and how they will produce or provide them, and how they will compete with other companies in the industry in accordance with company goals. The development of international strategies entails attention to other details that seldom, if ever, come into play in the domestic market. These other areas of concern stem from cultural, geographic, and political differences. Consequently, while a company only has to develop a strategy taking into account known governmental regulations, one language (generally), and one currency in a domestic market, it must consider and plan for different levels and kinds of governmental regulation, multiple currencies, and several languages in the global market.

2.1 Overview of International Strategy Development

Generally, a company develops its international strategy by considering its overall strategy, which includes its operations at home and abroad. We can consider four aspects of strategy: scope of operations, resource allocation, competitive advantage, and synergy. The first component encompasses the geographic locations countries and regions of possible operations as well as possible markets or niches in various regions.

Since companies have limited resources and different regions offer different advantages, managers must select the markets that offer the company the optimal opportunities. The second component of the global strategy focuses on use of company resources so that a company can compete successfully in the chosen markets. This component of strategy planning also determines the relative importance of various company functions and bases the allocation of resources on the relative importance of each function. For instance, a company may decide to allocate its resources based on product lines or geographical locations.

2.2 Strategy–SWOT Analysis

SWOT is an abbreviation for **Strengths, Weaknesses, Opportunities and Threats**. SWOT analysis is very important and successful tool for a manager to help them auditing the overall strategic position of a business and its environment, more to take advantage over its rivals or competitors. Once the key strategic is set, issues have been identified, they can now feed into business objectives, particularly marketing objectives. SWOT analysis can be used in conjunction with other tools for audit and analysis, such as PEST analysis and PORTERS five-force analysis. It has been mentioned that is also a very popular tool for business to grow and marketing students should focus on it to have better understanding of the market and I believe it is quick and easy way to learn because help you to develop or expand your company.

2.2.1 The Key Distinction - Internal and External Issues

Strengths and weaknesses are internal factors. For example, strength could be your specialist marketing expertise. Indeed manager expertise in the major items of its portfolio almost is the key to the success of the products in the market. Expertise spans a wide range of graphic design, new media, advertising and digital marketing etc...

A weakness could be the lack of a new product or product innovation such kind of issues can affect the company benefit. Opportunities and threats are external factors. Let's say an opportunity could be a developing distribution channel such as the Internet, web distribution channel as the current scenario, a distribution

channel plays an important role in the smooth supply of the products and its customers satisfaction, or changing consumer lifestyles that potentially increase demand for a company's products. A threat could be a new competitor in an important existing market or a technological change that makes existing products potentially obsolete. It is worth pointing out that SWOT analysis can be very subjective - two people rarely come-up with the same version of a SWOT analysis even when given the same information about the same business and its environment. Accordingly, SWOT analysis is best used as a guide and not a prescription.

Adding and weighting criteria to each factor increases the validity of the analysis.

Table 1 SWOT Analysis

		Positive	Negative
		Strengths	Weakness
I N T E R N A L	Positive	<ul style="list-style-type: none"> • Technological Skills • Leading Brands • Distribution Channels • Costumer Loyalty/Relationship • Product Quality • Scale • Management 	<ul style="list-style-type: none"> • Absence of Important Skills • Weak Brands • Poor access to Distribution • Low Customer Retention • Unreliable Product/Services • Sub-Scale • Management
	Negative	<ul style="list-style-type: none"> • Changing Customers Tastes • Liberalization of geographic Market • Technological Advanced • Changes in government politics • Lower personal Taxes • Change in population age structure • New distribution channels 	<ul style="list-style-type: none"> • Changing Customers Tastes • Close a geographic Market • Technological Advanced • Changes in government politics • Tax increases • Changes in population age structure • New distribution channels
E X T E R N A L	Positive	<ul style="list-style-type: none"> • Changing Customers Tastes • Liberalization of geographic Market • Technological Advanced • Changes in government politics • Lower personal Taxes • Change in population age structure • New distribution channels 	<ul style="list-style-type: none"> • Changing Customers Tastes • Close a geographic Market • Technological Advanced • Changes in government politics • Tax increases • Changes in population age structure • New distribution channels
	Negative	<ul style="list-style-type: none"> • Changing Customers Tastes • Liberalization of geographic Market • Technological Advanced • Changes in government politics • Lower personal Taxes • Change in population age structure • New distribution channels 	<ul style="list-style-type: none"> • Changing Customers Tastes • Close a geographic Market • Technological Advanced • Changes in government politics • Tax increases • Changes in population age structure • New distribution channels

2.3 Competitive Advantage

The goal of much of business strategies is to achieve sustainable competitive advantage. Differences in wages rates, worker productivity, inflation rates, energy costs, tax rates, government regulations and the like create sizable variations in manufacturing costs from country to country. Michael Porter identified two basic types of competitive advantage: Cost Advantage and Differentiation Advantage, a competitive advantage exists when the firm is able to deliver the same benefits as competitors but lower costs (cost advantage) or, deliver benefits that exceed those of competing products (differentiation advantage) thus a competitive advantage enables the firm to create superior value to its customers and superior value to itself. The following diagram combines the resources-based and positioning views to illustrate the concept of competitive advantage:

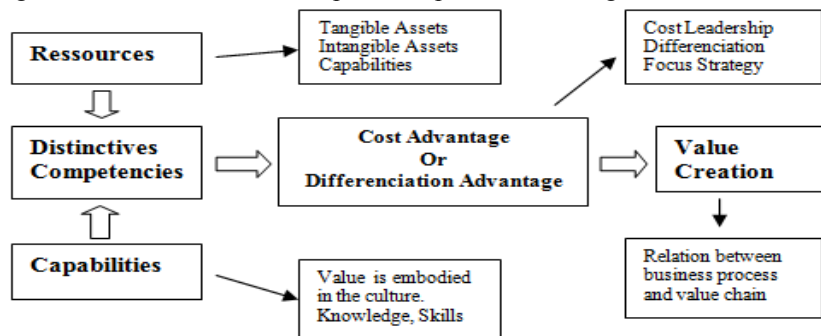


Figure 1 A Model of Competitive Advantage

2.3.1 Resources and Capabilities

According to the resources-based view, in order to develop a competitive advantage the firm has resources and capabilities that superior to those of its competitors. Without this superiority, the competitors simply could replicate what the firm was doing and any advantage quickly would disappear. Resources are the firm-specific assets useful for creating a cost or differentiation advantage and that few competitors can acquire easily. The following are some examples of such resources:

- ✓ Patents and trademarks
- ✓ Proprietary know-how
- ✓ Installed customer base
- ✓ Reputation of the firm
- ✓ Brand equity

2.3.2 Capabilities

Refer to the firm's ability to utilize its resources effectively. An example of a capability is the ability to bring a product to market faster than competitors. Such capabilities are embedded in the routines of the organization and are not easily documented as procedures and thus are difficult for competitors to replicate. The firm's resources and capabilities together form its distinctive competencies. These competencies enable innovation, efficiency, quality, and customer responsiveness, all of which can be leveraged to create a cost advantage or a differentiation advantage.

2.3.3 Cost Advantage and Differentiation Advantage

Competitive advantage is created by using resources and capabilities to achieve either a lower cost structure or a differentiated product. A firm positions itself in its industry through its choice of low cost or differentiation. This decision is a central component of the firm's competitive strategy. Another important decision is how broad or narrow a market segment to target. Porter formed a matrix using cost advantage, differentiation advantage, and a broad or narrow focus to identify a set of generics strategies that the firm can pursue to create and sustain a competitive advantage.

2.3.4 Value Creation

The firm creates value by performing a series of activities that Porter identified as the value chain. In addition to the firm's own value-creating activities, the firm operates in a *value system* of vertical activities including those of upstream suppliers and downstream channel members. To achieve a competitive advantage, the firm must perform one or more value creating activities in a way that creates more overall value than do competitors. Superior value is created through lower costs or superior benefits to the consumer (differentiation).

2.4 Build Company Competitive Advantage Based on Customers Value Delivery Strategy, Sustainable Marketing Systems

Sustainable marketing is a new concept put forward by Philip Kotler in his book *Rethinking Marketing: Sustainable Marketing Enterprise in Asia*. Sustainable marketing is a strategic conception. Its aim is to make three main stakeholders-consumer, employees and stockholders to get sustainable satisfaction. In the 2004, Philip Kotler put forward company sustainable marketing system in his latest composing, and made further interpretation of the sustainable marketing”.

The company sustainable marketing system is composed of three main strategic parts: strategy (S), tactics (T), and value (V), which are described as strategic business triangle. This system comprises three dimensions:

- Strategy-how to win the strategic share,
- Tactics-how to win the market share, and
- Value-how to win the sensation share.

The sustainable marketing system is dynamic process of identifying customer value, offering customer value and communicating customer value from outside.

Firstly, the company determines STV strategy through market segmentation, selecting target market and making market position. In this way, the company could confirm which products to offer and which target consumer to serve, as well as which customer value to satisfy. Then the company should determine the differentiated tactics aiming at target market, and supply customer value through marketing mix and selling. Meanwhile, the company could try to build up brand image, improve service quality, and provide additional service to communicate customer value. Therefore, we could use company sustainable marketing system--STV triangle to build company competitive advantage based on customer value delivery strategy, shown as figure:

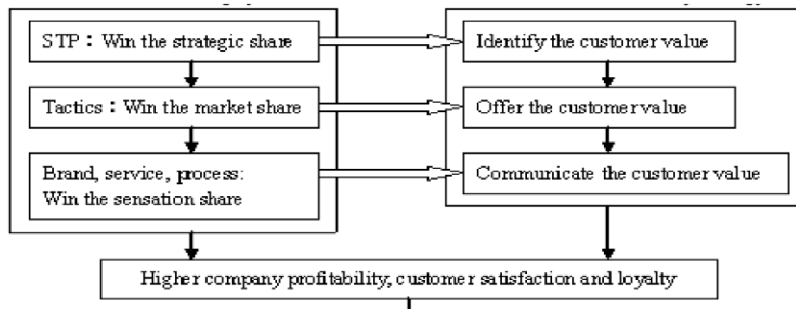


Figure 2 The framework of Company Competitive Advantage Based on Customers Value Delivery Strategy, Sustainable Marketing Systems.

3 International marketing Strategies That Fit Emerging Markets

Companies racing for global leadership have to consider competing in emerging markets like China, Brazil, India, Indonesia, Mexico and South Africa countries where the business risks are considerable but where the opportunities for growth are huge (example: Coca Cola has focused its marketing effort in China and India on making drinks attractive to status seeking young people in urbanized areas). It's no easy task to identify strategies for entering new international markets or to decide which countries to do business with. Many firms simply go with what they know and fall far short of their goals. Part of the problem is that emerging markets have "institutional voids": They lack specialized intermediaries, regulatory systems, and contract-enforcing methods. These gaps have made it difficult for multinationals to succeed in developing nations; thus, many companies have resisted investing there. That may be a mistake. If Western companies don't come up with good strategies for engaging with emerging markets, they are unlikely to remain competitive. Many firms choose their markets and strategies for the wrong reasons, relying on everything from senior managers' gut feelings to the behaviors of rivals. Corporations also depend on composite indexes for help making decisions. But these analyses can be misleading; they don't account for vital information about the soft infrastructures in developing nations. A better approach is to understand institutional variations between countries. The best way to do this is by using the five contexts framework. The five contexts are a country's political and social systems, its degree of openness, its product markets, its labor markets, and its capital markets. By asking a series of questions that pertain to each of the five areas, executives can map the institutional contexts of any nation. When companies match their strategies to each country's contexts, they can take advantage of a location's unique strengths. But first firms should weigh the benefits against the costs. If they find that the risks of adaptation are too great, they should try to change the contexts in which they operate or simply stay away. How does the experience of the emerging markets compare with that of the developed markets? In the developed markets, sector influences are more pronounced and they appear earlier in the data. This can be seen when you are entering the market, where, and overlay with developing markets it is not easy things to deal with.

Is It All Due to tech Stocks? An increased role of sector influences can be rationalized as the result of greater integration across markets by investors who have an increasingly global outlook.

4 Risks to Competing in Foreign Markets

The foreign exchange business is by natural risky, because it deals primarily in risk—measuring it, pricing it, accepting it when appropriate, and managing it. The success of a bank or other institution trading in the foreign exchange market depends critically on how well it assesses, prices, and manages risk, and on its ability to limit losses from particular transactions and to keep its overall exposure controlled. Broadly speaking, the risks in trading foreign exchange are the same as those in marketing other financial products. These risks can be categorized and subdivided in any number of ways, depending on the particular focus desired and the degree of detail sought. Here, the focus is on two of the basic categories of risk—market risk and credit risk (including settlement risk and sovereign risk)—as they apply to foreign exchange trading. Note is also taken of some other important risks in foreign exchange trading—liquidity risk, legal risk, and operational risk. The risk of an investment's value changing due to changes in currency exchange rates is one fact for internationalization.

However the risk that an investor will have to close out a long or short position in a foreign currency at a loss due to an adverse movement in exchange rates. This also known as "currency risk" or "exchange-rate risk". This risk usually affects businesses that export and/or import, but it can also affect investors making international investments. For example, if money must be converted to another currency to make a certain investment, then any changes in the currency exchange rate will cause that investment's value to either decrease or increase when the investment is sold and converted back into the original currency

5 Conclusion

After examining the prospective markets in this manner, managers are ready to evaluate the advantages and disadvantages of each potential market. One way of doing so is the determination of costs, advantages, and disadvantages of each prospective market. The costs of each market include direct costs and opportunity costs. Growth through foreign market expansion has become an increasingly popular strategy, as previously closed foreign markets open and as economies around the world globalize. Spurred by technological advances in transportation and communications many

strategists have used contingency theory to explain how an organization maximizes its alignment of strategy with its environment to achieve performance outcomes within a domestic strategy context. There can be various ways through which a business organization can achieve success in the market, but all those ways can be comprised into as above, then it can be rightly said that it revolves specifically around three parties or more; the triangular linkages or the relationship between these three parties (company, customers and competitors) determine the success and failure of business organization. Supply Chain Managers can provide considerable value to their companies by understanding the customers' delivery requirements. A very powerful tool for understanding these requirements is account segmentation. A company can use account segmentation to identify market segments Such as Acute & Chronic therapy market.

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Research on Construction of Informal Finance Risk Early Warning System and Empirical Data *

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Abstract: Informal finance serves as an important complement to the finance system, which can provide private, small and medium-sized enterprises the necessary financial support as well as promote agriculture development while bringing enormous financial risks that cannot be ignored. For the timely discovery and risk prevention, considering its theoretical value and practical significance, this paper sets up an informal finance risk early warning index system by applying early warning system construction principles, integration with Analytical Hierarchy Process and Experts Scoring Method. In addition, this paper chooses data of Hubei Province of China as the empirical analysis object.

Key words: Informal Finance Risk; Early Warning Index System; Analytical Hierarchy Process; Weight

1 Introduction

In retrospect of the past 30 years, China's informal finance has grown from small to big, from surplus capital to industrial capital and financial capital. Take Wenzhou as an example, among the overall capital of SME (small and medium-sized enterprises), there are only 24% coming from the state-owned commercial financial institutions; and the other 76% are coming from informal finance. Till 2012, the scale of informal finance in Wenzhou has reached 500 billion RMB. On one hand, informal capital is the beneficial supplement of formal finance, gradually becoming the important financial income of SME, rural areas and farmer, which will further boost the local economy. However, lacking the supervisions of laws and regulations, risk control measures of civil finance is hard to be involved into the supervision of formal finance, which will further cause many problems during its development, and even affect the stability of the society.

Scholars from home and abroad have conducted abundant research in theory and practice. Hangzhou Branch of Central Bank of China research group (2008) has illustrated the innate risk, regarding different informal finance activities. Li Wei (2007), Pan An'e (2008), designed risk evaluation index system from different viewpoint^{[1][2]}. Ni Jian (2009) has come up with the control measures for informal finance^[3]. Looking back to the research home and abroad, there are few comprehensive analyses for the informal finance risk warning regarding risk levels, risk warning index, and risk prevention. Therefore, to strengthen the research of informal finance risk early warning control and management and to find and prevent warning position, are of great significance in theory and practice, for promoting a virtuous circle of national economy and informal finance.

2 Methods of Constructing the Risk Early Warning Index System

2.1 Analytical Hierarchy Processes

Analytical Hierarchy Process (AHP) was proposed by Professor Thomas L.Saaty of Pittsburgh University in the nineteen seventies which provided a Multi-objective decision analysis method from both qualitative and quantitative aspects. According to the dominant relation, it decomposes the complex problem into a number of factors, these factors will be further decomposed, then line up on the basis of hierarchy of objectives, criteria, indexes, forming an Orderly hierarchical structure with multi-objective and multi-level. To calculate the relative importance of each factor by comparing in pairs, to evaluate the judgment matrix in a comprehensive way, finally there can be a total order arranged by the importance of each factor. Since informal financial risk early warning index system contains four first-level indicators, 13 secondary-level indicators and 30 third-level indicators which are obvious multi-level structure, this paper adopts AHP to modeling.

2.2 Expert Scoring Method

Expert Scoring Method: First consult the related experts anonymously; after the comprehensive

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and objective summary, process, analysis and conclusion of most experts' experience and subjective judgment, make a reasonable estimate for those large number of factors which is difficult to make quantitative analysis in technique method; after several rounds of consultation, feedback and adjustment, analyze the data value index and value realization degree. Since the method need brainstorming, which can give full play to the collective wisdom of experts, to avoid subjectivity and one-sidedness, this paper selects the method for scoring the various early warning indicators, which were quantitatively analyzed.

3 The Construction of Informal Finance Risk Early Warning Index System

3.1 Construction Principles

Informal finance risk early warning index system should obey the following principles: a. The principle of combination of Comprehensiveness and Representativeness Principle. b. The principle of combination of Scientific and Operability Principle. c. The principle of combination of Adaptability and Complementarities Principle. d. The principle of combination of Sensitivity and Vigilance Principle. The subtle changes in the chosen index should reflect the situation of informal finance risk in time so as to adopt the related countermeasures to prevent the risk.

3.2 The selection of indicators and weighting

Table 1 Informal Finance Risk Early Warning Index System

	First-Level Indicator	Second-Level Indicator	Third-Level Indicator	Informal Financial Risk position				
				Level I (scores 0)	Level II (scores 1)	Level III (scores 2)	Level IV (scores 3)	
Informal Financial Risk Early Warning Index System B	B ₁ External Economic Environment Indicators (5.58)	B ₁₁ Macroeconomic Conditions (3.12)	B ₁₁₁ GDP Growth Rate (1.57)	>12	(8,12]	(4,8]	≤4	
			B ₁₁₂ Inflation Rate (0.94)	≤3	(3,6]	(6,9]	>9	
			B ₁₁₃ Real Estate Investment Growth Rate(0.38)	≤20	(20,30]	(30,40]	>40	
			B ₁₁₄ Unemployment Rate (0.23)	≤4	(4,6]	(6,8]	>8	
		B ₁₂ Government Regulatory Capacity(0.68)	B ₁₂₁ Fiscal Revenue to GDP Ratio (0.45)	>24	(20,25]	(15,20]	≤15	
			B ₁₂₂ Expenditure to GDP Ratio (0.23)	≤40	(40,45]	(45,50]	>50	
		B ₁₃ Business Conditions (1.78)	B ₁₃₁ Return on Assets (1.34)	>2	(1,2]	(0.5,1]	≤0.5	
			B ₁₃₂ Enterprise Loss Rate (0.44)	≤15	(15,20]	(20,25]	>25	
		B ₂ Risk of Informal Financial Institutions in Supervised System (53.79)	B ₂₁ Capital Adequacy (4.38)	B ₂₁₁ Capital Adequacy Ratio (2.92)	>12	(8,12]	(4,8]	≤4
				B ₂₁₂ Core Capital Adequacy Ratio (1.46)	>5	(3,5]	(2,3]	≤2
	B ₂₂ Asset Quality (25.50)		B ₂₂₁ NPL ratio (11.90)	≤5	(5,10]	(10,15]	>15	
			B ₂₂₂ Non-performing Loan Ratio (7.08)	≤1	(1,2]	(2,3]	>3	
			B ₂₂₃ Overdue Loans Ratio (4.09)	≤4	(4,8]	(8,12]	>12	
			B ₂₂₄ Top Ten Customers Loan Ratio (2.43)	≤40	(40,50]	(50,60]	>60	
	B ₂₃ Profitability (8.75)		B ₂₃₁ Interest Rate Receivable(2.92)	≤5	(5,15]	(15,25]	>25	
			B ₂₃₂ Return On Capital (5.83)	>12	(8,12]	(4,8]	≤4	
	B ₂₄ Liquidity (15.16)		B ₂₄₁ Cash Reserve Ratio (10.11)	>7	(5,7]	(3,5]	≤3	
			B ₂₄₂ Loan-deposit Ratio (5.05)	≤65	(65,75]	(75,85]	>85	
	B ₃ Risk of Pawn (24.95)	B ₃₁ Profitability (4.07)	B ₃₁₁ Pawn Capital Margin (2.71)	>10	(5,10]	(0,5]	≤0	
			B ₃₁₂ Synthetic Cost Rate (1.36)	>4	(3.5,4]	(3,3.5]	≤3	
B ₃₂ Liquidity (7.41)		B ₃₂₁ Mortgage Rate (5.56)	≤60	(60,70]	(70,80]	>80		
		B ₃₂₂ Forfeited Realizations (1.85)	>95	(80,95]	(65,80]	≤65		
B ₃₃ Capital Security (13.46)		B ₃₃₁ Forfeited Rate (8.97)	≤5	(5,15]	(15,25]	>25		
		B ₃₃₂ Discount Rate (4.49)	≤50	(50,75]	(70,80]	>80		

B ₄ Risk of Guarantee agencies (15.68)	B ₄₁ Profitability (1.91)	B ₄₁₁ Main Operation Margins (1.27)	>30	(15,30]	(0,15]	≤0
		B ₄₁₂ Asset-liability ratio (0.64)	≤75	(75,85]	(85,95]	>95
	B ₄₂ Credit Risk (5.01)	B ₄₂₁ Guarantee Reserve Adequacy Ratio (3.76)	>25	(10,25]	(0,10]	≤0
		B ₄₂₂ Non-performing Asset Ratio (1.25)	≤1	(1,10]	(10,20]	>20
	B ₄₃ Encumbered Assets Condition (8.77)	B ₄₃₁ Compensatory Loss Rate (2.92)	≤5	(5,10]	(10,15]	>15
		B ₄₃₂ Compensatory Rate Guarantee (5.85)	≤3	(3,4]	(4,5]	>5

(Note: The values in parentheses signify the indicators' weight relative to total target.)

Practice shows that there are two kinds of the forms of informal finance institutions. One is the institutions in supervised system; the other is out of being controlled by the supervised system. Among them, informal finance institutions in supervised system including rural credit cooperatives, urban credit cooperatives and rural cooperative foundations, institutions outside the supervised system contains private lending, underground banks, RCAs, pawn shops and guarantee agencies. This paper chooses pawn shops and guarantee agencies as representatives to study the risk of institutions outside the supervised system for data easily obtained.

Applying the multi-level indicator system and "The New Basel Capital Accord", this paper calculates each indicator's critical value by referring to widely recognized early warning values and principles of financial risk early warning interval criteria. And based on these, this paper divides all the indicators into four levels demonstrating. Each level with different colors and points illustrated as follows: level I means security scores 0, with "Blue Light", while level II stands for basic security scores 1, with "Green light". Besides, level III represents warning scores 2, with "Yellow light". level IV signifies dangerous scores 3, with "Red light". Therefore, the informal finance risk assessment system has formed (as shown in Table 1).

3.3 To weight each indicator

3.3.1 To construct judgment matrix

After considering the different importance of each indicator in the first-level of informal financial risk early warning index system, using a 1-9 ratio scale method to assign its importance by AHP and Experts Scoring Method, the result is shown in Table 2.

Table 2 The Assignment of level I indicators' importance

First Level Indicators	B ₁	B ₂	B ₃	B ₄	W
External Economic Environment B ₁	1	1/6	1/5	1/4	5.58%
Risk of Informal Financial Institutions in Supervised System B ₂	6	1	3	4	53.79%
Risk of Pawn B ₃	5	1/3	1	2	24.95%
Risk of Guarantee institutions B ₄	4	1/4	1/2	1	15.68%

Therefore, obtaining a judgment matrix of indicators' importance

$$A = \begin{bmatrix} 1 & 1/6 & 1/5 & 1/4 \\ 6 & 1 & 3 & 4 \\ 5 & 1/3 & 1 & 2 \\ 4 & 1/4 & 1/2 & 1 \end{bmatrix}$$

3.3.2 To calculate the weight of each indicator at same level.

(1) Multiply the elements of each row in matrix A.

Obtained: $B_1=1/120, B_2=72, B_3=10/3, B_4=1/2$.

(2) Calculate n-th Root of B_i , order $C_i = \sqrt[n]{B_i}$ (i=1,2,3,...,n)

Obtained: $C_1=0.3021, C_2=2.9130, C_3=1.3512, C_4=0.8490$.

(3) Normalize Vector $C=(C_1, C_2, C_3, \dots)^T$, order $W_i = \frac{C_i}{\sum C_i}$ (i=1,2,3,...,n).

$W = (W_1, W_2, W_3, \dots)^T$, W_i is the weight of each indicator.

Obtained: $W_1=0.0558$, $W_2=0.5379$, $W_3=0.2495$, $W_4=0.1568$ (see table 2).

3.3.3 Consistency test

After calculating the weight of each indicator, it does not mean that the process of setting target weight has finished. Since effected by strong subjective sense of human beings, the assignment of judgment matrix need to be verified its consistency, as to evaluate the reliability.

(1) To calculate Consistency Index CI, $CI = \frac{\lambda_{max} - n}{n - 1}$. λ_{max} is the maximum Eigen values of

the judgment matrix. N is the order. The larger value CI the greater deviation from consistency. In contrast, the value of CI is smaller(close to 0)CI smaller value (close to 0), indicating that the better degree of consistency. By using the Mat lab software to calculate data, we obtain:

$$\lambda_{max} = 4.1389, CI=0.0463.$$

(2) To calculate Consistency ratio CR, $CR=CI/RI$. For the value RI, you can direct look-up table 3. When $n = 1,2$, $RI = 0$. For $n \geq 3$, if $CR < 0.1$, accept consistency, that means judgment matrix consistency test passed; if $CR \geq 0.1$, then appropriate adjustments to the corresponding judgment matrix.

Table 3 Average Random Consistency Index Value

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.54	1.56	1.58	1.59

In this case, $n=4$, look-up table 3 shows, $RI = 0.90$, $CR = CI / RI = 0.0514 < 0.1$, pass the consistency test.

By applying expert scoring method, we make assignment of the importance of the level II and level III indicators of the informal financial risk early warning index system, in accordance with its affiliation to the higher indicators. After using the same method validation mentioned above, which proved that all the indicators have better consistency, we finally obtained the weight of indicators at all levels.

3.3.4 To calculate the indicators' weight relative to the target.

After weighting each indicator at the same level by Analytical Hierarchy Process, we may calculate the indicator relative to the total weight of the target.

$$\text{Equ: } W_{ijk} = W_{B_i} \times W_{B_j} \times W_{B_{jk}} \tag{1}$$

$$W_{ij} = W_{B_i} \times W_{B_j} \tag{2}$$

Where W_{ijk} is the total weight of the target of indicator B_{ijk} . W_{ij} is the total weight of the target of indicator B_{ij} . W_{B_i} is the weight of indicator B_i in the first level, W_{B_j} is the weight of indicator B_j in the second level, $W_{B_{jk}}$ is the weight of indicator B_{jk} in the third level. According to these steps, we can obtain all the indicators' total weight of the target. (As shown Table 1).

3.4 Comprehensive warning model

To calculate the risk of the comprehensive evaluation value Z, according to the following formula.

$$\text{Equ: } Y_{ij} = \frac{\sum X_{ijk} \times W_{ijk}}{\sum W_{ijk}} \tag{3}$$

$$Y_i = \frac{\sum Y_{ij} \times W_{ij}}{\sum W_{ij}} \tag{4}$$

$$Z = \sum_{i=1}^n W_i Y_i, (i=1,2,3,4; j=1,2,\dots,n; k=1,2,3,\dots, n) \tag{5}$$

W_{ijk} is the total weight of the target of indicator B_{ijk} . X_{ijk} is the score of the indicator B_{ijk} . By Experts Scoring Method. Y_{ij} is the score of the indicator B_{ij} in the second level. Y_i is the score of the indicator B_i in the first level. Z is the comprehensive evaluation value.

When calculating Z, look up Table 1 to determine the overall operation situation of informal financial institutions and express warning instructions.

4 Empirical Analysis of Informal Financial Risk Warning System

4.1 Establishing original database of the warning index of financial risk

To regulate, evaluate and early warning risks, this paper adopts external economic environment data of Hubei Province of China from the year 2007 to 2011 to test the results (shown table 4).

Table 4 The original data of the external economic environment index of Hubei province of China(%)

Indicator	2007	2008	2009	2010	2011
GDP Growth Rate	14.60	13.40	13.50	14.80	13.80
Inflation Rate	4.80	6.30	-0.40	2.90	5.80
Indicator	2007	2008	2009	2010	2011
Real Estate Investment Growth Rate	28.10	23.30	34.50	34.80	27.70
Unemployment Rate	4.21	4.20	4.21	4.18	4.10
Fiscal Revenue to GDP Ratio	6.33	6.27	6.29	6.33	7.78
Expenditure to GDP Ratio	13.65	14.57	16.13	15.67	16.37
Return on Assets	5.35	5.89	5.68	7.99	8.06
Enterprise Loss Rate	16.89	14.33	13.02	10.62	8.18

Data resource: the Office for Hubei statistics and data from other related regulators.

4.2 To score the indicators

According to the data above and corresponding with index critical value in Table 1, the scores of each indicator can be achieved. Take data of 2011 as an example.

Firstly, scoring the third-level indicators:

- [1] GDP Growth Rate= 13.80%, fall into the first interval of the warning zone, scores 0.
- [2] Inflation Rate=5.80%, fall into the second interval of the warning zone, score 1.
- [3] Real Estate Investment Growth Rate= 27.7%, fall into the second interval of the warning zone, scores 1.
- [4] Unemployment Rate=4.10%, fall into the second interval of the warning zone, scores 1.
- [5] Fiscal Revenue to GDP Ratio=7.78%, fall into the fourth interval of the warning zone, scores 3.
- [6] Expenditure to GDP Ratio=16.37%, fall into the first interval of the warning zone, scores 0.
- [7] Return on Assets=8.06%, fall into the first interval of the warning zone, scores 0.
- [8] Enterprise Loss Rate=8.18%, fall into the first interval of the warning zone, scores 0.

Then calculate the comprehensive assessment of the external economic environment condition:

- (1) The calculation of third-level indicator system:

$$\text{Macroeconomic Conditions}=(0 \times 1.57\%+1 \times 0.94\%+1 \times 0.38\%+1 \times 0.23\%) \div 3.12\%=0.50$$

$$\text{Government Regulatory Capacity}=(1 \times 0.45\%+3 \times 0.23\%) \div 0.68\%=1.68$$

$$\text{Business conditions}=(8.06\% \times 1.34\%+91.82\% \times 0.44\%) \div 1.78\%=0$$

- (2) The calculation of External Economic Environment Indicators

$$\text{External Economic Environment Indicators}=(0.50 \times 3.12\%+1.68 \times 0.68\%+0 \times 1.78\%) \div 5.58\%=0.48$$

Finally, correspond the composite scores with table 1, it shows that the informal financial external economic environment of Hubei province of China in 2011 is generally in a state of financial security.

Similarly, we can calculate the scores of other sub-systems and the composite value of the informal financial risk system of Hubei province of China, then evaluate its safety.

5 Conclusion

To detect and prevent informal finance risk in time, this paper constructs an informal finance risk index system featuring relatively comprehensiveness, simplicity but effectiveness and also collects the data of Hubei province of China as an example to analyze, as to show practicality of the system. This system can contribute to proving theoretical supports for regulators' decision-making as well as effectively reducing and avoiding the risk of a regional financial crisis. For the purpose of more accuracy evaluation of warning system, all the indicators need to gradually perfect in the future.

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Diversity and Innovation: Empowering Women Fosters Innovation

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Abstract: Women’s participation in labor market is required to utilize diverse variety of talent. In Japan, females are not participating in the labor market yet, especially in policy/decision making positions although the legislation has progressed slowly. There are many potentials that might achieve a remarkable improvement in terms of innovation growth and productivity by incorporating the female labor force in the Japanese economy. Women’s active participation to economy is one of the pivotal economic growth strategies of Japanese government in 2013. The government is aiming to attain the target of 30% of women’s participation in policy/decision making process by year 2020. However, only two categories attained that target number, pharmacists and member of the councils for national government. In order to win the objective in seven years, more positive actions will be needed. This paper explores why females are needed in the Japanese labor market, how extent women improve corporate performance and economy, and how women’s diversity fosters product innovation and process innovation. Materials used for analysis are related government papers, books, and journals. Some interviews with business executives were conducted.

Key words: Diversity; Women’s matter; Innovation; Positive action; Gender gap,

1 Introduction

World economy moves quickly and market changed day by day. To survive through the bustling world, diverse human resource should be utilized appropriately as a human capital portfolio. The then U.S. Secretary of States Hillary Clinton said at APEC Women and the Economy Summit 2011 “Unlocking the potential of women by narrowing the gender gap could lead to a 14-percent rise in per capita incomes by the year 2020.” Christine Lagarde, director of the international Monetary Fund, delivered the speech during the annual meetings of the IMF & the World Bank Group held in Tokyo 2012, “Women could save Japan’s economy if more of them went to work.” Women’s participation is essential in order to boost economy in a short term and a long term.

2 Why Does Economy Need Women?

2.1 A declining birth rate and work force

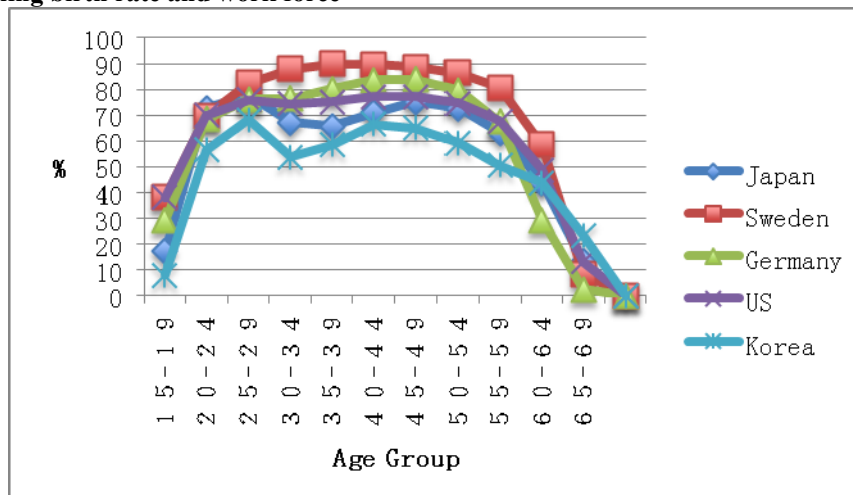


Figure 1 Female Work Force Participation Rate by Countries

(Source: Statistics Bureau, Ministry of Internal Affairs and Communication (2011) and ILO LABORSTA)

Exhibit 1 shows female work force participation rate by some OECD countries. Japanese women’s work force participation rate in age group from 25 to 54 years old ranks 22nd among 30 OECD countries.

In Japan and Korea, in age group from 30-34 years old, the female work force participation rate declines sharply. In this age group, women tend to give birth after marriage and retire their jobs and raise their children at home. After children are raised up, mothers go back to jobs or try to find new jobs so that a job participation rate increases again around age 40-49 though it is difficult to take good occupations as before they retired. Consequently, the line graph forms M-shaped. This tendency cannot be seen in other countries below. In Sweden, during the age group 30-34, female work force participation rate increase in contrast.

Recently, Japan’s work force decline about a million people per year because of a low birth rate and retiring the baby boom generation. Total population is declining since 2011 due to the diminishing birthrate so that demographic structure in Japan changes to the ageing society. 2.6 people in working generation are supporting the one elderly person now. Declining work force might give a good chance for non-working women. As about 3.42million female from 25-to 49 years old want to have jobs,^[1] they have a possibility to compensate for the reduction of the labor, if they could.

Among the OECD countries, there are some countries, such as Italy, Korea, and Japan that have a low birth rate. Those countries tend to face the serious concerns of falling birth rate and rapid aging population coming with demographic changes.

Consequently, some worry when female goes to work and does not stay home, birth rate might diminish more. However, as Exhibit 2 shows, it is not true in OECD countries.

Relations between women’s employment rate and birth rate have not been studied profoundly. There are some hypothesis why a birth rate does not decline when women have jobs in developed countries. First, when a husband and wife work together, total income of the family increases so that they can have more stable finance plan for raising children.

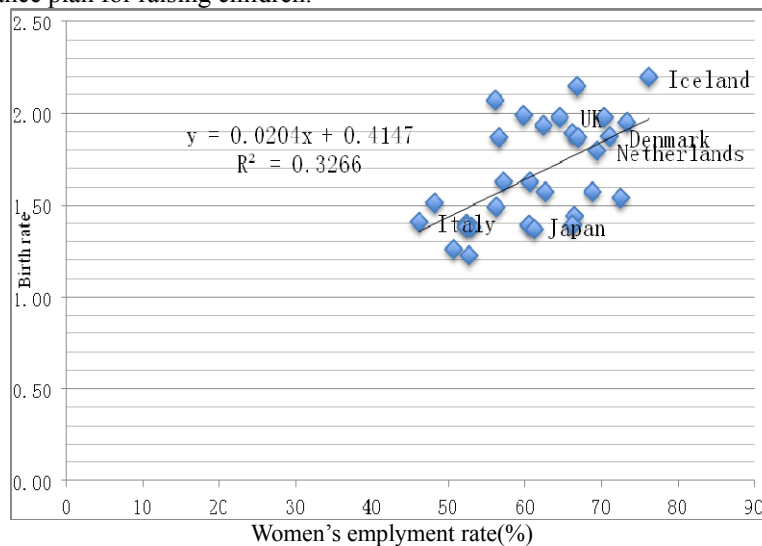


Figure 2 Women’s Employment Rate and Birth Rate in OECD Countries
(source: Calculated with OECD statistics data 2010)

At the same time, when the one loses a job, the other partner support family expense. Second, a country which is able to provide substantial public supports for working women, could provide supports for raising childrens so that working woman would have more children.

2.2 Some economic indexes show women’s contribution to improving business performance

Countries and companies should deploy people effectively in order to obtain a sustainable competitiveness. However, it is not certain that how extent the profit would expand when the employment of women is expanded. A report of Goldmansachs says “in many countries where there is already a high proportion of educated women who are not working, the potential economic boost from employing more of them does not necessarily come at a significant cost.Greater female employment has direct implications for household disposable income and savings, which have a trickle-down effect in terms of higher spend on education and health.”^[2]

Exhibit 3 shows when the women’s employment rate goes up, the GDP per capita goes up in OECD countries. When a woman works, total income per family increases and disposable income increases as well.

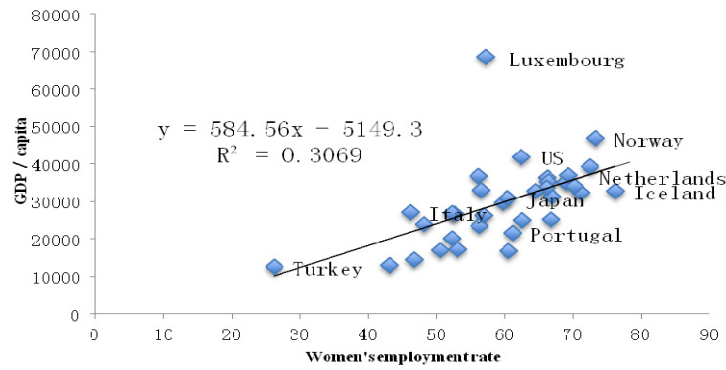
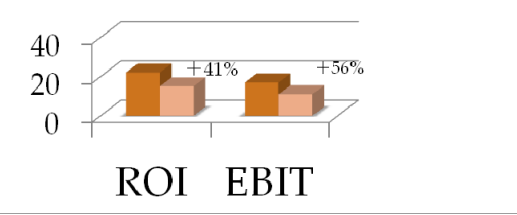


Figure 3 Women's Employment Rate and GDP
(source: calucrated with OECD statistics data 2010)

Mckinsey's report "Women's matter 2010" suggested the top-quartile companies in terms of share of women in executive committees from 2007 to 2009 show higher financial performance of this top-quartile companies with all-male executive committees. As for return on equity, the top-quartile group with companies exceeds by 41 percent the group with zero women. In terms of earnings before interest and taxes, the top-quartile companies exceeds by 56 percent.

Exhibit 4 Companies with a Higher Proportion of Women in Their Executive Committees have Better Financial Performance^[3]

- Companies in the top quartile for the women representation in executive committee vs. sector
- Companies with Zero Women in Executive committee in that specific sector



Source: Women's Matter 2010

TSE (Tokyo Stock Exchange) and METI (the Ministry of Economy, Trade and Industry) tackled jointly to designate enterprises that are encouraging women's success in the workplace as "Nadeshiko-brand" in February, 2013. 17 companies was selected as a Nadeshiko-brand. ^[4]

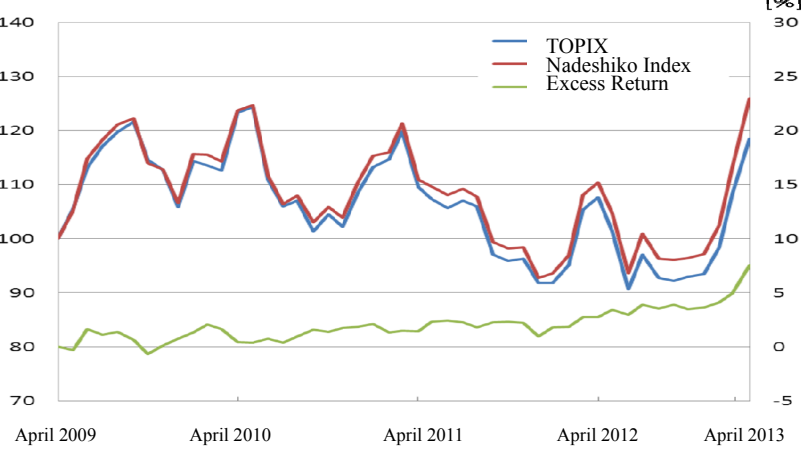


Figure 5 Performance of the Nadeshiko Brand in Tokyo Stock Excnage

Note: the excess rate of return was calculated by subtracting the rate of return on the TOPIX index of 72 stocks on the basis of the April 1, 2009 in the same period.

Source: Japan Cabinet Office Kyodo-Sankaku Number 56 April-May 2013 pp10

The Exhibit shows the performance of the top three enterprises (in total 72 stocks) that have high Nadeshiko index among 33 each industry in Tokyo Stock Exchange. "Nadeshiko index" is designated in order to promote the visibility to what extent companies would encourage women to play active role in the workplace. Compared with the TOPIX (:Tokyo Stock Price Index), high Nadesiko index enterprises tend to exceeds the performance of the TOPIX and their excess return expands almost consistently year by year.

Through the Nadeshiko Brand and index, METI is aiming to accelerate the efforts of listed companies for encouraging women's success showing that the investors who are interested in improvement of corporate value over medium to long term would like to invest the value added companies that promoting women's success.

The analysis shows the more gender diverse companies tend to have a higher performance than the companies with less gender diversity.

2.3 diversity triggers some innovation

Companies should utilize the variety of gender, age, ethnic, social and carriers so that they would obtain competitive advantages, foster innovation, minimize risks, and acquire productivity improvement.

In Japan, women are not participating in the labor market well or management positions in workplaces so there is a significant potential that should be pulled out.

By including in the female labor force, the Japanese economy might achieve a remarkable improvement in terms of innovation growth and productivity.

Japan, however, ranked at the bottom of the table of women senior management among 40 economies with just 7 percent occupied by the women according to the report of Grant Thornton.^[5] . Global average of women as percentage of senior management is 24 percent. China is the highest at 51 percent followed by Poland at 48 percent and Latvia 43 percent. The report says countries at top of the table for women in senior management such as China, Latvia, Vietnam, Thailand and the Philippines have high GDP growth for 2012 between 7-8 percent while the bottom eight countries for women in senior management such as Japan, the UK with 19 percent and the USA with 20 percent are also experiencing low levels of growth, with GDP in Japan (1.9%), the UK (-0.1%) and the USA (2.2%) in 2012. In terms of the company's board, G7 countries have just 16 percent of female board members while 26 percent occupied by women in the BRIC economies and 38 percent in the Baltic states.

According to "Equal Employment Opportunity Survey (Equity Research) of Japanese Ministry of Health, Labour and Welfare " in 2011, among the Japanese companies with 10 or more regular employees, 78.7% of the companies have more than one divisions with no or less than 10% female managers. 48.9% of the companies answered as a reason to no/less female managers "at the moment, there are no women with the knowledge, experience and ability of judgment." In addition, 16.3% answered "No one meets the enough job tenure", 15.0% answered "Women tend to have low seniority and retire before they become managers".^[7]

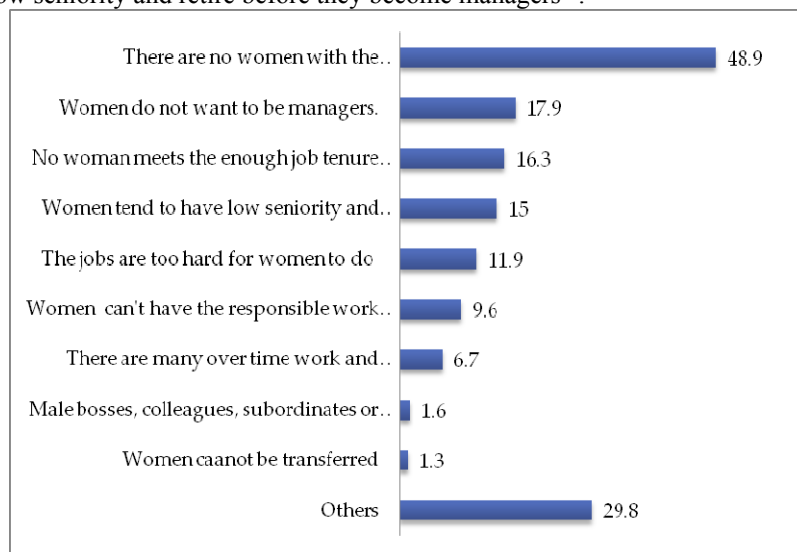


Figure 6 Equal Employment Opportunity Survey

Source: Equal Employment Opportunity Survey, Japanese Ministry of Health, Labour and Welfare, 2011

Why diversity is necessary to the current economy is stemming from the techno-paradigm shift.

Gibbons suggested in his thesis production of knowledge shifted from “Mode1” to “Mode2”

“The old paradigm of scientific discovery (‘Mode 1’) – characterized by the hegemony of theoretical or, at any rate, experimental science; by an internally-driven taxonomy of disciplines; and by the autonomy of scientists and their host institutions, the universities – was being superseded by a new paradigm of knowledge production (‘Mode 2’), which was socially distributed, application-oriented, trans-disciplinary, and subject to multiple accountabilities.”^[6]

Kodama indicated that innovation patterns shifted from technology breakthrough to technology fusion. “Recent innovations in mechatronics and optoelectronics make it more appropriate to view innovation as the fusion of different type of technology rather than as a series of technology breakthroughs.”^[8] The techno-paradigm shift requires different abilities from the past. Not only specialized knowledge but also interdisciplinary one will be needed to achieve innovations. Ways of thinking has been changed from Homo to Hetero, from uniform and standardized to diversity.

Valleys of Death or Darwinian Seas is a metaphor which separates research from product development. How to interlock two separated areas where asymmetry of information exists would be important for innovation.^[9] Among the institutional gaps and variety of stakeholders, management of diversity plays a pivotal role as well.

There are some examples of successful patterns of innovation incorporating management of diversity especially for women. Some product innovation and process innovation have been created by women from the female point of views.

Examples of Product Innovation

- Nissan motor company, after made an alliance with Renault S.A. of France, the diversity inside the company has increased ethnically and genderly. The company has promoted diversity management as a business imperative. For instance, one manager becomes in charge of two sections that interests conflict each other. To manage two different contradict business activities, managers would be trained for management of diversity. The company succeeded in developing new car incorporating female’s idea. Domestic market is shrinking because of low birth rate and aging society. 74 percent of wives are the decision maker to buy somethings in the family. When you decide to buy a car, 60 percent of decision makers are women, which is more than half. So, the company formed a woman team for to car product development in order to reflect women needs to the design.

For instance, Nissan Note adopted the rear seat doors open to 85 degrees so that it is easy to get in and out with children or children in a buggy. You can carry children very quickly and safely. This car achieved the best sales for five consecutive months sales among gasoline cars.^[10]

- A Japanese electronics maker, Toshiba corp. started a female managers development program. Ms Fukushima, the member of the inaugural class, was successful in the development of world first glasses free 3D televisions. The company is developing consumer electronics series from female point of views. For instance, capability of refrigerators in retention of vegetables’ freshness has been improved well.

- Kirin holdings company involved female staffs in liquor product planning. The staffs hit an idea of non-alcoholic beer women could drink during pregnancy and breast-feeding. Thanks to meet the needs of women, new markets has been successfully developed and replaced the shrinking beer market.^[11]

Process innovation

- Tenhiko launched web site for steel sales for overseas making use of female employees who have good English language skills but working as clerical work before. International sales have increased through the internet and a casual type of web design attracted people. The company’s amokestack image have changed and people regarded the company as a place that is easy to work. A number of applicants for the company has increased for both men and women from 20 applicants before web site started to exceeded 2000 in fiscal year 2011.

- Start Today Co.Ltd., the company running internet fashion and clothing mall called “Zozotown”, introduced 6-hour work (9:00 to 15:00) for all employees and it contributed to increase a productivity 25% year-on-year improvement. Women employees raising up their children came to feel easy to pick them up at nurseries. Some employees go and visit shops to search something in fashion after work which contribute to their business marketing knowledge.

Women engineers who came back to work after childcare leave organized “Customer Care Group”. During the daytime, they visited customers to understand market needs with sensitivities.

This activity contributed to the business development after that.

3 Conclusions, implications and actions

The analysis suggested that any companies and enterprises with gender diversity show higher performance than those with less diversity. It is said that diversity might boost economy and many economic indexes show them. Companies in Japan are providing many cases that female employees contributed to product innovation and process innovation. So that incorporating gender diversity might contribute to create innovation. However, rate of the Japanese women who are in the labor market is still low in Japan comparing to world average and rate of the women who are in senior management is still low as well and glass ceilings remain almost all the countries although the number of the female management is increasing in total. In order to enhance the gender diversity, many policy should be accelerated including positive actions.

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Research on Passenger Satisfaction and Behavioral Intention under the Situation of Flight Delay Based on SEM

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Abstract: Based on the survey data from passenger satisfaction questionnaire in the context of flight delay and using structural equation model, the factors impacting passenger satisfaction and their relations are investigated in the paper. The results show that: the travelers expect directly impact their satisfaction. The passengers want to affect the passenger behavior indirectly by the mediating variable called the passenger satisfaction. At the same time the expectation will also affect the passenger satisfaction through the mediating variable named perceived value and ultimately affect the passenger behavior. In this paper a service management model aiming to improve passenger satisfaction is proposed, including that the airlines and airports should take measures to meet the travelers' expectation, raise the service quality comprehensively to improve the passenger satisfaction and so on, to reduce and avoid the irrational behavior of travelers.

Key words: SEM; Flight Delay; Factor Analysis; Passenger Satisfaction

1 Introduction

With the development of Chinese economy, the civil aviation industry of China has seen rapid development. According to statistics, the number of registered civil aviation planes in China exceeded 600 in 2003, with the number of airplanes being about 1000. By the end of 2009, the total number of registered civil aviation airplanes increased to 1400, and the number of scheduled airlines was 1.5 times as many as it previously had been^[1]. Because of the increase of people's livelihood and the acceleration of living rhythm civil aviation has become one of the main transportation methods owing to its comfort ability and fast speed. While civil aviation is in its fast development phase, flight delay often occurs due to the lack of transportation capacity of airline companies and other reasons such as weather, traffic control in the air, air safety and so on. "Survey report of Air service consumer in 2011" which was released by China Consumers Association shows that complaints on airline service have become the biggest service complaints industry. 76.5% of consumers encounter delays which show that flight delay is widespread. Flight delay causes mismatch of transport service resources, and affect travel plans of passengers, service quality of air transport and enterprise image of air transport. Because of flight delay information lack of transparency and sharing, no emergency disposal and timely guidance scheme which lead to passenger group incident and bring negative effects to aviation safety. This article begins with the degree of satisfaction of passengers and conducts demonstrative research, in the end comes up with responsive suggestions.

2 Reference Overview

Through looking up in domestic and foreign references, it is found that researches on emergent conflicts between passengers and airline companies caused by flight delay are rarely seen abroad. This is mainly because although some European and American countries have different ways to regulate compensation for flight delay, most of them doesn't have compensation regulations for passengers. They only regulate in transportation conditions that airline companies should provide communication, transportation, food and accommodation and so on for passengers if a flight is delayed. Few of them specifically require compensation for flight delay, emergent conflicts between passengers and airline companies caused by flight delay have been hardly reported. Since 2000 emergent conflicts have gradually increased in China. Many researchers have conducted a number of studies, which have gained plenty of results. Lu Rong (2006) argued from the policy aspect that since China Civil Aviation Bureau released "Instruction for economic compensation caused by flight delay" in 2004, mass emergencies under circumstances of flight delay had gradually increased, and even become more drastic in recent years. The main reason lay in the discrepancy of compensation standards^[2]. Li Xiong believed that after flights were delayed, airports, air control authorities and airline companies have not properly exchanged related information, and that led to dissatisfaction of passengers, which further evolved to irrational

behavior such as beating related staff, sabotaging security facilities, jamming security entrances and soon^[3]. Zhou Haibin (2010) studied passengers' service remedy after flight delay. These literatures have too many descriptive studies which are lack of empirical studies on the influencing factors' relationship of passengers' satisfaction^[4]. Although Zhang Li (2006)^[5] studied the relationships of passengers' satisfaction and behaviors, he studied passengers' behavior intentions from passenger s' psychology and from negative emotions and he didn't study passengers' expectations, passengers' perception and passengers' perceived value. This study adopt structural equation model to analyze the causal relationship between passengers' satisfaction and behavior intention, according to actual situation of passengers' behavior when flight delay, from the related theory, the design of questionnaire, the construction of passengers' satisfaction and behavior intention of causal model.

3 Research Methods

Linear correlation analysis shows statistical relationship between two random variables which are in equal status and have no differentiation on independent and dependent variables^[6]. Although the traditional regression defined independent and dependent variables in models which can only provide direct effect between variables and cannot display possible indirect effects, appear the analysis results of overall and individual index negative which were unable to interpret because the reason of co linearity. Structural equation model is a causal method which constructs latent variable estimation and testing of latent variable which contains not only the latent variables which cannot be measured directly, but also the dominant variables which can be measured directly, which can handle multiple dependent variables, and compare and evaluate different theory model^[7,8]. Structural Equation Model is a method that establishes estimation of latent variables and proves the cause-effect relation between latent variables. It consists of Measurement Model and Structural Model. As for the relation between latent variables and exogenous variables, namely is called as Measurement Model.

4 Designation of Scales, Correlation of Data and Statistics of Samples

In order to secure the reliability of the questionnaires, we firstly had an interview with related people, and identified the main part of the questionnaires as well as the specific questions. Then we sent the questionnaires to experts in related fields, and asked them to give some suggestions, after that we modified the questionnaires based on feedbacks; secondly we had a test on the questionnaires among a small circle, further modifying the questionnaires; at last we came to a relation chart which describes the relation between satisfaction of passengers and their behavioral intention in case of flight delay. The whole chart consists of five sub-charts, and they are service expectation, service conception, conceptive value, satisfaction of passengers and passenger behavior respectively. The questionnaires adopted Linker five-point scale, 1 signals very unsatisfied, 2 refers to not very satisfied, 3 refers to normal, 4 refers to relatively satisfied and 5 refers to very satisfied. In this survey 220 questionnaires have been sent out, from which 183 questionnaires have been effectively returned, the rate of effective return is 83.18%.

It can be seen that the ratio is about 1:1 in terms of the gender of interviewees, educational level of them is above college degree, their age is about 40; 61.8% of them encountered flight delay occasionally, 21.7% of them often encountered flight delay. As a whole, the samples surveyed have universality and representativeness, and the results of the survey have strong reliability and persuasion.

5. Empirical Analysis

5.1 Exploratory Factor Analysis

We have used SPSS16.0 to analyze all 15 factors. Validity reliability analysis shows that Cronbach's alpha value is 0.806, indicates that the scale with good reliability. Each subscale reliability: perception value, passengers' behaviors, service perception, passengers' satisfaction, service expectation, Cronbach's alpha= 0.835, 0.793, 0.751, 0.938 and 0.829, all more than 0.70 and meet the requirements, and correlation coefficient of each item and latent variable is relatively high. Therefore, the scale has good reliability and consistency. Due to the latent variable measurement has good reliability which need expand further exploratory factor analysis. Exploratory factor analysis find out mainly degree of correlation^[9] which affect numbers of observed variable factor, each factor and observed variables. Using SPSS16.0 analyze all of 15 factors. From the results of the statistics we know KMO value is 0.844, the value of KMO and Bartlett's Test is 1573, so the sample data have passed test. This indicates that it is suitable for factor analysis. We use the Maximum Likelihood method as a factor extraction method and select the maximum variance rotation Varian method to obtain clearer factor solutions using the

variance maximization orthogonal rotation, Using Maximum Likelihood method as extracting method, we extract those shared factors whose factor loadings are bigger than 0.5 through Varian. After Several rounds of iterative principal component factor analysis, we find out that there are 5 eigenvalue that are bigger than 1, accumulative contribution rated has reached 85.46%. This indicates that the remained 15 variables can be explained through these 5 shared factors (passenger perception value, passenger behavioral intention, passenger service perception, satisfaction of passenger and passenger expectation respectively). Therefore the structural design of the variables in the questionnaire is reasonable.

5.2 Model fitting

While undergoing structural model fit, we must take into account the sample is less than 500, estimated using Generalized Least Squares (GLS) will get better results^[10], and the fitting indicators are shown in Table 1. Figure 1 is the initial path graph on passengers’ satisfaction when flights delay and behavior intention structural equation model.

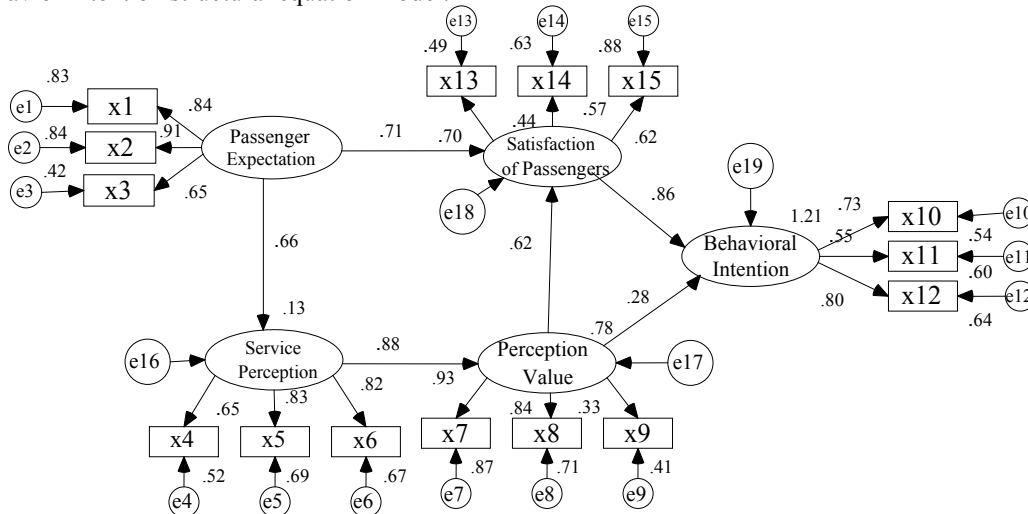


Figure 1 Flight Delays Initial Path Diagram of the Structural Equation Model

Table 1 The Parameter Values of the Initial Model Fitting Indicators

Indicator	chi-square	df	χ^2/df	GFI	AGFI	SRMR	RMSEA	CFI
Result	313	84	3.73	0.840	0.772	0.06	0.112	0.653

Exploratory Factor Analysis:We have used SPSS16.0 to analyze all 15 factors. From the results of the statistics we know KMO value is 0.844, the value of KMO and Bartlett’s Test is 1573, so the sample data have passed test. This indicates that it is suitable for factor analysis. We use the Maximum Likelihood method as a factor extraction method and select the maximum variance rotation Varian method to obtain clearer factor solutions using the variance maximization orthogonal rotation, Using Maximum Likelihood method as extracting method, we extract those shared factors whose factor loadings are bigger than 0.5 through Varian. After Several rounds of iterative principal component factor analysis, we find out that there are 5 eigenvalue that are bigger than 1, accumulative contribution rated has reached 85.46%. This indicates that the remained 15 variables can be explained through these 5 shared factors (passenger perception value, passenger behavioral intention, passenger service perception, satisfaction of passenger and passenger expectation respectively). Therefore the structural design of the variables in the questionnaire is reasonable.

Model modification:The further modified exponential model correction use Maximum Likelihood estimation method. Results of the model estimated parameters shows in Table 2. The modified model is shown in Figure 1.

Table 2 The Modified Parameter Values of the Initial Model Fitting Indicators

Indicator	chi-square	df	chi-square /df	GFI	AGFI	SRMR	RMSEA	CFI
Result	100.145	78	1.23	0.845	0.914	0.042	0.023	0.834

Based on the results of the assessment from the relevant fit index, the revised model chi-square statistic value is 100.145, df is 78, the chi-square / DF = 1.23 <3, indicating a better model fit. RMSEA 0.023 <0.05; GFI is 0.845, and the relative fitting index CFI of 0.834. The modified model indicators have reached the acceptable range, better fitting the structural equation model.

5 Conclusions

We have the following conclusions: (1) through factor analysis we get 5 shared factors: passenger behavior factor, service awareness factor, passenger satisfaction factor, service expectations. (2) We confirmed that visitors expect not only a direct impact on passenger satisfaction and passenger satisfaction through the mediating variables indirectly affect the behavior of passengers, but also find that the expectations of travelers will affect travelers perceived value and perceived value affect passenger satisfaction through the mediating variables ultimately affect the behavior of visitors, service perception perceived value and passenger satisfaction ultimately affect the behavior of visitors through the mediating variables.

According to the conclusions of this study, we propose service management model to improve passenger satisfaction. On one hand, traveler expectation indirectly affects passenger behavior through the mediating variable passenger satisfaction, after flight delays, airlines and airports should adopt management model that is consistent with travelers expect service. The civil aviation passengers select civil aviation as travel transport due to the improvement of living standards and a decline in ticket prices, different travelers face the same kind of service failure, and the intended purpose may be significantly different. For example, when flight delays, some travelers hope to get free tickets or discounts and other compensation, other travelers hope the airline can contact other flights to leave as soon as possible. For the different expectations of different travelers, airlines should treat differently. On other hand, airlines and airports want to improve all-round quality of service in order to improve passenger satisfaction. For example, provide human services in the transfer flight, waiting and flight delays. Due to the special nature of the civil aviation, flight delays are inevitable, it is necessary to establish the emergency response mechanism to refine service.

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The Construction of Quality Management System of Commissioned Audit in Higher Education Institutions' Construction Projects

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Abstract: Commissioned audit in higher education institutions' construction projects has become a main form of project audit, so as to realize specialization, socialization and refinement. But there still exists the problem on the assurance of audit quality. Based on the agency theory, this paper proposes the concept of the whole process management and constructs a quality management system of project commissioned audit in the process of early, middle and later phase of management, which covers the selection of agent, the design of optimal incentive contract, interim regulation and the afterwards evaluation.

Key words: Construction projects; Quality management; Commissioned audit; Agency

I Introduction

With the development of higher education in China, higher education institutions increased the investment in infrastructure construction. In order to save construction funds, standardize management, prevent corruption, the construction audit as an extension of the Internal Audit has developed rapidly. The report of university internal audit qualification audit issued is lack of engineering qualification, cannot meet the audit requirements of construction projects. To resolve this contradiction, university construction projects commissioned audit emerged. Chinese Ministry of Education issued "the Opinions on Strengthening the Whole Process of Auditing on Standardized Construction Project" on January 3, 2008, which officially includes the commissioned audit for university construction projects by using of the university audit approach. Social audit in construction projects is implemented by means of entrusting the construction project audit services to the engineering cost consulting companies and other institutions, which has become the university's general audit mode.

The university construction project audit provides the fresh blood for traditional internal audit, so as to realizing specialization, socialization and refinement of the construction project auditing. The driving force of social audit institutions entrusted with auditing is to make profit. From the university's standpoint, commissioned audit is facing a major problem of strengthening audit quality control and management to ensure the qualities of audits for university construction projects.

As to the current audit market of commissioned Chinese construction projects, engineering cost consulting companies and other social auditing institutions varies greatly. As the qualification requirement for practitioners is not high, who employed different levels of expertise, so it is difficult to ensure the quality of the audit commission. Construction projects commissioned audit was commissioned by the typical agency relationship, and exists the problems of information asymmetry and moral hazard; the immaturity of construction projects commissioned audit market, lack of credibility of the system of monitoring and surveillance, and so on. At present, the research on construction project commissioned audit quality control, is mostly discussed in the special aspect. For example, Zhu Feng (2007) studied the incentive contract arrangements and external oversight mechanisms on unique features, the inherent limitations and the role of both the law and the internal mechanism, which plays an important role in promoting audit quality and auditor independence^[1]; Ren Liang (2008) analyzed the interactive relationship between audit parties based on the game theory, and provided the countermeasures of the fraud audit quality control^[2].

Through in-depth study and practice, the author believes that construction management and control of project commissioned audit quality during the whole process of commissioned audit formed a system. Based on this point of view, under the early, middle, late management context of construction project commissioned audit, the author uses some idea of the principal-agent theory and game theory, and try to build construction projects commissioned audit system.

2 The Reference of Principal-Agent Theory

Principal-agent theory is the one of the main theory of institutional economics contract. The main research agency relationship refers to one or more actors designate, hires some actors servicing for them, while the latter must be granted the right decision, and according to the quantity and quality of services the corresponding reward is provided to pay under an express or implied contract. The one who authorizes is the principal, who is authorized is the agent.

Agency relationship is originated in the existence of "professional". "Professional" may occur a relationship that the agent may take the action because of the relative advantage. The modern sense of agency concept was first proposed by Ross: "If the parties, in which an agent acting on behalf of the interests of the principal party to exercise certain decision-making powers, then the agency relationship may formed." Unlike the traditional principal-agent theory from the perspective of microeconomics, analyzing the agency relationship in enterprises and between different enterprises, which explains some of the organizational phenomenon, and the general microeconomics construction projects commissioned audits are typically commissioned - - agent relationship, which involves two principals- the principal (university) and agents (fiduciary audit unit). Since the existence of specialization, compared with principal, agent has more relatively professional advantage in the exercise of agency business on behalf of the principal duties of the audit.

Agency relationship is a contractual relationship, and the contractual relationship is built on the premise of asymmetric information. In the process of project audit, audit unit entrusted has a more comprehensive grasp of the audit of the whole project, with more information and control, however, as the principal, higher education institutions has incomplete information, which means they need to take more risks. According to the principal-agent theory, for asymmetric information of both sides, and the different target in the project, the audited entity entrusted makes decisions following the principle of maximizing their own interests that may harm the interests of higher education institutions. As to the audit of the business project, discreditable behavior audit unit entrusted mainly lies in following several aspects: (a) the irresponsible and inefficient audit process. (b) fraud in audit process, instead of rigorous practice. (c) more worse thing is that the entrusted and the audit of the audited entity conspired to deceive the delegator to reach the purpose of making profit. In dealing with these risks, the establishment of an effective monitoring mechanism is particularly important.

Principal-agent relationship cannot avoid supervision. In fact, with the asymmetric information, the principal level of understanding of the agent's information can be selected by the principal himself. For example, by hiring supervisor or spending more time and energy, the principal may get more information about the agent to some extent. Thereby, it is necessary to strengthen incentives and supervision of agents. However, the acquisition of information will cost, so the client is facing problem of selecting the optimal supervision[3].

The classical economists thought marginal productivity depends on the worker's wages. But the development of the economists found that, in developing countries, the relationship between the two appears to be just the opposite: marginal productivity depends on the wage. And this phenomenon also exists in the developed countries. Solow(1979) and Shapiro and Stiglitz(1984) regarded higher wages as incentive approach to prevent laziness. When companies can not fully monitor the behavior of workers, wages become an opportunity cost of a lazy worker who is identified and dismissed. The higher wages, the greater opportunity cost. Therefore, higher wages help to reduce the tendency of workers' laziness. On the other hand, as to discussing the supervision problems in incentive wage model, we found that the higher the marginal productivity of agents, the higher the marginal revenue brought by supervision, and the higher principal motivation to supervision; The higher the marginal cost of the agent's effort, the lower supply of the given stimulus efforts under, and the lower of observing the behavior of the given information agents under the variance optimal incentive to monitor, the lower the marginal revenue, naturally, the principal supervision enthusiasm is lower; In addition, the more difficult supervision, the higher marginal cost, and supervision of the principal motivation is also lower..

3 The Choice of Agent

3.1 Adequate market research

The market of current construction project audit is basically controlled by the commissioning party audit, there are many cost consulting company, project manage companies and units with engineering audit qualifications. Enterprises compete fiercely with various means to contract business. Some reduced costs, some proposed to reduce audit time, and some contacted higher education institutions'

audit department through a variety of channels with the hope of providing commercial rebates. How to select best fiduciary audit unit fair, merit while limiting the risk of internal audit department, is becoming a problem that the university construction projects commissioned audit should face. As the saying goes, “seeing is believing”, the choice of agents should be based on sufficient investigations and studies, with a clear awareness of the proposed participation in competitive agent.

3.2 Bidding option

Selecting an agent bidding is necessary for an open, fair and just competition. Bidding determines the finalists units and establishes agent qualification library. Constructing project commissioned audit was commissioned by the service class, the price is an important factor in competition, but not the decisive factor, so it can take the qualification of storage, classification alternatives. The project cost consulting unit library is established through bidding. In the bidding process, technical standards are mainly focused on appraisal agencies, corporate reputation, performance, registered professional personnel, quality management system, financial condition, etc. All construction projects audit work shall be borne by the intermediary staff in the library. According to the scale of audited project, small projects commissioned are decided by the rotation, medium-sized projects by lottery number, large projects by fully understanding of advisory body’s cost of the qualification, credit status, results, business expertise and operational personnel composition, etc. Inviting reputable audit intermediary bank, and capable engineers of the Commission to participate in the bidding, means taking two finite invitations for public bidding in order to choose the best cost consulting company. Such ways are shown in the following table:

Table 1

Commissioned audit project amount	Entrustment
Below 2 million yuan	Rotation
2 million yuan to 5 million yuan	Determined by lottery
Above 5 million yuan	Secondary bidding

4 The Optimal Incentive Contract Design

According to principal-agent theory, in the environment of interests’ conflict and asymmetric information, the client should design the optimal contract incentive agent. The construction project implements audit entrusted audit contract according to the benefits of contract pay standard received from client. In modern economic activities, economic leverage should be the core of the optimal contract incentive agent, namely the pay standards.

When information is asymmetry, agent of income with the likelihood ratio varies, so the reasonable must fully embody the incentives of the agency contract, find appropriate likelihood ratio. Construction project commissioned audit the likelihood the ShenJian rate. Set ShenJian rate for B, are:

$$(1) B = S \text{ (amount) submitted} - D/S \text{ (authorized amount)}$$

ShenJian rate B can be viewed; its value can measure agent’s ability and working effort. Contract for construction project commissioned audit standards should be associated with ShenJian rate B [4]. Set the amount to be paid F settlement entrust audit contract, we can get pay with incentive factor model:

$$(2) F = B * b + M$$

Type: b for incentive factor (fixed or interval), and each additional unit increase in unit B, F b embodies the incentive role of agent. M for fixed payment, only related to the project scale and should change with engineering scale, authorized amount D reflects the engineering scale, namely, $M = f(D)$. Make M starting values for, a corresponding to the D value of D, when $0 < D \leq D_0$ or less when $M = a$; When $D > D_0$, M should be with the increase of D. The author believes that through practice D's positive contribution in the M should decline, diminishing ln function can be used to describe this relationship. (1) can be formulated as:

$$(3) F = B + a * B = 1 + (\ln - \ln D) D > D (D)$$

Type: According to the regional actual situation, b, a, d values should be, generally speaking, in 4% to 6% advisable, b d according to the requirement of the public bidding for 2 million yuan, is a value of ten thousand yuan(0.5 0.8).

Values of a and b, should reflect the cost of agents. And agent cost can neither be estimated beforehand, nor observed accurately afterwards. But as a general rule, engineers with high level can conduct a high quality audit, so the pay will also be higher accordingly, i.e. the

agent cost will be corresponding one, d, b should also be high correspondingly only for reasonable values.

5 Tracking and Monitoring

First, conduct the management under the principle of the program contract. Audit commission contract is the foundation of university construction project audit work. The rights and obligations are regulated by audit contract, so the responsibility is born by higher education institutions and the audit units, and is mainly based for final submission of audit results and audit fees. Special provisions in the contract must make it clear that who is responsible for audit, who is the trial cost engineers, what are audit schedule requirements, auditing and audit quality issues punitive measures proposed after the audit recommendations.

Secondly, combine the work content and delegate fees with quantitative management. Provincial price administration departments have developed a construction cost consulting services fee standards. Such as the Hubei Provincial Price Bureau in 2000 document No. 81 provides a standard for construction of the first audit-related fees, and changed in 2011 document No. 23. According to the specific implementation scope and its corresponding work content of the commissioned audit on the construction project, it should be paid one by one

Again, the special person is involved in supervision and management. Determine the specific involvement of internal audit staff to track the entire delegate audit work. Remand the whole process of quality control from the data, which transferred to the process management and coordination, report re-examination. Selected internal audit staff should handover the written project settlement information to advisory body first. At the same time, introduce the general situation of the construction project and project management, and put forward some problems in the engineering settlement audit; accomplish the supervision, inspection and control in the process of work. On the one hand oversight the schedule time according to the contract; on the other hand to check audit working papers irregularly and supervise the quality and quantity to complete its audit of the project. Questions raised by the audited entity entrusted, answered by the internal audit department staff contact the school site personnel infrastructure management, on-site person in charge of the construction unit representatives to the audit department. Ensure that all key aspects of internal audit were participated by universities' staff, to fully understand the situation and prevent the audited entity entrusted contact closely with the audited entity, and help to maintain interests of the school.

6 Regulatory Discipline

At the same time, strengthen government supervision. Such as national audit institutions audit periodically checks each dispatch various social audit advisory report issued by the agency. And regard the sampling results as the evaluation of social audit institution which can be continued to engage in construction projects based on project audits, or should be punished by penalties in accordance with sampling results. Increase government oversight force.

7 Conclusions

After the audit for large construction projects, the audit unit will handover outcome document. The internal audit department will evaluate the project, such as: the professional ability of engineer, the audit team's work attitude of the audit units, cooperation, audit time, communication and coordination ability, the reducing rate; The following measures can be taken: if failed to complete the audit of the quality requirements of the contract audit content, they should no longer be engaged in auditing business entrusted for 2 years; and if causing some economic loss to the university or universities, they should also be investigated due to their respective responsibilities.

Establish institutional repositories annual appraisal system. At the end of each year, the university organized internal related units to make a special audit assessment evaluation for the consulting audit company. According to survey results at the end of the year, the poor assessment units will be eliminated, then the secondary invite bidding units will be decided. If social intermediary organizations in the assessment are determined to be ineligible, they shall not be entrusted to engage in audit operations for 3 years. Those who violate the state laws and regulations, professional ethics, principle of avoidance, or have fraud, collusion, or tell secrets and other major violations, or obtain commissioned audit by the business through improper means, as well as have other problems spotted by departments in afterwards audit inspection, causing loss to the school and having adverse effects, will not allowed to entrust their

business in auditing, and will be notified to relevant authorities.

The quality of construction project audit can only be ensured by constructing the model, the construction of commission audit system, global management, effective supervision and coordination .

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Employee Motivation and Satisfaction in Niger: An Application of the Job Characteristics Model

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Abstract: The study examined the role of job dimension in determining the motivating potential score of the employees and compared the motivation of different sectors in Niger and also compared Niger employee's motivation and other place employee's motivation level. A sample of 120 employees of 3 sectors in Niger was surveyed using the job diagnostic survey and the scores were compared with the normative data established by Oldham, Hackman and Stepina using nine job families. The study revealed that the job dimensions highly influenced the motivating potential score. The study also revealed the presence of significant differences between the sectors and between Niger companies and Oldham, Hackman and Stepina normative data.

Key words: Motivation; Job characteristics model; Core job dimensions; motivating potential score.

1 Introduction

Employee motivation is one of the key variables that provide systematic opportunity for an organization success in all areas of its operation. Noteworthy is the fact that no matter how sophisticated an organization is (i.e. high degree of automation) it requires the services of human labor, therefore it is the human labor that serves as a locomotive engine for the attainment of organizational objectives. It is on record that organizations that perform excellently in the competitive market are those who have highly motivated staff; hence the ability of an organization to excel and perform well depends squarely on how it designed its motivational strategy.

This paper attempts to evaluates employee motivation in Niger through applying job characteristics model, Most studies on motivation were conducted in advanced countries with notable exception of the few, therefore this study will contribute to the stream of literature by focusing on small country with less managerial expertise. Three notable sectors namely; banking, telecommunications and mining industry were examined and the findings indicate high motivation potential score for the telecommunication sector followed by the banking sector and mining sector the last.

The rest of the paper is structured as follows; section 2 presents Hackman and Oldham theory, which describes job characteristics that promotes high performance. Similarly, this section presents motivating potential score (MPS) which serves as a basis of comparison between the sectors and even departments, section 3 presents methodology, section 4 presents the empirical results, while section 5 concludes the paper.

2 Presentation of the Theory and the Related Research

Hackman and Oldham developed the theory that the job itself should be designed to possess fundamental characteristics needed to create conditions for high work motivation, satisfaction and performance. The concepts of their Job Characteristics Theory are diagrammed in Figure 1.

Hackman and Oldham began by searching for the basic psychological states that promote high-performance motivation and satisfaction at work. The three conditions they suggested were: (a) a person must experience the work as meaningful, as something which is generally valuable and worthwhile; (b) a person must experience responsibility for the results of the work, that is, he /she must feel personally accountable and responsible for the work results; (c) a person must have knowledge of the final results of the work being done, that is, he/she must understand the effectiveness of his/her job performance. For the development and maintenance of strong internal work motivation, Hackman and Oldham (1975) assert that it is necessary for all three critical psychological states of experienced meaningfulness, experienced responsibility, and knowledge of results to be present^[1]. Since the three critical psychological states are, by definition, internal to persons, they cannot be directly manipulated in managing work. Therefore, the authors began with the question of how the critical psychological states could be created. They identified five core job characteristics of skill variety, task identity, task significance, autonomy, and feedback as reasonably objective, measurable and changeable properties of work, and that foster the desired psychological states, which in turn motivate positive personal/work

outcomes. They further suggested that skill variety, task identity, and task significance contributed to the experienced meaningfulness of the work while autonomy accounted for experienced responsibility, and feedback established knowledge of work results. A job high in motivating potential must be high on at least one of the three job characteristics that prompt experienced meaningfulness, and high on both autonomy and feedback, to create conditions which foster all three critical psychological states (Hackman and Oldham, 1980, p.81). The overall motivating potential of a job can be determined by the computation of a motivating potential score, which is calculated as illustrated below:

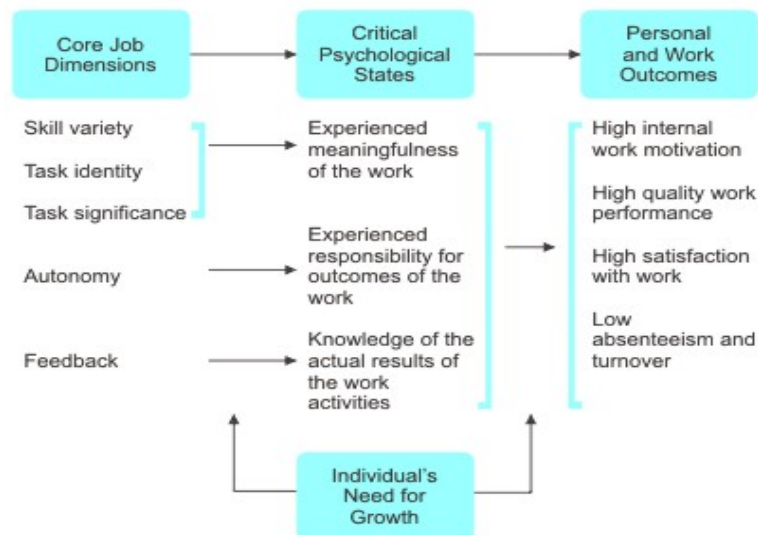


Figure 1 The Relationships among the Core Job Dimensions, the Critical Psychological States, Personal/Work Outcomes, and Moderators^[2].

2.1 Motivating Potential Score: $(\text{Skill Variety} + \text{Task Identity} + \text{Task Significance}) / 3 \times \text{Autonomy} \times \text{Feedback}$

The motivating potential score provides a quantitative diagnosis of the job situation in question by means of the scores obtained from the Job Diagnostic Survey. In summary, the Job Characteristics Theory of Hackman and Oldham asserts that a job will be meaningful to an employee to the extent that it requires a variety of skills, involves the completion of a whole and identifiable piece of work, and has significance for the lives of other people; it will foster feelings of personal responsibility to the degree that it provides the employee autonomy in selecting the methods for carrying out the work; and it furnishes the employee knowledge on which to judge the effects of his or her efforts if it is arranged to allow such feedback. Thus, the motivating potential of a job, as elaborated by the five core job characteristics, are said to affect the three critical psychological states, which, in turn, are essential ingredients of the employee's internal work motivation and other positive personal/work outcomes.

2.2 Definition of Terms: Hackman and Oldham provide the following definitions

Core Job Characteristics refers to objective properties of Skill Variety, Task Identity, Task Significance, Autonomy, and Feedback that contribute to the work effectiveness and satisfaction of employees. Critical psychological states refer to the Experienced Meaningfulness of Work, Experienced Responsibility for Work Outcomes, and the Knowledge of Work Results.

Motivating Potential Score refers to a single summary index of the degree to which the objective characteristics of the job will prompt high internal work motivation.

Skill Variety is the degree to which a job requires a variety of different activities in carrying out the work, which involve the use of a number of different skills and talents of the employee

Task Identity is the degree to which the job requires the completion of a "whole" and identifiable piece of work (i.e.; doing a job from beginning to end with visible outcomes).

Task Significance is the degree to which a job has a substantial impact on the lives or work of other people whether in the immediate organization or in the external environment.

Autonomy is the degree to which the job provides substantial freedom, independence, and discretion to the employee in scheduling his or her work and in determining the procedures to be used in carrying it out.

Feedback refers to the degree to which carrying out the work activities required by the job results

in the employee obtaining information about the effectiveness of his or her performance.

Knowledge of Results refers to the degree to which the employee knows and understands, on a continuous basis, how effectively he or she is performing his or her job.

In 2010, using the JCM in Chennai (India), Doms found that, the job dimensions highly influenced the motivating potential score [3] and also shown significant differences between his data and the normative data of Oldham, Hackman, and Stepina.

3 Methodology

Through the job characteristic model that we have presented, we analyze the employees' motivation and job satisfaction in Niger. The data for the study were based on a survey of 120 respondents from various departments of 3 sectors banking telecommunication and mining industry. These departments are: Professional or technical, managerial, sales clerical and machines trades. The respondents were asked to answer 23 questions about their job. For each question they give a score from 1 (very non descriptive) to 6(very descriptive). Then we use this information to calculate the score of the five core job dimensions we use to calculate the MPS for our analysis. We also use in the study data provided by Oldham, Hackman, and Stepina. The table 1 presents the data that we have collected.

Table 1 the 5 Core Job Dimensions the Internal Motivation Pay Satisfaction and the MPS of Different Department of the 3 Sectors

Variable	Banking					Telecommunication					Mining			
	Pr	Man	Sal	Ser	Clr	Pr	Man	Sal	Ser	Clr	Pr	Man	Clr	Mach
Skill Variety	5.4	5.8	4.2	4.9	3.8	5.2	5.6	4.3	5.0	3.6	3.0	5.5	3.5	3.2
Task Identity	3.9	5.1	4.4	4.0	5.0	4.9	4.3	4.3	4.1	5.2	2.8	4.7	5.4	5.3
Task Significance	5.0	5.9	5.5	5.7	4.2	5.7	5.8	5.9	5.8	4.2	4.9	5.7	4.0	4.2
Autonomy	4.8	4.2	4.3	4.8	3.8	5.2	4.2	4.2	4.9	3.8	4.7	4.2	3.7	3.0
Feedback	5.0	5.2	5.4	5.3	3.8	4.9	5.2	5.8	5.2	3.7	5.1	5.0	3.6	3.2
Internal Motivation	5.0	5.2	5.5	5.7	5.5	5.3	5.4	5.7	5.7	5.2	5.6	5.1	4.9	4.2
Pay Satisfaction	4.8	4.6	4.9	5.2	4.5	4.7	5.4	4.8	5.3	4.0	4.9	4.6	4.2	4.0
MPS	114.4	122.3	109.1	123.8	62.6	134	114.3	117.7	126.6	60.9	85	111	57.28	40.64

Man: Managerial; Clr:Clerical; Sal:Sales; Ser:Services; Pr:Processing; Mach: machine trades.Result

4 Result

4.1 Result 1

The comparison of the MPS score in the 3 sectors reveals that the MPS in telecommunication sector is the highest. It is just a little higher than the MPS in banking and they are both higher than the MPS in mining industries that is very low. The table 1 and figure 1 show these differences.

Table 2 MPS in the 3 sectors

Sector	Banking	Telecommunication	Mining
Mps	106.44	110.7	73.48

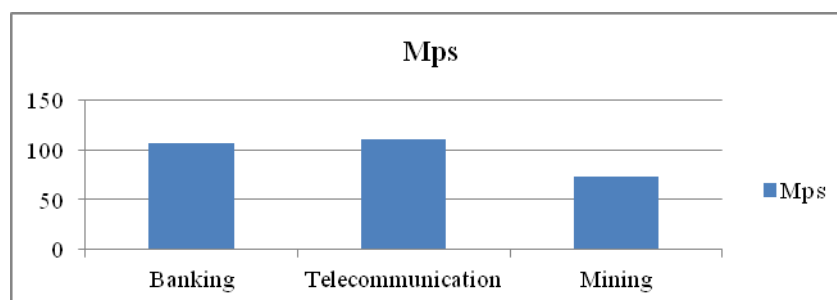


Figure 2 The MPS in the 3 Sectors

4.2 Result 2

The comparison between different departments in the 3 sectors shows that the MPS is higher for professional, sales and services in telecommunication than in bank. But it is higher in managerial and clerical in banking than in telecommunication. In the entire department Mps is higher in banking and

telecommunication than in mining industry. The figure shows these variations.

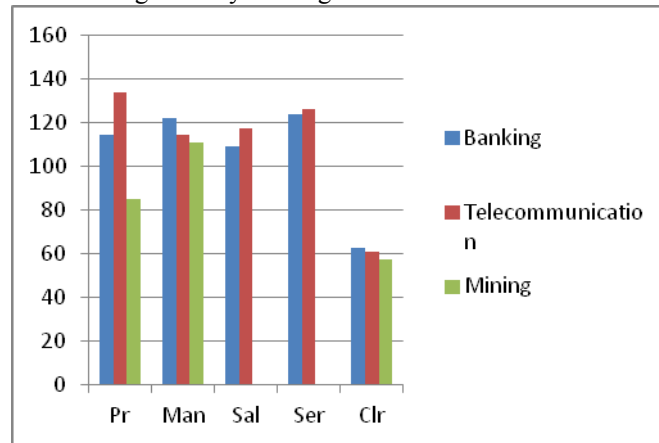


Figure 3 MPS of Deferent Department of the 3 Sectors

4.3 Result 3: Comparison with normative data

In an effort to establish a meaningful perspective of the data collected for this study, the means for the job were compared to normative data established by Oldham, Hackman, and Stepina (1979). The normative data are based on the results of studies involving 6,930 employees holding 876 jobs in 56 organizations. The jobs included in those studies were highly heterogeneous and divided into nine job groups established by the Equal Employment Opportunity Commission (EEOC) and defined in the Dictionary of Occupational Titles (DOT) published by the U.S. Department of Labor. Table 3 presents the core job dimensions and motivating potential score of the present study and that of the five job groups proposed (only five out of nine were considered for this study) by Oldham, Hackman, and Stepina as normative data.

Table 3 Comparison of the MPS Between the Job Dimensions of the Study and the Five Job Families Used by Oldham, Hackman, and Stepina^{[4]-[5]}

	Banking	Telecom	Mining	5 job families(Oldham et al)
Pr	114.4	134	85	105
Man	122.3	114.3	111	156
Sal	109.1	117.7		146
Ser	123.8	126.6		152
Clr	62.6	60.9	57.28	106

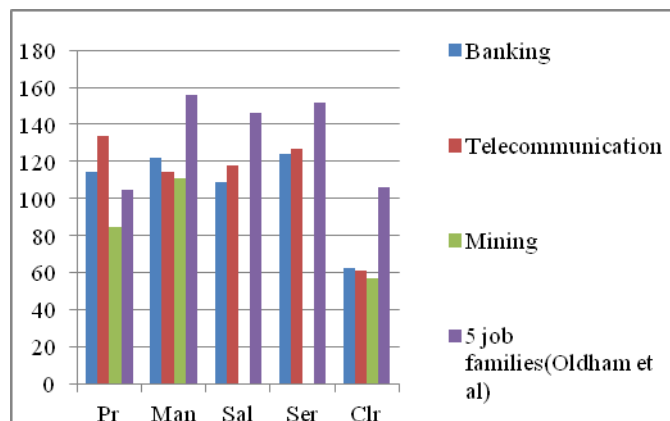


Figure 3 Variation of the MPS in Department of this Study and the Five Job Families Used by Oldham, Hackman, and Stepina.

The MPS of the study is higher in professional than in the normative data of Oldham, Hackman, and

Stepina. But in all the rest of the sectors the MPS of the normative data is higher.

5 Conclusions and Discussions

The following conclusions can be drawn from the results of this investigation:

1) Employees felt most strongly about their sense of work responsibility due to the autonomy experienced in doing the job.

2) Employees felt least strongly about the meaningfulness of their job due to the degree in which they felt the job required a variety of different activities, allowed for the completion of entire tasks, and the impact the job has on the lives of others.

3) Employees indicated a strong desire to experience stimulating work and the opportunity to exercise creativity and independent thought; however, their feelings towards the core job dimensions produced a low motivating potential score.

4) A job high in motivating potential must be high on at least one of the three job dimensions (skill variety, task significance, task identity) that prompt the psychological state establishing an employee's feelings of meaningfulness in his or her job.

5) A job high in motivating potential must be high on autonomy to instill the psychological state that establishes an employee's feelings of accountability and responsibility in his or her job.

6) A job high in motivating potential must be high on feedback to instill the psychological state that establishes an employee's awareness of how effectively he or she performs the job.

7) The professional of banking and telecommunication in Niger are more motivated than those in the normative data but in general employees of the normative data are more motivated than in Niger.

These variations can be explained by the cultural differences.

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Study on Innovative Development Strategy for the Private Economy of Wuhan of China

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Abstract: Wuhan's private economy accounts for approximately 50% of the city's economic aggregate, but is facing unprecedented challenges and competition pressures against the backdrop of current economic globalization and the global financial crisis, insufficient development remains the biggest issue, this is most prevalently shown by the low economic aggregate, low proportion, small size, slow development, low degree of industrial agglomeration and imperfect social service system. This paper suggests that we shall tackle these problems by adhering to innovative development concepts, raising management ability, perfecting the service system, remedying the difficulties in financing, increasing policy support, optimizing the development environment and other measures, so as to promote innovative and sustainable development of Wuhan's private economy.

Key words: Private Economy; Scientific and technological innovation; Management innovation; Institutional innovation; Mathematical analysis

1 Introduction

The private economy is an important supporting strength for economic development in Wuhan. Since the "11th Five-Year Plan", Wuhan's private economy has been developing and growing stronger rapidly in terms of market competition, significantly contributing to the construction of Wuhan as a national central city. At present, research on the development of private economy countermeasures are more concentrated at the theoretical level, such as the significance of the development of private economy, strategy, corporate culture, and human resource management. Area studies are less, especially with regard to the development of private economy in Wuhan. In light of this, strengthening the study on innovative development of the private economy is fundamentally important in both theoretical and practical terms.

2 Theoretical Bases for Innovative Development

"Innovation" is a concept put forward by the economist Joseph Schumpeter, who thought that innovation is "to establish a new kind of production function", that is, introducing a "new combination" regarding production factors and production conditions which had never existed before into production system. Schumpeter thought that the main driver of innovation are entrepreneurs and the entrepreneurial spirit, his theory on includes two kinds of fundamental types, technological innovation and institutional innovation; the theory of technological innovation deems technological progress and innovation as the decisive factors for economic growth, while the theory of institutional innovation argues that technological progress plays an important role in economic development, however the theory that really plays a vital role is institutions, which exert an influence on economic development through property rights, benefit distribution, decision-making, coordination and other mechanisms. Peter Drucker (Peter F. Drucker) is also on the innovation theory, try to innovation and entrepreneurship as a purposeful, systematic knowledge to interpret its inherent law.

3 Main Results of Innovative Development of Wuhan's Private Enterprises

3.1 Continuous growth in size and strength

In the economic take-off stage, the accumulation of capital occupies the center position. In 2011, the private economic subjects registered in Wuhan were 548,700 households, with year on year growth of 14.9%. The private economy achieved an added value of RMB 277.68 billion Yuan, increasing by 12.8%, accounting for 41.4% of Wuhan's GDP, boosting GDP by 5%; private investment amounted to RMB 196.398 billion Yuan, increasing by 24%. Private investment accounted for 46.2% of the total investment in fixed assets, becoming an important force in the social investment in Wuhan.

3.2 Continual improvement of its comprehensive quality

The industrial field has been gradually expanding. From 2008 to 2011, the industries with obvious increases in terms of the proportion of actual private enterprises in Wuhan were communication and

transportation, warehousing and post services, information transmission and others, indicating that private economy made rapid development in the new fields (details are shown in Table 1).

Table 1 Sub-Sector Proportion of Actual Private Enterprises in Wuhan (2008-2011) Unit:%

Industry Classification	2008	2009	2010	2012
Agriculture, Forestry, Animal Husbandry, Fishing	0.93	1.01	1.07	1.20
Mining		0.03	0.03	0.03
Manufacturing	9.79	8.98	8.37	7.80
Production and Supply of Electricity, Gas and Water		0.11	0.12	0.12
Construction	8.13	8.34	8.65	9.24
Communication and Transportation, Warehousing and Post Services	2.57	2.66	2.78	2.84
Information Transmission, Computer Services and Software	3.83	4.06	4.17	4.34
Wholesale and Retail	35.36	34.36	33.85	33.25
Accommodation and Catering	1.68	1.62	1.53	1.48
Finance Industry		0.32	0.29	0.30
Real Estate	4.45	4.45	4.65	4.63
Leasing and Business Services	15.52	16.46	17.09	17.27
Scientific Research, Technology Services and Geological Surveys	11.94	12.34	12.48	13.07
Water Conservancy, Environment and Public Facility Management	0.54	0.50	0.44	0.38
Residential Services	3.47	3.30	3.02	2.58
Education		0.12	0.10	0.09
Health, Social Security and Social Welfare	1.03	0.18	0.18	0.19
Culture, Sports, Entertainment	0.74	1.15	1.17	1.19

Source of data: Edited by the Wuhan Municipal Statistics Bureau, Wuhan Statistical Yearbook-2012.

Year on year the number of listed companies are increased. By the end of 2011, the total number of private listed companies in Wuhan had reached 18, adding 8 to the total number in 2008; private listed companies accounted for 40% of the total listed companies, increasing by almost 10% from 2008.

3.3 Constant enrichment of innovation carriers

In 2011, the number of business incubators above the municipal level in Wuhan reached 65, 13 of which were national level business incubators, developing technological number 3,678, a large number of science-and-technology enterprises with good development prospects grew and developed into back-up listed enterprises. At present, 75 municipal engineering and technological research centers and 70 municipal enterprise research and development centers have been established, 80% of which depend on private science-and-technology enterprises.

3.4 Constant perfection of innovation policies

The speed of private economic development is closely related to national and regional systems and policies, the ideological preferences and policy orientation of the local government have a significant influence on private economic development and path selection. In recent years, the Wuhan Municipal Party Committee and the Municipal Government have introduced some policy documents in succession, including The Opinion of the Municipal People's Government on Further Supporting Construction and Development of Science-and-Technology Business Incubators and The Opinion of the Municipal People's Government on Further Encouraging and Supporting Development of the Private Economy, providing a strong guarantee for guiding and promoting innovative development of the private economy.

4 Problems in the Innovative Development of Wuhan's Private Economy

From a macroscopic view, the private economy of Wuhan has made great progress, but in recent years, the absolute value of the economic aggregate has not been big, its development speed is slowing

down, with its proportion in Wuhan's GDP stagnating. Especially compared with some areas of its kind, development speed, economic aggregate and economic aggregate proportion all lag behind relatively. (Details are shown in Table 2)

Table 2 A Comparison of the Development Situation of the Private Economy in 2009

Item	Wuhan	Guangzhou	Hangzhou	Chengdu
Private Economy Achieved GDP (RMB in hundred million yuan)	1852.43	3164.44	2676.8	2389.1
Proportion in Regional GDP (%)	40.60	52.6	64.5	53.1
Number of Private Enterprises (tens of thousands)	12.88	23.8	14.1	16.3
Individual Businesses (tens of thousands)	43.57	36.9	28.5	59.9
Gross Total of Taxes Paid in Private Economy (RMB in hundred million yuan)	192.05	491.2	370.77	236.5
Private Enterprise Average Registered Capital (RMB in ten thousand yuan)	202.09	224	267.5	222.1
Sales and Production Value of Private Industry above Designated Size (RMB in hundred million yuan)	1627.43	5978	4678.01	1411.5
Number of Private Industry Enterprises	10785	20335	18564	11653

Source of data: Wuhan Private Economic Development Report 2009

4.1 Economic aggregate is relatively low

In 2012, the private economy of Wuhan achieved added value of RMB 329.7 billion Yuan, while other cities at provincial or sub-provincial level were respectively: Shanghai RMB 488.37 billion Yuan, Tianjin RMB 517 billion Yuan, Chongqing RMB 562.29 billion Yuan, Chengdu RMB 474.5 billion Yuan, Hangzhou RMB 456.898 billion Yuan, Shenzhen RMB 410 billion Yuan, ranking approximately 10th in terms of proportion of private economy among the 15 sub-provincial cities.

4.2 Lack of size and strength

In 2012, among the top 100 enterprises in Wuhan, only 36 are private, with average operating revenue of RMB 5 billion Yuan, only 23.5% of that of state-owned enterprises. In 2012, among China's top 500 private enterprises, only 10 were from Wuhan, while in economically developed areas of Jiangsu and Zhejiang provinces, there were 24 from Wuxi, 23 from Suzhou and 21 from Wenzhou.

4.3 Economic structure is not optimal

In terms of market access, most private enterprises are centered on traditional labor-intensive industries such as manufacturing, commerce, catering, wholesale and retail industry, etc. with low entry threshold, low technology content, low added value, they are at the low end of the tertiary industry.

4.4 Industrial agglomeration is not concentrated

The private economy in Wuhan has not yet formed a relatively complete industrial chain or high-density industrial cluster. Industrial cluster features in urban industrial parks are not clear, industrial relevancy among enterprises in the parks is not high, manifesting as a kind of enterprise agglomeration with weak coordination and collaboration, the industry chain is neither complete nor strong.

4.5 Management levels are not high

In most private enterprises, management mode and corporate governance structure are a long way short of the requirements of the modern enterprise system, family-run management is popular and the rule of man phenomenon is common. Decision-making mechanisms involve a lot of arbitrary decisions made on a whim.

4.6 Financial mechanisms are not flexible

According to surveys, similar to other regions in the rest of the country, the most prominent "bottleneck" of private economic development in Wuhan is financing difficulties, insufficient capital is the biggest problem for private enterprises in Wuhan, which is prominently manifested through difficulty in obtaining bank loans, direct financing and financing guarantees.

4.7 Policy environment is poor

In the context of the market economy, the main way the local government plays a role in economic development is to provide institutional supply. The policy environment is an important impetus for innovative development of the private economy. Although in recent years the municipal government has introduced many policies to support enterprise development, but as far as execution is concerned, details

of operable implementation are still needed, so implementation of the policies is difficult. “Swinging door” and “glass door” phenomena still exist.

5. Main Strategy for Innovative Development of Wuhan’s Private Economy

5.1 Speeding up concept innovation for private economic development

First is promoting the strategic position of the private economy. It is suggested that the Wuhan Municipal Party Committee and the Municipal Government consider the development of the private economy as an important strategy to support the construction of Wuhan as a national central city, starting from the top-level design of the policy framework to boost the development of the private economy to the urban development strategy level, sparing no efforts in boosting the private economy to achieve breakthrough development. Second is encouraging the private economy to walk on the road of technological innovation. Use “professional, refined, special and new” as the important way for transforming and upgrading the private economy and transformation of the development mode. Third is to develop strategic emerging industries. Guide the private economy to participate in the development of strategic emerging industries including new energy resources, energy conservation and environmental protection, new materials, a new generation of information technology, and engage in development of modern service industries such as finance, logistics, cultural creativity, etc.

5.2 Speeding up science and technology and management innovation for private enterprises

The Local Government should promote the establishment of a market-oriented technology innovation system with private science-and-technology enterprises as the main bodies and close integration of enterprises, universities and research institutes. Small and medium-sized private enterprises can establish joint research and development institutions with universities and research institutes, or make joint efforts to build research and development institutions by way of investment holding, equity participation, etc.

First is to establish a modern enterprise system, perfect corporate governance structure and strengthen internal management. Second is to shape an enterprise culture with innovation as the internal core, making the employees form a sense of identity and a sense of belonging to the enterprise, thereby motivating employees and management teams to continually raise innovation awareness and enthusiasm for intelligent capital investment, making the enterprises constantly obtain new competitive advantages.

First is to train up a high quality team of private entrepreneurs. Entrepreneurs are the souls of enterprises; their character determines the rise or fall of the enterprise. It is essential to cultivate entrepreneurship with an innovative spirit as the essence, eternally preserving the vitality and vigor of the enterprises. Second is to perfect personnel mechanisms. Healthy private enterprises facilitate talent introduction, cultivation and employment, which creates a comfortable and harmonious innovation environment of fair competition for the majority of private enterprises.

5.3 Speeding up institutional innovation of development in the private economy

Private enterprises should make full use of the platform of national “new three board” pilot project in the East Lake Development Zone to get listed for financing. We should accomplish construction of a financial guarantee system. The local government should support the development of various forms of credit guarantee institutions, raise guarantee funds through various channels, share and manage security risks well, provide more credit guarantee and re-guarantee businesses for private investment projects.

First is to strengthen the construction of business incubators. Government departments should particularly attach importance to the construction of enterprise incubation platforms, leading to the establishment of different types of business incubation bases at different levels, funding a batch of potential and excellent entrepreneurial talents and projects. Second is to strengthen the construction of the public service platform. Further improve the service function of SME service supermarkets. Third is to establish and improve the social service system. Guide and integrate social resources, strive to develop accounting, auditing and other kinds of intermediary service agencies, providing quality social services for private enterprises. American psychologist Andy Clark believes that the system of people's choices and learning activities to provide "external stent," which coordinate people's activities and the establishment of confidence-building mechanism.

Policies are the biggest government actions. The municipal finance department should enhance the support to the private economy, increase special funds for development of private enterprises and include this in the management of the budget. The municipal tax department should earnestly implement various kinds of preferential tax policies for encouraging and supporting private economic development, carry out differentiated preferential tax policies for growing high-tech private enterprises. The municipal

human resource and social security department should give appropriate support to private enterprises on subsidy amount and payment methods regarding payment of social security fees.

The market is the main leader of innovation. The government's responsibility is to create a good environment for innovation. Therefore, it should firstly deepen the office working style; secondly, it should deepen the reform of administrative examination and approval system; thirdly, it should administer in strict abidance with the law; fourthly, it should create a positive atmosphere of public opinion, to develop and expand the spirit of innovation, creating a public opinion atmosphere conducive to innovative development.

6 Conclusion

Innovation is the power and the source of enterprise development. As a means of datas, the article indicates seven specific issues through the development of private economy in Wuhan . At the same time, the article proposes some suggestions in a targeted manner from the system and management recommendations for the relevant reference. Next, in order to make this research more practical, we will focus on innovation about resource elements, the main elements, structural elements, environmental elements and cultural elements.

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Research on the Serious Transfer Path of Supply Chain Risk

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Abstract: Cooperation among node enterprises of supply chain makes supply chain risk (SCR) transfer easily, while study on the transfer path of SCR can be helpful to the effective management on SCR. In this paper, based on theoretical analysis, the serious transfer paths of SCR are interpreted according to the transfer direction of SCR which are Positive serious transfer of SCR, Reverse serious transfer of SCR and cross serious transfer of SCR. Furthermore, the characteristics of every transfer path are deep explored correspondingly. When crisis occurs, the risk source in the supply chain can be found easily along the risk transfer paths of supply chain.

Key words: SCR; Risk transfer; Serious transfer paths

1 Introduction

The relationship of agency by agreement in supply chain makes SCR exist inevitably. The independence of the enterprise legal person and increasing cooperation among the supply chain enterprises promote the risk transfer in the supply chain^[1].

Researches on SCR transfer home and abroad mainly concern the following three aspects: the transfer mechanism of SCR^[2,3], the utility of SCR transfer^[4] and the control of SCR transfer^[5-7], among which studies on supply chain management by applying the adaptive system theory are in the majority^[8,9]. However, there are few researches studying the transfer paths of SCR. This paper attempts to analyze the different paths of SCR by adopting some concepts in physics as reference, thus explore the evolution rule of the SCR transfer, hoping to provide some reference for the effective management of risk of the supply chain enterprises.

2 Serious Transfer Path of SCR (SSTPSCR)

Supply chain refers to the value increasing chain from the initial supply to the final demand. One node enterprise transfers SCR to the next one, namely serious transfer of SCR, is the main path in SCR transfer. Defining the direction of SCR transfer from supply to demand as positive, the STPSCR can be divided into three types, namely positive serious transfer, reverse serious transfer and cross serious transfer.

2.1 Positive serious transfer of STPSCR

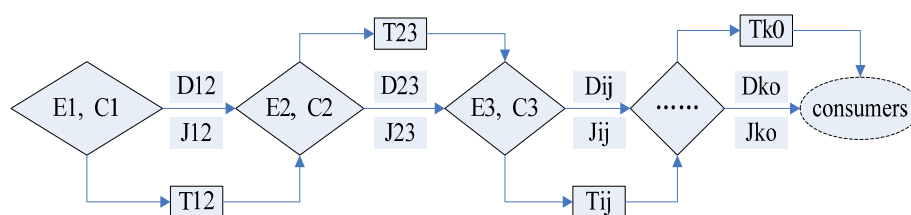


Figure 1 Positive Serious Transfer Path of SCR

Positive serious transfer means the transfer path of SCR is from the initial node enterprise to the downstream one till to the consumers under the influence of risk catalyst. Thus the negative impact of a risk in one node enterprise will influence the whole supply chain. During the process of positive serious transfer of SCR, risks adhering to risk carrier transfer among node enterprises in proper order. Supposing a certain supply chain has some node enterprises, node enterprise is expressed as E, enterprise risk current is expressed as C, diffusion coefficient is expressed as D, diffusion current is expressed as J, and time of risk transfer is expressed as T, the first node enterprise is expressed as E1, risk current of the first node enterprise is expressed as C1, the diffusion coefficient of E1 diffusing the risk current to E2 is expressed as D12, transfer time of E1 diffusing the risk current to E2 is expressed as T12, transfer current f of E1 diffusing the risk current to E2 is expressed as J12. The positive serious transfer path of SCR is described just as Figure 1.

Major features of positive serious transfer path of SCR are explained as following:

① Single direction. Single direction is reflected by the single risk transfer path which is from the upstream enterprise to the downstream one. As risk transfers from upstream to downstream, the source of risk can be inspected easily along the value chain from downstream to upstream. ② Long latent period. Long latent period makes the fatalness of the disaster difficult to predict in a short time. On one hand, the risk source exists in a relative small space, so it hides. On the other hand, the risk current from a risk source isn't big at the beginning, which may lead to underestimation of the loss of the risk. These two factors together generate the high latency of risk. ③ Developing. Positive serious transfer of SCR transfers risk on time sequence. According to the measurement index, risk energy consists of L^E, L^F, L^S . During the process of risk transfer, risk energy enhances as risk passes through every node enterprise, for both the increasing extensional space and cost to save the prestige of the enterprise, once risk turns into disaster, loss becomes greater than before. ④ Concealment. High concealment leads to the weak anti-risk capability since risk can not be perceived easily at the beginning. When the risk becomes clear, it may have been transferred to the whole supply chain, which makes it more difficult to control. In positive serious transfer of SPSCRT, the enterprise itself may be the source of risk or the risk may originate from other resources. In different transfer stage, risk carrier and risk catalyst of one stage may be the same or different from those of the next one. Risk catalyst may push the risk forward and be a positive catalyst at some time, and it can also hinder or even cut off the risk, thus becoming a negative catalyst. Transfer time for every stage is different the same risk^[2].

Positive serious transfer of STPSCR is common in supply chain management and product quality risk typically belongs to the positive serious transfer. For instance, the event of melamine in milk of China in 2008 is a typical case.

2.2 Reverse serious transfer of STPSCR

Reverse serious transfer and positive serious transfer are very similar. The major difference is the change of risk transfer direction. Risk transfers from the upstream enterprise to the downstream one in positive serious transfer, but it transfers from the downstream enterprise to upstream one on time sequence in reverse serious transfer. Furthermore, reverse serious transfer is divided into two kinds, namely strict reverse and non-strict reverse serious transfer (Figure 2).

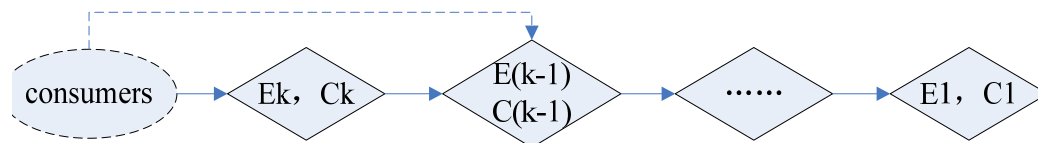


Figure 2 Reverse Serious Transfer of SCR

As is shown in figure 2, strict reverse serious transfer means risk transfers from downstream enterprise to upstream enterprise one by one just as the solid line expresses in figure 2. While non-strict reverse serious transfer means risk transfers from the downstream enterprise to non-direct upstream enterprise. Namely, risk transfers along the dashed line and then the solid line just as the dashed line expresses in figure 2.

Besides possessing the features of positive serious transfer of STPSCR, reverse serious transfer of STPSCR possesses another feature of great difficulty in checking the risk source. In the reverse serious transfer of STPSCR, risk transfers from downstream to upstream and the scope of downstream is larger than that of the upstream, so the risk source in reverse serious transfer of STPSCR exists in a larger scope than that of positive serious transfer of STPSCR, making the checking of the risk source a difficult work. Risk in the reverse serious transfer of STPSCR originates from two sources. It may originate from the supply chain system itself or it may originate from other sources. Meanwhile, the risk source of positive serious transfer of STPSCR might induce other risks. The induced risks may transfer along the path of the previous positive serious transfer of STPSCR, and they can also change the transfer direction from the previous positive serious transfer of STPSCR to reverse serious transfer of STPSCR. The occurrence of any accident in the supply chain might induce the collapse of the whole system due to its chain structure. Risk induced by market demand belongs to one type of reverse serious transfer of STPSCR. For example, high-tech mobile phone produced by Iridium Satellite Company of Motorola makes the company become a meteor through market test. Iridium Satellite Company places a higher expectation on the high-tech mobile phone than the demand of market, thus the little profit from the

poor sale of the phone leads to the bankruptcy of the company due to its high investment and operation cost.

2.3 Cross serious transfer of STPSCR

Risks in supply chain are complex and unstable. Different risks diffuse through the supply chain network. Cross serious transfer of STPSCR means that one risk transfers in the supply chain through both positive serious transfer of STPSCR and reverse serious transfer of STPSCR. Namely, one risk sometimes transfers by the way of positive serious transfer of STPSCR and by the way of reverse serious transfer of STPSCR sometimes else just as embodied in Figure 3.

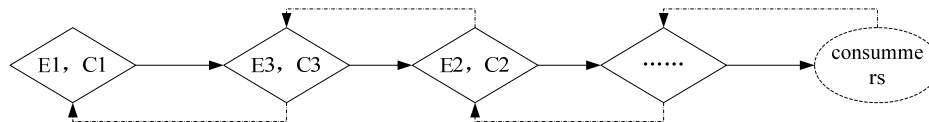


Figure 3 Cross Serious Transfer of STPSCR

In Figure 3, solid line refers to positive serious transfer of STPSCR and dashed line refers to reverse serious transfer of STPSCR. Doubtlessly, cross serious transfer of STPSCR is much more complex than both the positive serious transfer of STPSCR and the reverse serious transfer of STPSCR. The reasons for the occurrence of cross serious transfer of STPSCR can be summarized as the following:

① When one risk transfers positively or reversely, it might induce the positive or reverse transfer of some other risks in another supply chain. For instance, the occurrence of financial crisis in a node enterprise of the supply chain may delay the payment time of goods for the upstream enterprise, on this occasion the financial risk transfers by the way of reverse transfer. When the upstream enterprise finds the delay paying of goods from the downstream enterprise, it may adopt some measurements to avoid the crisis by delaying supply. Thus the supply risk transfers by the way of positive serious transfer of STPSCR, though it is induced by the positively transferring financial risk.

② When different SCRs coexist, some risks transfer through positive serious way while some others transfer through reverse serious way. Although the types and transfer directions of the risks are complex, the transfer direction of any one risk is unchanged, transferring along a fixed direction. For instance, supply risk of a supply chain always transfers from upstream to downstream enterprise by the way of positive serious transfer of STPSCR while demand risks always transfer from downstream to upstream enterprise by the way of reverse serious transfer of STPSCR.

Major features of cross serious transfer of STPSCR are explained as the following:

① Diversity of risk sources and difficulty in inspecting them. Risk sources of cross serious transfer come from two types. One is original SCRs such as inventory risk, supply risk, demand risk, policy risk and institutional risk, etc. The other is secondary SCRs induced by original risks. For instance, in order to avoid product shortage, node enterprise may order a large demand to increase the inventory, which may produce Bullwhip effect. This is the case of inventory risk induced by demand risk. Because the sources of risks originate differently and co-transfer in the supply chain system, inspecting the risk sources of cross serious transfer of STPSCR is much more difficult than that of single transfer of STPSCR.

② Agglomeration. Agglomeration includes risk source agglomeration and effectiveness agglomeration. Risk source agglomeration means that original risks or secondary risks may form various types of risks in the supply chain system after a period of time. Effectiveness agglomeration means that larger risk current may be produced from cross serious transfer of STPSCR than from single direction transfer of STPSCR after all risk currents agglomerate in the supply system.

Cross serious transfer is a common form of risk transfer in supply chain system as supply chain is a virtual extension organization. The complex internal and external environment together with the network structure of supply chain makes the occurrence of supply chain risks universal and the interaction of different risks produce more intercurrent risks. When one node enterprise sends out risks, it may receive risks simultaneously, displaying the duality of the node enterprise. The bidirectionality of SCR transfer lies in two factors. When one node enterprise sends out risks to another node enterprise in a certain way, the other enterprise may transfer another risk to it in the same or different way. The effectiveness and path of cross serious transfer depend on not only the characteristic and current of

original risks but also the type of SCR and the factors that influence the formation of the type. Different types of risks have different influences on each other, and the reason lies in many factors, such as the characteristic and anti-risk capability of the enterprise, its risk preference, its capability of risk diffusion, etc.

3 Conclusions

Through judging TPSCR, risk source can be found. It is urgent to adopt some countermeasures to control the risks to avoid the crisis. Further study will focus on the radar transfer path of SCR and interactive transfer path of SCR.

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Research on the Structure and Function of Enterprise R&D Knowledge Management Platform*

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Abstract: With the advent of knowledge economy and information society, knowledge management in the enterprise occupies a more and more important position. This article defines the concept of enterprise research and development knowledge, expounds the characteristics and basic process of the R&D knowledge management, and constructs the overall structure of the system and the core functions of the system.

Key words: Enterprise; R&D knowledge management platform; Structure; Function

1 Introduction

With the rapid development of economy and technology, the knowledge human society has grows explosively. For this reason, knowledge management in enterprise occupies a more and more important position. It's key for enterprise to improve competitive ability that quick grasping and reasonable using knowledge, saving and accumulating experience and proprietary technology enterprises have. Therefore, how to implement knowledge management is a hot research topic in academia and companies in recent years. The knowledge management system is undoubtedly one of the effective tools to implement knowledge management.

2 Enterprise R&D Knowledge and Its Characteristics

Corporate R&D knowledge refers to the enterprise internal knowledge which is closely related to the product R&D of technology, including the knowledge of research object, R&D process, R&D methods, common sense and basic theoretical knowledge and so on.

Its characteristic mainly reflects in these aspects: (1)wide sources, (2)complicated structure, (3)strong professionalism, (4)various expressions, (5)communication difficulties, (6)innovative and (7)inheritance and so on.

3 The Basic Process of R&D of Enterprise Knowledge Management

In recent years, many scholars[2-5] have learnt a lot about the connotation of knowledge management, and its basic flow. Compositing their points of view, this article will define the enterprise R&D knowledge management as a management process of identifying, sorting, transforming knowledge, to share, use and innovate knowledge, with corporate R&D knowledge as the core. There are five links in the management flow, namely, knowledge accumulation, knowledge sharing, knowledge reuse, knowledge innovation, and knowledge evaluation. As shown in figure 1.

4 The Structure Model of Application Layer System

Combined with the enterprise R&D knowledge structure, the basic process of R&D knowledge management and the basic functional requirements, the structure model of enterprise R&D knowledge management system and its core functions are set up, as shown in figure 2.

5 The Function of Storage Layer

Storage layer is responsible for the storage of all kinds of knowledge, inference rules and the current project of all kinds of information.

(1) Data base

Data base stores the classification results, meta-knowledge lists, the key attributes of meta-knowledge, the storage address of related multimedia documentation and mathematical model, the

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basic information and process information of research and development project. In the database all kinds of information through the key attributes establishes links with rule base and method base, and through the address information establishes links with multimedia libraries and D/a library.

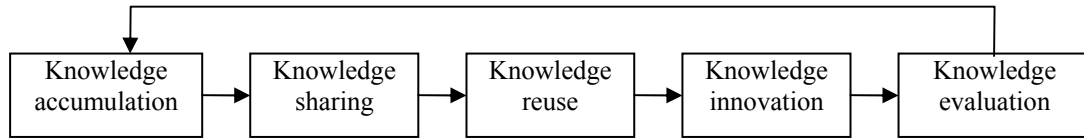


Figure 1 the Basic Process of R&D of Enterprise Knowledge Management

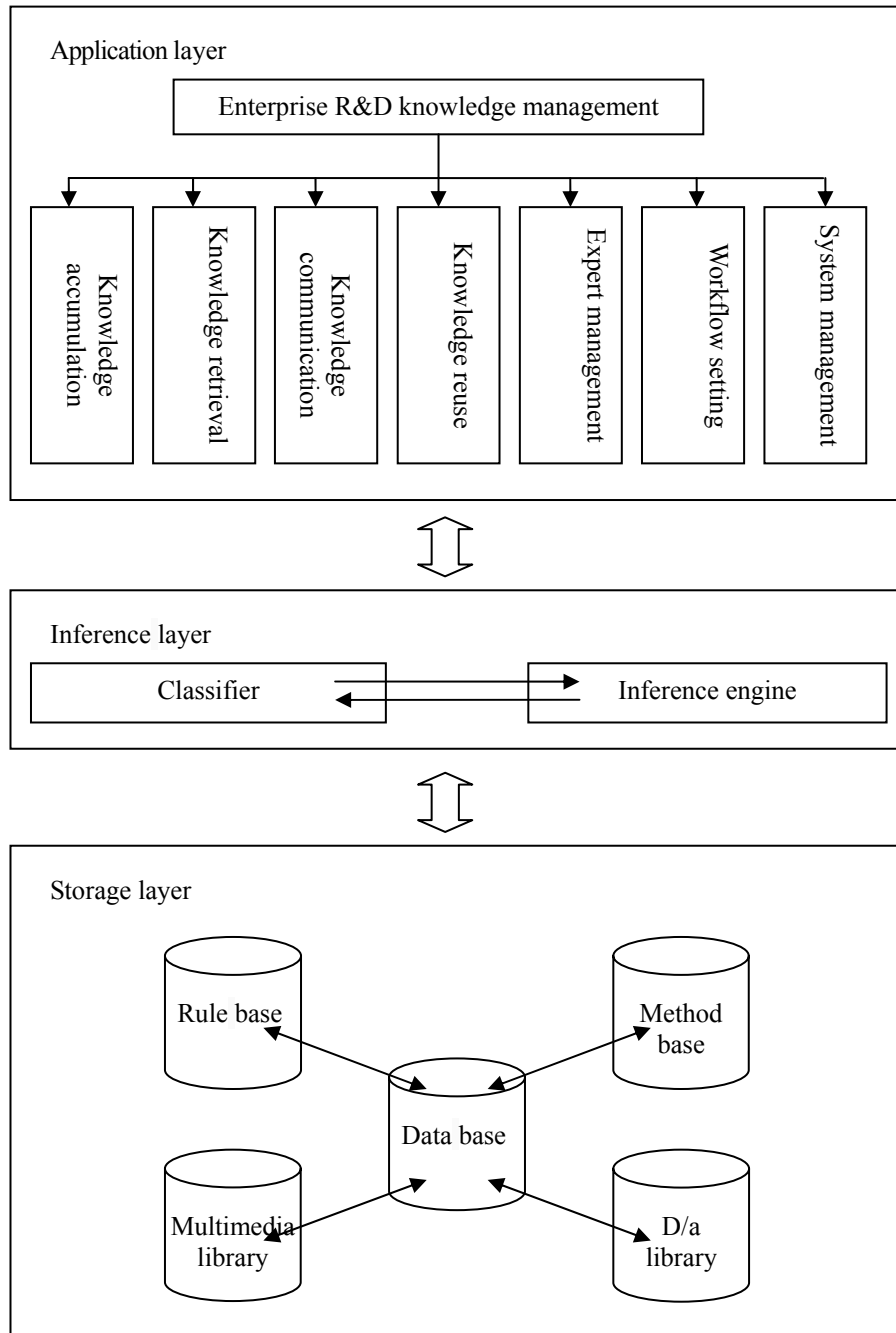


Figure 2 the Structure Model of Enterprise R&D Knowledge Management System

(2) Rule base

Rule base stores knowledge representation rules, knowledge classification rules and knowledge inference rule.

(3) Method base

Method base stores in the knowledge treatment of specific model and algorithm, such as Bayesian classification algorithm, knowledge evaluation algorithm, association rule algorithm and similarity matching algorithm [2], etc

(4) Multimedia library

Multimedia knowledge library stores knowledge of all kinds of document forms, such as design standards and specifications, design drawings, design specification documentation, project plans, meeting records, stage results view records, project information, test plans and results, problems and solutions, etc. Forms include text, pictures, PPT, electronic chart, animation, film, etc.

(5) D/a library

D/a library stores 2D drawings, 3D data model, the technical documentation and components performance simulation analysis data which are from other product aided design tools (such as CAD, UG).

6 The Function of Inference Layer

Inference layer mainly provides services for the application layer to realize the function of knowledge inference and mining. The classifier classifies the certainty or uncertainty problems of new knowledge. Common tools and methods are clustering analysis, rough set method, Bayesian classification, etc. Inference engine is responsible for the knowledge mining. Common tools and methods are association rules and sequential patterns found, etc. Summing up the research from Li Nong et al, the basic steps of knowledge mining are shown in figure 3.

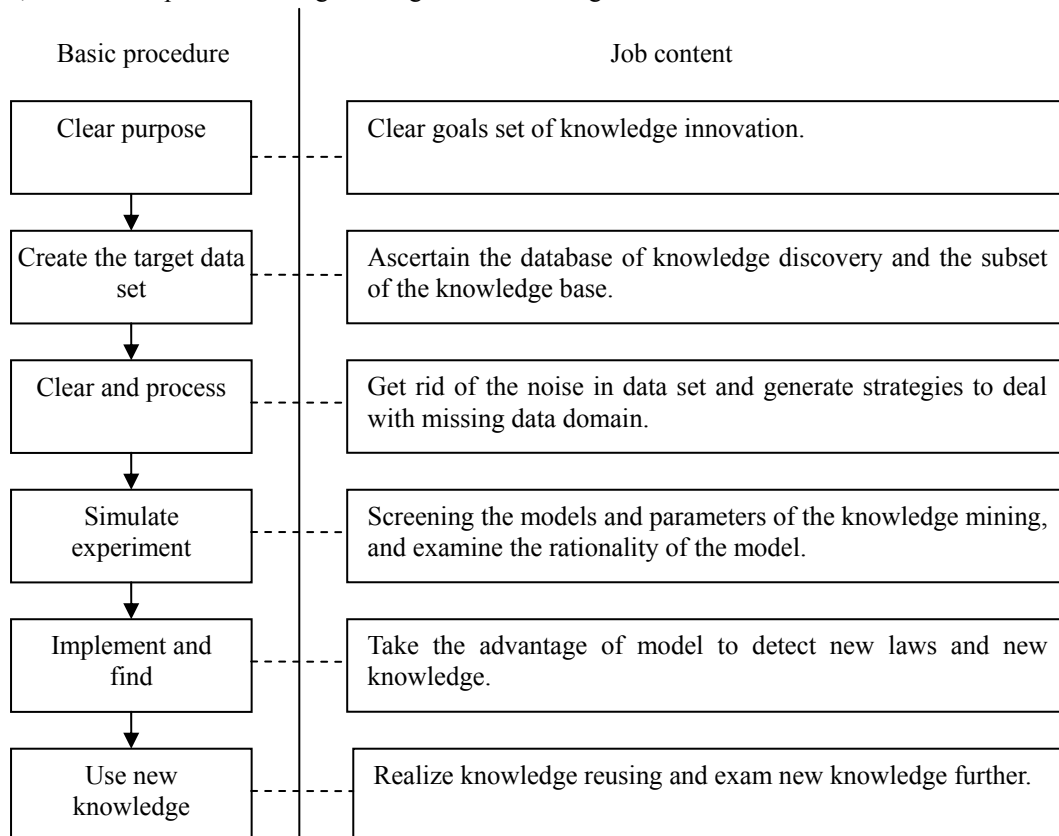


Figure 3 Basic Steps of Knowledge Mining

7 The Basic Function of the Application Layer

The application layer is mainly facing the user to provide the operating platform to, share

knowledge, and innovate for the knowledge management.

(1) Knowledge accumulation

Knowledge accumulation can be realized through external access and knowledge mining. External access refers to the employees summarize project has been completed from research technology, development experience and project management etc, and then store in the knowledge base after coding and audit. Knowledge mining refers to the knowledge in knowledge base, through classification, reasoning and other technical means to realize the process of knowledge discovery and innovation. The basic process includes knowledge matching, extraction, innovation, evaluation, storage, etc. Specific functions include knowledge edit, submit and review, warehousing, distribution, etc.

(2) Knowledge retrieval

Knowledge retrieval provides an efficient platform and tool for staffs to query and share enterprise R&D knowledge. Mainly includes the keyword searching, full-text retrieval, knowledge map and knowledge push, etc.

(3) Knowledge communication

Knowledge communication provides online real-time communication, discussion and collaborative design platform.

(4) Knowledge reuse

It assists enterprise employees to reuse existing knowledge in the knowledge base, shorten project development time, and improve the development efficiency. Mainly includes the template selection, parameter setting, program evaluation, knowledge reconstruction and other functions.

(5) Expert management

Manage the expert who has the right to evaluate knowledge or domain expert.

(6) Workflow setting

It is used to set the information such as name, responsible person in the process of knowledge review, knowledge release and so on, so as to guide, control and handling related tasks.

(7) System management

Includes personnel information management, setting operation permission, department information management, post information management, knowledge base backup and restore, etc.

8 Conclusion

Enterprise R&D knowledge management system is the important mean and effective tool to assist enterprise to accumulate knowledge, complete the R&D knowledge sharing, shorten the product development cycles, and reduce cost of product research and development. The author according to own working experience engaged in knowledge management in enterprise, knowledge management process as the main line, analyzed the type and management requirements of enterprise research and development knowledge, put forward the structure model of enterprise research and development knowledge management system, and achieved good application effects in local application. The implementation of knowledge management system to the enterprise has a certain reference value.

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Research on Price Regulating Structure of Medical Expenditure on the Condition of Non-Separation of Hospital and Medicine Enterprises

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Abstract: Based on motivation theory of economics, this paper analyzes the government's price regulating structure of medical expenditure. It is due to the government's inappropriateness in price regulation on the condition of information asymmetry between doctors and patients that doctor's effort level has been lower than suboptimal levels. That is, doctors are not only motiveless to upgrade their own qualities, but also motiveless to control patients' costs. Thus, the thesis designs a motivating mechanism to drive doctors to provide effective and efficient services on the condition of non-separation of hospital and medicine enterprises.

Key words: Non-separation of hospital and medicine enterprises; Price regulating structure; Motivation; Models

1 Introduction

There are many reasons for fast rise of medical costs. Some are reasonable while some are not^{[1][2]}^[3]. Presently, the policies controlling medical expenditure are focused on the prices of medicines. Due to the government's difficulty in knowing the producing costs of medicines, as well as inflated medicine prices resulting from the present medical system, the government should put their attention to reducing governmental regulations, deregulating retail rights of prescribed medicines and breaking up monopoly of state-owned hospitals.^{[4][5][6][7]}

Presently, the government's price regulation fails to control the rise of medical costs. Why? Li Pengfei^[8] and others were pioneers focusing on analyzing the governmental price regulation. They analyzed doctors' motivation and patients' welfare. According to them, when the medical service prices are controlled and the ceiling price is lower than the equilibrium price, if the regulators are unable to solve the problem of information asymmetry between doctors and patients, there will absolutely arise the phenomenon that hospitals will make profits from medicines. Therefore, they suggest deregulating medical service prices. Following their thoughts, the thesis tries probing into price regulating structure of medical expenditure.

2 Basic Hypotheses and Models

2.1 Basic hypotheses

Suppose there are a doctor (hospital) and a representative consumer (patient), the doctor provides medical services for the consumer to recover his health. The hypotheses are as follows:^[9]

(1) The value of medical service for the patient is S , then the doctor's cost function is:

$$C = \beta - e$$

Wherein, β is the efficiency parameter, e is the doctor (hospital)'s effort level.

(2) The amount of compensation of the patient for the doctor is the net money transfer payments of t . Let U represent the doctor (hospital)'s utility level, then:

$$U = t - \psi(e)$$

For the doctor (hospital), the utility acquired from regulation is at least the same as that he acquires when he stays away from the relationship. If the utility level of the doctor's outside opportunities is standardized as 0, then his individual rational constrain is $t - \psi(e) \geq 0$.

(3) Let $\lambda > 0$ represent the shadow cost of public money when regulating.

(4) The doctor's efforts fall into two respects: the efforts of their own techniques and experiences are e_1 ; the efforts of appropriate tests as well as medicines are e_2 .

(5) For the patient, the doctor's efforts in two respects are symmetric with the same random value $s^i = S \text{ or } \bar{S}$, wherein, $i=1,2$, \bar{s} represents high value meaning that the patient obtain effective

treatment while \bar{S} represents low value.

(6) The doctor's effort level is continual and supposes that $e_i \in [0,1]$. Within the above domain the probability of the doctor's efforts resulting in high value is $P_r(S^i = \bar{S} / e_i) = \pi(e_i) = e_i$ when $i=1, 2$.

(7) The negative utility of the doctor's efforts is further divided into $\psi_1(e_1)$ corresponding to e_1 and $\psi_2(e_2)$ corresponding to e_2 , and $\psi_i' > 0, \psi_i'' < 0, i=1,2$. To guarantee that the model has interior point solution, suppose the rice field condition holds, that is $\psi_i(0) = 0$ and $\lim_{e \rightarrow 1} \psi_i(e) = +\infty$.

(8) Similarly t – the monetary transfer payment of the patient for the doctor is divided into two respects: the diagnosis price P_1 and the medicine price P_2 when $t = P_1 + P_2$. The hospital's related costs are respectively c_1 and c_2 . While \bar{t} and \underline{t} respectively corresponds to treating results of different levels - \bar{S} and \underline{S} .

2.2 Theoretical model of medical expenditure rise and price regulation

2.2.1 Basic model of price regulators' social welfare

According to Hypotheses (1), (2) and (3), the net surplus of the patient and the doctor is as follows:

$$S - (1 + \lambda)(t + \beta - e)$$

For the utilitarian regulators of medicine prices, their ex post social welfare is:

$$S - (1 + \lambda)(t + \beta - e) + t - \psi(e) \\ = S - (1 + \lambda)[\beta - e + \psi(e)] - \lambda U$$

The social welfare of medical services equals to the patient's value minus $(1 + \lambda)$ times $[C + \psi(e)]$ - the total costs the doctor observes, and then minus λ times the doctor's rent on his opportunity utility. According to the above social welfare function, medicine price regulators are unwilling to leave any rents for doctors.

On the condition of perfect information, medicine price regulators know β and observe e , the regulators will solve the following formula:

$$\max_{\{U, e\}} \{S - (1 + \lambda)(S - (1 + \lambda)[\beta - e + \psi(e)] - \lambda U)\}$$

Wherein, constraint condition is $U \geq 0$, then the solution is:

$$\psi'(e) = 1 \text{ or } e = e^* \\ U = 0 \text{ or } t = \psi(e^*)$$

$\psi'(e)$ - the marginal negative utility of the doctor's efforts must equal to the marginal cost economy. Meanwhile, owing to the shadow cost, the doctor will not obtain price rents in fact.

2.2.2 Analysis on the doctor's efforts in two respects

Analysis on the optimal condition [10][11]

According to hypotheses (4), (5), (6) and (7), on the condition of e_1 – the doctor's effort of diagnosis, to maximize the sum of the doctor's and the patient's utility will result in:

$$\max_{\{e_1\}} \{V^{FB} = e_1 \bar{S} + (1 - e_1) \underline{S} - \psi(e_1)\}$$

To solve the first-order condition will end in:

$$\bar{S} - \underline{S} = \psi_1'(e_1^*)$$

According to hypotheses (4), (5), (6) and (7), on the condition of e_2 – the doctor's effort of medicine, to maximize the sum of the doctor's and the patient's utility will result in:

$$\bar{S} - \underline{S} = \psi_2'(e_2^*)$$

That is to say, on the optimal condition, the value difference the patient obtains exactly equals to the marginal cost of the doctor's efforts; in addition, the marginal costs of the doctor's efforts in two

respects are equal.

Analysis on the condition of the doctor's moral risk and limited liability ($\bar{t} > 0, \underline{t} = 0$)

In reality, there is information asymmetry between the doctor and the patient. The doctor's efforts are non-observable at all. Therefore, the moral risk is inevitable.

On the condition of e_1 – the doctor's effort of diagnosis, the doctor's expected return is as follows:

$$\max_{\{e_1\}} \{e_1 \bar{t} + (1 - e_1) \underline{t} - c_1 - \psi_1(e_1)\}$$

To solve the first-order condition will result in:

$$\bar{t} - \underline{t} = \psi_1'(e_1)$$

Similarly, on the condition of e_2 – the doctor's effort of medicine, to maximize the doctor's expected return will result in:

$$\bar{t} - \underline{t} = \psi_2'(e_2)$$

On the condition of e_1 – the doctor's effort of diagnosis, the patient's expected return is as follows:

$$\max_{\{e_1\}} \{e_1 (\bar{S} - \bar{t}) + (1 - e_1) (\underline{S} - \underline{t})\}$$

$$\text{s.t. } \bar{t} > 0, \underline{t} = 0$$

$$\bar{t} - \underline{t} = \psi_1'(e_1)$$

If suppose further $\psi''' > 0$, that is, the patient's objective function is strictly concave on e_1 , to solve the optimization problem leads to:

$$\bar{S} - \underline{S} = \psi_1'(e_1^{SB}) + e_1 \psi_1''(e_1^{SB})$$

Similarly, on the condition of e_2 – the doctor's effort of medicine, to maximize the patient's expected return will result in:

$$\bar{S} - \underline{S} = \psi_2'(e_2^{SB}) + e_2 \psi_2''(e_2^{SB})$$

According to the above analysis, on the condition of the doctor's moral risk and limited liability, the doctor will surely prefer the suboptimal efforts to the optimal.

2.2.3 Price regulating model on the condition of non-separation of hospital and medicine enterprises

Just as Arrow points out in his pioneering work of medical economics, the fundamental problem of medical market lies in information asymmetry between the doctor and the patient. The information asymmetry is consequent upon the fact that the doctor has professional knowledge which is why the medical consumption is characteristic of induced consumption; upon another fact that the patient is without the professional knowledge which results in his inability to examine the doctor's medical services (Arrow, 1963). Therefore, related hypotheses are revised as follows:

The patient, though he may notice whether he is cured or not, has no way to measure whether he obtained the lowest value, and consequently has no way to distinguish \bar{S} from \underline{S} , that is, to

distinguish \bar{t} from \underline{t} . What he can do is to pay $t = P_1 + P_2$. Owing to piece regulation and according to

the present regulating measures, we have $P_1 < c_1$, $P_2 > c_2$, and $P_2 = (1+r)c_2$, $r \leq 15\%$.

On the condition of e_1 – the doctor's effort of diagnosis, the doctor's objective function is as follows:

$$\max_{\{e_1\}} \{e_1 (P_1 - c_1) + (1 - e_1) \times 0 - \psi_1(e_1)\}$$

To solve the first-order condition will result in:

$$P_1 - c_1 = \psi_1'(e_1)$$

Similarly, on the condition of e_2 – the doctor's effort of medicine, to maximize the doctor's

expected return will result in:

$$P_2 - c_2 = \psi'_2(e_2)$$

On the condition of e_1 – the doctor’s effort of diagnosis, the patient’s objective function is as follows:

$$\begin{aligned} \max_{\{e_1\}} \{ & e_1(\bar{S} - P_1) + (1 - e_1)(\bar{S} - 0) \} \\ \text{s.t. } & P_1 - c_1 = \psi'_1(e_1) \end{aligned}$$

Because $P_1 < c_1$, then $P_1 \psi'_1(e_1) \leq 0$, wherein only e_1 agrees with $e_1 \leq 0$.

Similarly, on the condition of e_2 – the doctor’s effort of medicine, the patient’s objective function is as follows:

$$\begin{aligned} \max_{\{e_2\}} \{ & e_2(\bar{S} - P_2) + (1 - e_2)(\bar{S} - 0) \} \\ \text{s.t. } & P_2 - c_2 = \psi'_2(e_2) \end{aligned}$$

To solve the optimization problem leads to:

$$\bar{S} - \bar{S} - c_2 = \psi'_2(e_2^{SB2}) + e_2 \psi''_2(e_2^{SB2})$$

Because when $\psi''' > 0$, $P_1 < c_1$, $P_2 > c_2$, $\psi'_2(e_2^{SB2}) + e_2 \psi''_2(e_2^{SB2})$ is increasing function, then $e_2^{SB2} < e_2^{SB}$. Thus it may concluded that when $P_1 < c_1$, $P_2 > c_2$, then $e_1^{SB2} = 0 < e_1^{SB} < e_1^*$; $e_2^{SB2} < e_2^{SB} < e_2^*$.

On the condition of the present price regulation, the doctor is motiveless to improve his own techniques to provide basic medical services, and meanwhile he is motive to pay the least efforts to look for proper medicines.

To compare e_1 and e_2 , the optimal price design should agree with:

$$\frac{P_1 - c_1}{\psi'_1(e_1)} = \frac{P_2 - c_2}{\psi'_2(e_2)}$$

On the condition of the present price regulation, the above equation doesn’t work, because efforts in two respects are asymmetric. To make it work, P_1 must be raised to meet $P_1 > c_2$. That is, it is necessary to make reasonable price compensation for basic medical services to correct the present motivation distortion.

3 Motivating Mechanism of Price Regulation of Medical Expenditure

Are there a motivating mechanism on the condition of non-separation of hospital and medicine to drive doctors to provide effective and efficient services? Is it somewhat related to the doctor’s efforts, the prices charged as well as the market structure?

3.1 Hypotheses

(1) There are n homogenous doctors - i ($i = 1, 2, \dots, n$) in the market. Suppose one doctor represents one hospital; the doctor’s effort for one “diagnosis” is e_1 and his charge is E_1 ; his effort for one “treatment” is e_2 and his charge is E_2 ; $e_i > 0$, $E_i > 0$.

(2) When he comes to see the doctor, the patient doesn’t know he has serious illness or minor illness (or no illness). Suppose the probability he has serious illness is p and $p \in [0, 1]$, then the probability he has minor illness (no illness) is $1 - p$.

(3) When the patient has serious illness, the utility on his health is q_l ; when he has minor illness, the utility is q_h and $0 < q_l < q_h < 1$.

(4) After the doctor’s diagnosis and treatment, the patient’s health may be recovered, that is, his utility may come back to q_h .

(5) The doctor’s time and energy are limited, that is, his supplying capacity is limited. Let his limited energy be T , and then the patient number he can interview when he is conscientious is $\frac{T}{e_1 + p e_2}$.

3.2 The doctor's and the patient's utility as well as their strategic choice

The patient's initial utility function is: ^{[12][13]}

$$U_0 = pq_l + (1-p)q_h$$

When the doctor price on marginal cost and be conscientious, the patient's expected utility function is:

$$U = q_h - e_1 - pe_2$$

For the patient, only when $U > U_0$, it is efficient for him to choose diagnosis and necessary treatment, which means:

$$p(q_h - q_l) > e_1 + pe_2$$

The left of the equation is the exactly total benefits when he has serious illness and is cured; while, the right of the equation is the cost he pays. It may be calculated as follows:

$$\omega = \frac{p(q_h - q_l)}{e_1 + e_2}$$

Wherein, ω is the cost performance for cure of disease. Only when $\omega > 1$, it is efficient for the patient to choose diagnosis and necessary treatment.

The doctor's target is to choose his strategy to maximize his profits when his supplying capacity is constricted.

The game between the doctor and the patient is divided into 3 phases:

(1) The doctor's treatment strategy

The doctor's strategy to maximize his profits is affected by 2 conditions: comparison between his market share and attack ability; comparison between profit rates of "diagnosis" and "treatment", that is,

comparison between $\frac{E_1^i - e_1}{e_1}$ and $\frac{E_2^j - e_2}{e_2}$.

When $\eta_i > \frac{T}{e_1 + pe_2}$, that is, patient number exceeds the number the conscientious doctor may interview, the constriction on his supplying capacity is strong, and thus:

When $\frac{E_1^i - e_1}{e_1} = \frac{E_2^j - e_2}{e_2}$, it will make no beneficial difference when the doctor chooses to diagnose or treat and he will be conscientious.

When $\frac{E_1^i - e_1}{e_1} > \frac{E_2^j - e_2}{e_2}$, the doctor's benefit from diagnosis is greater than that from treatment, he will increase time on diagnosis and decrease time on treatment.

When $\frac{E_1^i - e_1}{e_1} < \frac{E_2^j - e_2}{e_2}$, the doctor will provide over-treatment for the patient.

When $\eta_i = \frac{T}{e_1 + pe_2}$, patient number equals to the number he may interview, the doctor will work at full capacity and thus:

When $\frac{E_1^i - e_1}{e_1} = \frac{E_2^j - e_2}{e_2}$, the doctor will be conscientious.

When $\frac{E_1^i - e_1}{e_1} > \frac{E_2^j - e_2}{e_2}$, the doctor will increase time on diagnosis and decrease time on treatment.

While, because patient number is limited in market, decrease of treatment will not result in increase of patient number and increase of benefits, the doctor will not decrease treatment and will be still conscientious.

When $\frac{E_1^i - e_1}{e_1} < \frac{E_2^j - e_2}{e_2}$, the doctor will provide over-treatment for the patient, that is, he will provide treatment for all patients diagnosed and finally the number he interviews will be smaller than

$$\frac{T}{e_1 + pe_2}$$

When $\eta_i < \frac{T}{e_1 + pe_2}$, if he is conscientious, he doesn't have enough patients but has spare time and energy, then:

If $E_2^i > 0$, the doctor is motivated to provide over-treatment;

Only when $E_2^i = 0$, over-treatment will not happen.

(2) Search for patients and the doctor's strategy to price

According to the above analysis, the doctor's pricing is closely related to market demand situation.

The patient number he may interview when conscientious is $\frac{T}{e_1 + pe_2}$. Suppose there are k doctors, they just meet medical demand in market.

When the doctor number is smaller than k , each doctor's service will fail to meet the demand, then $\eta_i > \frac{T}{e_1 + pe_2}$, and the doctor's optimal pricing will be $(e_1\omega, e_2\omega)$; when the doctor number is exactly k ,

each doctor will work at his full capacity, then $\eta_i = \frac{T}{e_1 + pe_2}$, and the doctor's optimal pricing will still be $(e_1\omega, e_2\omega)$; when the doctor number exceeds k , the doctor's service supply exceeds demand, his optimal pricing will be $(0, 0)$.

4 Conclusions and Suggestion

Two conclusions will be drawn from the above analysis:

(1) The present separately regulating structure of expenditure and price tends to distort behaviors of the doctor (hospitals) as agents.

(2) On the condition of non-separation of hospital and medicine, there is still a motivation mechanism in competing market to drive doctors to provide effective and efficient services.

The conclusions are significant for policies: if the price regulating structure were not changed, the problem would not be solved under the present medical system that medical expenditure has been unreasonably raising. The reasons are: the doctor is superior in grasping information and is possible to induce consumption while the distorted regulating structure turns the possibility into truth.

On the basis of above analysis, the following steps may be taken to reform present medicine price regulating structure:

To change the present distorted methods and prevent medical expenditure from unreasonable rise, it is irrational to regulate more severely; it is rational to deregulate or change regulating structure.

(1) To regulate on the basis of total costs. For example, introduce in system of paying on disease instead of on services.

(2) To raise the ceiling price of doctor's technical services to reform the distorted motivation structure.

(3) To deregulate, allow hospitals to set prices by themselves; meantime, encourage competition to increase market supply capacity.

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Creation of Value Through the Transformation Program in University Teknologi Malaysia

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Abstract: The Ministry of Higher Education (MOHE) of Malaysia has launched its transformation initiative, called National Higher Education Strategic Plan (NHESP) that sets the foundation towards attaining merit and sustainability for the higher education system beyond 2020. One of the initiatives is for one Malaysian university to be in the top 50 of world ranking. Universiti Teknologi Malaysia (UTM) has decided to go for this challenge. To achieve this objective, UTM has to set a very clear and tangible target by setting challenging Key Performance Indicators (KPI). This paper summarizes the transformation initiatives that UTM undertook since 2009, the lesson learnt and good practices that other institutions of higher learning could adopt.

Key words: Value Creation; Transformation; Accelerated; Sustainability

1 Introduction

As a country, Malaysia is undergoing massive and accelerated transformation through national initiatives called Government Transformation Program and Economic Transformation Program (PEMANDU, 2013). Through Vision 2020, Malaysia inspires to be a fully developed nation by the year 2020 (EPU, 2013).

The Malaysian Ninth Plan on 31 March 2006 emphasizes the second phase of the government's effort to achieve Vision 2020. The Ministry of Higher Education (MOHE) of Malaysia has the main role of initiating the mission to raise the capacity for knowledge and innovation, as well as encouraging a first class mind set to the nation. The desired human capital should be knowledgeable, skillful and possess a superior personality.

In relation to these needs, the National Higher Education Strategic Plan (NHESP) was formulated in 2007 with the vision to transform higher education within the context of establishing Malaysia as an international hub of excellence for higher education (MOHE, 2013). This transformation is the foundation towards attaining merit and sustainability for the higher education system beyond 2020.

There are seven thrusts of NHESP that comprises of 33 initiatives, one of which is to aim for one of the Malaysian universities to be in the top 50 of world-renowned universities by 2020. Universiti Teknologi Malaysia (UTM) has decided to take up the challenge in 2009 when a new Vice Chancellor was appointed in UTM.

UTM knew very well that the good intention of the government would not come with huge allocation of resources and funding. Time is also not at UTM side. Harvard, for example, took 300 years and huge resources to become top ranked university in the world. With such constraints, UTM could not afford to adopt a normal conventional change strategy. Rather UTM has to be creative and innovative by employing very unconventional strategy, by capitalizing the current available minimum resources for maximum impact in a very short timeframe.

UTM is also very aware that the transformation journey is not going to be an easy ride. As such, UTM has to have a proper change management methodology to ensure the success of the noble effort. This paper summarizes the transformation journey, the lesson learnt and good practices that other institutions of higher learning could adopt.

2 Literature Review

Despite the importance of change management in organizations, unfortunately there is a high failure of change management initiatives. For instance, Kotter (1996) reports a failure rate of around 70 percent of all change programmes initiated and Zook and Allen (2001) find that only 88 percent of companies failed to execute their strategies on change. In addition, there is a high failure rate of 85

percent in public sector as well (Donlan, 2006).

There are several reasons contributed for the high failure rate in change management literature. Firstly, there is a fundamental lack of a valid framework of how to implement and manage organisational change (Kotter, 1996). Secondly, there is the lack of a formal strategy execution management process (Russell and Koch, 2009). Based on a survey of 143 organizations, they found that 75 percent of the respondents that were using a formal strategy execution management process were outperforming their peer group. Another reason is that change is often unpredictable. Therefore, change management tends to be reactive, discontinuous, ad hoc and often triggered by a situation of organizational crisis (De Wit and Meyer, 2005).

3 Change Management Framework

As stated above, one of the primary reasons for the high failure rate in change management initiative is the lack of a valid change management framework. As such, in order to reduce the risk of change management failure, UTM has adopted a framework that is based on a typical chemical process engineering model (Felder and Rousseau, 2005), as shown in Figure 1.

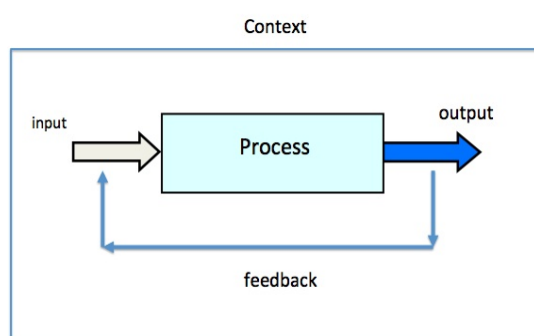


Figure 1 The Change Management Framework employed by UTM

3.1 Context

The context of the transformation of UTM is as stipulated by the Malaysian Government's Ninth Plan towards achieving the Vision 2020 and the National Higher Education Strategic Plan (NHESP) by the Ministry of Higher Education (MOHE) of Malaysia. There are seven thrusts of NHESP that comprises of 33 initiatives, one of which is to aim for one of the Malaysian universities to be in the top 50 of world-renowned universities by 2020. The newly appointed Vice Chancellor of Universiti Teknologi Malaysia (UTM) has decided to take up the challenge.

3.2 Input

With such a clear context and vision from the government, the new Vice Chancellor organized a series of strategic planning sessions with the senior management team of UTM to craft the input for the transformation of UTM from a local and undergraduate centric to an international and postgraduate focused university. The input for the transformation initiatives basically covers three aspects, namely strategy, structure and culture. To measure the outcomes of these inputs, Balance Score Card methodology and a set of Key Performance Indicators (KPI) are used.

3.2.1 Balance Score Card & Key Performance Indicator (KPI)

Balance Score Card (BSC) links the strategies to UTM's vision and mission. The BSC Strategy Map provides a macro-perspective of UTM future direction viewed from the four perspective: stakeholders, internal process, learning and growth, and financial management. Figure 2 shows the UTM Strategy Map (UTM,

Detail implementation of the BSC is translated into Key Performance Indicators (KPI). KPIs that will match the criteria of the current top 10 universities in the world by the year 2020 has been decided. The key common features of these top ranked universities are the emphasis in the numbers of publication (impact factors and citations), postgraduate and doctorate students, post doctorate fellows, Intellectual Properties, spin-off companies, and amount of research grants and endowment fund. Those KPIs are then staggered from 2008 (status quo) for the next 12 years until the year 2020 (Zaini, 2009).

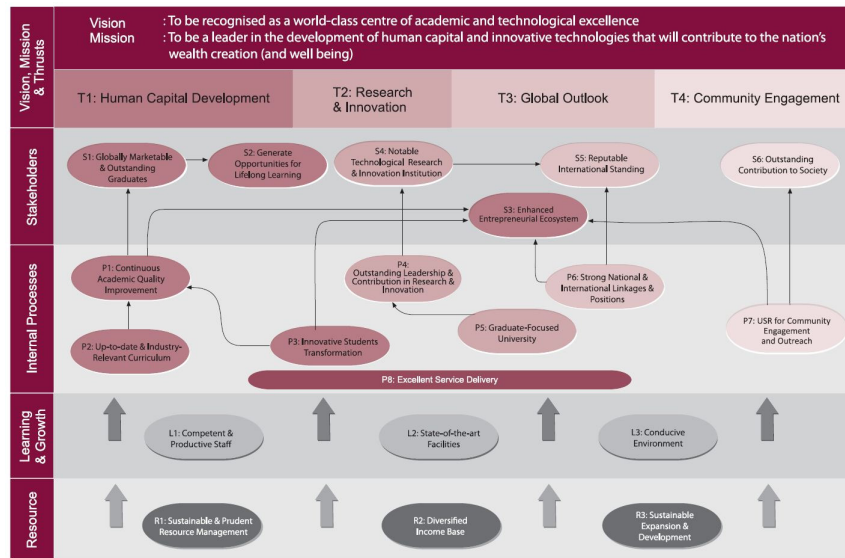


Figure 2 UTM BSC Strategic Map (UTM OCA, 2013)

Besides the tangible KPIs, there are other factors that influence the ranking, such as quality of networking with international partners, quality of student intakes, quality of our graduates and satisfaction of employers that employed our graduates.

3.2.2 Strategy

In order to achieve those KPIs, UTM employs the Blue Ocean Strategy (BOS) methodology to identify critical elements for transformation process. BOS helps in identifying strategic moves that could eliminate and reduce elements in UTM that were taken for granted before but do not add any significant values, as shown in Figure 3 (Zaini, 2012). By eliminating and reducing such elements, UTM has able to release huge amount of resources in terms of manpower, equipment, time and money. At the same time also, UTM has identified strategic moves that could raise and create certain elements that require minimal resources but give huge impact and value creations to UTM.

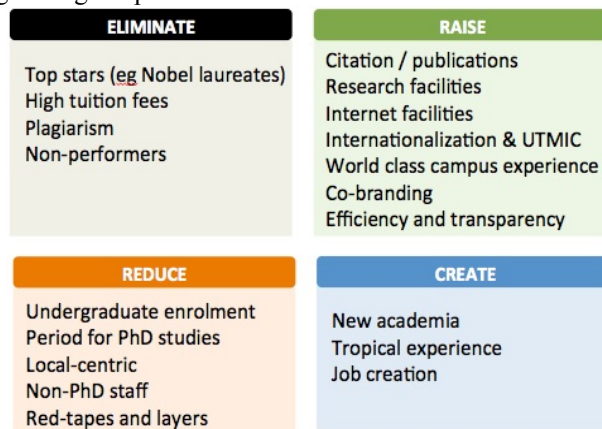


Figure 3 UTM Blue Ocean Strategy (Zaini, 2012)

To increase national and international reputation, networking with top ranked universities such as Harvard, MIT, Cambridge, Imperial College, Stanford, and others were initiated under smart partnership collaboration.

Realizing that government fund is quite limited, UTM has initiated UTM Endowment Fund and unlocking the values of UTM assets and human capital to provide enough funds to cover the expenses of the above initiatives.

3.2.3 Structure

To support the implementation of the above strategy, the administration structure of UTM has been reengineered. One of the main strategic moves is to increase the number of postgraduates from 25% in

2008 to 70% in 2020. Since the number of undergraduate is to be reduced, several faculties and departments were merged hence releasing some resources (academicians, administration staff and finance) that could be redeployed somewhere else. The reduction in the number of academic programs has reduced tremendously the resources and paper works that are required to comply with the national accreditation requirements.

Research Alliances that manages the team research themes in UTM were established under the Office of Deputy Vice Chancellor (Research & Innovation) to strengthen the postgraduate program, research and publication. The ten research themes are transport, water, biotechnology, manufacturing & material, sustainability, energy, nanotechnology, information and communication, construction and knowledge economy.

Academicians are allowed to become full time researchers and to fully supervise postgraduate students. The amount of research fund and graduate assistantships was increased. Monetary incentives were given to academicians who published papers in indexed and high impact journals and whose doctorate students graduated on time. The yearly assessment has been revised to include the number of publications and doctorate students. A publication unit is established to facilitate and guide academicians and postgraduate students on journal writing and publication skills. The number of post doctorate fellows is increased to strengthen research and publication activities in major research groups that have significant amount of research funding and doctorate students.

3.3.4 Culture

The organization structure and strategy should be supported with the right value and culture of the campus community. A wholesome culture will create an intellectual ecosystem that encourages high performance, integrity, healthy living, creativity and innovation. Consciously, UTM has decided to focus on developing and nurturing three aspects of culture, namely the Culture Knowledge & Learning and Healthy Living.

A fertile knowledge and learning culture in UTM symbolizes our understanding of the concept and appreciation of knowledge. Various activities and programs have been developed to instill the love of knowledge and learning, to encourage thinking, to share academic experience through publication and discourse, to encourage new research areas, to inculcate the reading culture, to encourage creativity, and to implement innovation.

The entire UTM community needs to take care of their health and optimize their strength. With a healthy body and sharper mind, it is thus easy for the staff of UTM to perform various major and challenging assignments in our endeavor to advance the institution and the nation.

3.3 Process

To ensure timely implementation of the strategies, the University has set-up a new unit called UTM Transformation & Risk Management Unit (TRM). The TRM office is the secretariat to conduct more specific planning programs and ongoing monitoring. The Director of TRM is appointed as a member in the University Management Committee reporting on the development of the transformation program on regular basis. The transformation program consists of 40 task forces and 184 projects that were administered under five programs, namely Synergy, Sunrise, Tropicana, Job Creation, and New Academia, as shown in Figure 4.

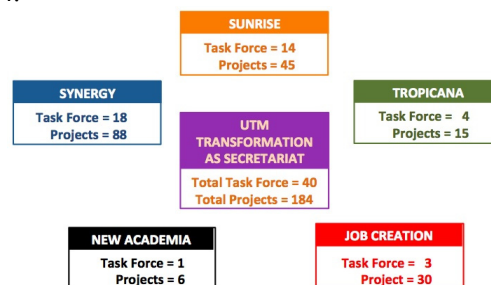


Figure 4 The Five Programs for UTM Transformation (Zaini, 2012)

The transformation projects are executed through project team whose members are representatives of various units in UTM to ensure multidisciplinary approach and enhancement of effective communication. To ensure high commitment of project team members, their contribution in the projects are included in the annual assessment exercises.

The TRM has employed a methodology to ensure smooth implementation of the various programs

and projects, called VACCINE (Value Creation Acceleration through Creativity and Innovation Experience) (Ahmad, 2010), as shown in Figure 5. VACCINE is about facilitating organization to harvest the enormous but largely untapped human capital inside the organization to create exceptional values. VACCINE focuses on the middle managers that have been identified as the future leaders to leverage massive cultural changes towards the creation of Innovation Culture in the organization. VACCINE starts with the harvesting of “pains” in the organization that are then blended with the vision of the Vice Chancellor to come up with transformation projects.

During the Assess Phase, the project teams need to conduct a thorough analysis on the project and to propose the need statement and resource requirement. Once the project is approved by the University Management Committee, the project will be implemented in three stages, namely piloting (Stage 1), consolidation (Stage 2) and enterprise-wide implementation (Stage 3). The preparation of project report is during the Final Phase.

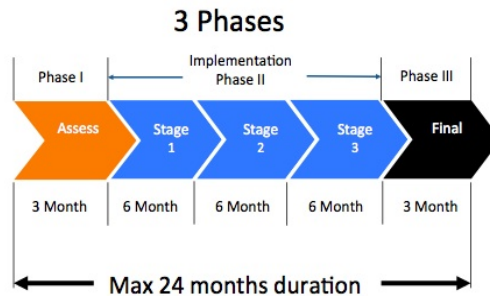


Figure 5 VACCINE Methodology (Ahmad, 2010)

3.4 Output

With a very clear KPI and concerted effort to realign and synergize all resources, UTM has exceeded almost all the critical KPIs that were set, as shown in Table 1. UTM SCOPUS publication, ISI impact factor and SCOPUS citation have increased (2008-2012) by 121%, 880% and 304%, respectively. Significant increases are registered for the number of postgraduate students (184%) and doctorate students (251%) for the duration from 2008-2012. Dramatic increased in the number of Intellectual Property (157%) and amount of endowment fund were also registered during 2008-2012.

Table 1 VKPI for UTM (Zaini, 2013)

Indicators	2008	2012 (target)	2012 (Actual)	2020 (target)
1 Staff with PhD	737	1300	1143	2100
2 SCOPUS journals	678	2500	1500	15,000
ISI impact factors	153	1200	1500	7000
SCOPUS citation	1372	5000	5552	50,000
3 Postgraduate (%)	25%	50%	53%	70%
Postgraduate no.	4,850	11,500	12,883	14,000
PhD students no.	1269	4000	4455	7000
4 Mean Intake CGPA	3.11	3.60	3.71	4.00
5 Research grant (RM m)	124	120	87	400
6 Intellectual property	1075	3000	2770	10,000
7 Spin-off companies	1	100	18	1000
8 Staff research load	30%	55%	55%	70%
9 Endowment (RM m)	0	50	50	500

The achievement of the KPIs has created motivation and inspiration within the internal eco-system in UTM and its stakeholders, hence providing the required momentum and stamina for UTM to reach the targeted destination of being in the top 50 universities in the world by 2020, as set by MOHE. MOHE in particular is very satisfied with the achievements of UTM despite giving only very minimal funding and resources. Since MOHE has seen the promising progression of UTM to achieve one of its main targets, MOHE has agreed to provide additional funding and support to UTM to accelerate further the transformation process in UTM. In fact MOHE has openly encouraged other universities in Malaysia to learn and emulate the strategy that was employed by UTM to transform itself to the current state. UTM also has been invited by numerous local and international universities and organizations to share its success story.

The biggest challenge to date is to change the mindset of UTM staff from status quo and complacency to a new mindset suitable to response to challenges in achieving the noble target. Hence, based on UTM experiences, it is suggested for universities who want to go for a similar journey should embark first with the mindset change initiative.

3.5 Feedback

Being prepared to improve weaknesses and limitations is a progressive and excellent work culture that needs to be nurtured. UTM practices transparent re-evaluation process with an open mind to gather feedbacks from stakeholders on how to enhance the effectiveness of the strategy, implementation methods, outcomes and expected impacts. Continuous feedbacks are gathered through regular formal scheduled meetings with the Board of Directors, senior management team, staff and the public. UTM also provides an online feedback portal, idea@utm.my for everyone to give ideas, suggestions or comments.

4 Conclusion

The transformation program of UTM has delivered its intended outcome. Almost all of the KPIs that were set in 2008 have outstandingly surpassed the targets in 2012. The proposed Change Management Framework that comprises the five important elements, namely the context, input, process, outcome and feedback has guided UTM in navigating the uncharted journey of change management to reach its intended destination on timely manner. The setting up of the UTM Transformation and Risk Management Division that oversees the implementation of the transformation strategies and its deployment of VACCINE process methodology has enabled UTM to reduce the risk of failure that normally happen in other change management initiatives.

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Understanding the Impact of ‘Hard’ and ‘Soft’ elements of TQM in South-East European Firms

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Abstract: The study emphasizes on the understanding of the impact of ‘hard’ and ‘soft’ elements of TQM in South-Eastern European (SEE) firms in Albania, Bulgaria, Bosnia-Herzegovina, Greece, Macedonia, Montenegro, Serbia and Romania. Thus, 350 questionnaires were collected out of 1000 from different industry sectors in order to have reliable statistical measurements of the ‘hard’ and ‘soft’ side of TQM. Hence, this study adopts an exploratory rather than a confirmatory research approach. This approach seeks not only to investigate firms’ awareness and perception to TQM but also explores to what extent are firms’ familiar with TQM tools techniques, and systems as well as TQM philosophies and principles. Therefore, it can be noted TQM in these SEE firms is neither resisted nor directly accepted, rather they tend to see it from a technical aspect, being familiar and understanding only the essential of its ‘hard’ elements and less the ‘soft’ elements.

Key words: TQM; ‘Hard’ elements; ‘Soft’ elements; South-Eastern Europe

1 Introduction

TQM originated early 1970s in Japan and has been further developed in USA and other Western European countries. Many authors now see it as having been superseded by Business Process Reengineering (BPR), where as others argue that TQM is still one of the most promising management approaches, and the underlying codes of the two are rather similar. During 1980s and 1990s TQM drifted to influence countries as well as regions and was seen as revolution in management methods and organizations recognized the need for a deeper focus, where TQM mainly spread to Europe. Its emergence generated enormous quantities of literature and journals that have been focusing on the analysis and principles of how TQM should be implemented in firms. According to Oakland (1989) TQM requires to gain ground continuously and become a way of life in many firms. Therefore, TQM cannot become a way of life by night or immediately. Time is the most important factor in order to align the proper TQM philosophies and concepts as well as tools, techniques and systems into firm’s culture (Goetsch and Davis, 2010).

Time, resources, experience are not the only imperative that TQM requires. Human resources are as much required for TQM in order to succeed; by this we mean specifically Top management and Middle management. Hence, it could be noted that firms understanding of TQM is focal point within a firm and spreading information around. As Morgan and Murgatroyd (1997) point out from their evidence that TQM understanding is sometimes limited in firms’. For this reason, TQM can be understood differently by managers and employees working within the firm. The issue that arises is that, how can TQM become “a way of everyday life” within a firm when managers and employees do not understand it totally? Hence, the purpose of this study is to explore firms understanding of TQM extent in wider approach such as the SEE region.

This research provides insights of a qualitative study that was conducted in the firms in South-East European Countries (Albania, Bulgaria, Bosnia-Herzegovina, Greece, Macedonia, Montenegro, Serbia and Romania). Basically, one hundred (100) interviews were conducted with top and middle managers from these firms. The rationale of using qualitative approach was in order to dig underneath the quantitative data, testing the meaning of TQM concept from firms’ top and middle managers and their view of linkages to wider individual and firm processes.

2 Theoretical View

According to Fotopoulos and Psomas (2008) gurus such as Juran’s quality of trilogy, Deming’s 14 points as well as plan, do, check, act cycle, Crosby’s quality management absolutes, Garvin’s dimensions of quality, Ishikawa’s cause and effect diagram, Feigenbaum’s steps of quality, Taguchi’s effort to turn firms into using statistical process control, and many other gurus respectively have represented the most vital elements of the TQM framework. There is no unique or specific model for

implementing TQM, since it is a network of interdependent elements consisting of tools, techniques, systems, philosophies and concepts. However, TQM implementation is nearly never 100 percent because some firms implement some elements, where as some implement other elements.

According to the Deming's (1986) phrase "in God we trust – others must use data analysis" it is clear that his point was emphasizing on management techniques, systems, tools that "hard" elements of TQM incorporates. Therefore, management tools and techniques are considered as mean collecting and displaying information in manner to provide a helpful objectives to the human in order to grasp thoughts and ideas that when are applied to physical processes, cause the processes to yield accurate results and better decision making (Goetsch and Davis, 2010). The TQM literature offers a wide range of tools, techniques, systems and methodologies. However, some of them are quite simple; where as some are more complex. The most common 'hard' elements of TQM detected in the TQM literature are (Table 2): statistical process control, ISO 9000 series, HACCP, kaizen approach, JIT, six sigma, EFQM, 5S's, scatter diagrams, benchmarking, quality function deployment, run charts and control charts, pareto analysis, matrix diagram, histograms and process charts, tree decision diagrams, critical path analysis and fishbone or Ishikawa diagram.

Table 1 The 'Hard' and 'Soft' TQM elements identified in the Total Quality Management Literature

Statistical Process Control	Total Employee Involvement
ISO 9000 series	Continuous Improvement
HACCP	Strategic Quality Planning
Kaizen Approach	Continuous Training
JIT	Teamwork
Six Sigma	Empowerment
EFQM	Customer Satisfaction
5S	Information & Analysis
Scatter Diagrams	Supplier Management
Benchmarking	Top-Management Commitment and Support
Quality Function Deployment	Democratic Management Style
Run Charts & Control Charts	Culture Change
Pareto Analysis	
Matrix Diagram	
Histograms & Process Charts	
Tree Decision Diagram	
Critical Path Analysis	
Fishbone or Ishikawa Diagram	

On the other hand, a number of 'soft' elements were introduced in order to increase the awareness of TQM philosophies and concepts for firms' overall improvement. 'Soft' TQM elements incorporate the following: total employee involvement, continues improvement, strategic quality planning, continues training, teamwork, empowerment, customer satisfaction, information and analysis, supplier management, top-management commitment and support, democratic management style, culture change.

A high number of firms around the world have adopted some elements of TQM and continually demonstrate significant benefits. Also it is noted that there is a high demand for improved measures of firms' performance in relation to TQM. Yet an interesting study conducted by Psychogios *et al.* (2009) on the impact of TQM on Middle Managers working in the Greek service industry provided some insights how they perceived TQM and its both elements, however this was done only for the service industry and in a particular country that did not fulfill the requirements of a region.

There are many studies on analyzing 'hard' and 'soft' elements of TQM, however, one can argue that they all have focused on statistical analysis such as the study of Fotopoulos and Psomas (2008) as well as Psychogios *et al.* (2009) that focused on constructing validity through confirmatory analysis. Yet, Talib *et al.* (2011) developed a study in order to priorities the practices of TQM through an Analytical Hierarchy Process (AHP) focusing on service industry. Therefore it is an interesting point to

research such kind of relationship in region which has not been explored yet and crosscheck similar studies such as that of Psychogios *et al.* (2009) for reliability and validity not only in the service industry or in a particular country rather than in region such as SEE where no light has been shade on TQM in qualitative method.

3 Methodology

The research was conducted in SEE region through questionnaire. Based on the above mentioned 'hard' and 'soft' TQM elements and the results from their familiarity and adoption, a questionnaire was designed and reviewed by quality management academics and professionals and tested through a pilot study. Initially, the present research was designed on the basis of received 350 questionnaires (respondents) out of 1000 that were sent to firms, visits, e-mail, fax and posted. This *survey method* has three interrelated advantages. The first is that through this method we aimed to come up with conclusions referring to firms in SEE region and the impact of TQM. The interest and familiarity of firms with the hard and soft side of TQM is another point that from the methodological perspective firms from different sectors answered the survey and that were mainly middle and top level manager. Therefore, the survey obtained a variety of responses that include different views on TQM; it was important and feasible for such as TQM issues to have access to this middle and high level managers.

4 Findings

As mentioned earlier, this study is interested to identify the impact and familiarity of the hard and 'soft' aspect of TQM. One way would be to explore the effect from each of these 'hard' and 'soft' aspects of TQM on individual attitudes. However, this would result to miss the whole picture of TQM we intend to explore. In other words, this study was interested to analyze the soft side and the hard side as a whole and not as separate entities. Thus, two types of measures of 'soft' and 'hard' TQM were developed. We start in this case with the 'soft' elements since it got lower

The first or the 'soft' side of TQM is based on philosophies and concepts and this is done through the summation of variables, which is formed by combining several individual variables into a single composite measure (Hair, *et al.*, 1998). Therefore in our case regarding the soft side of TQM, the sum of 10 TQM elements can form one single variable. There are two basic arguments for following this method. The first one is related to the theoretical notion that these concepts together compose what 'soft' TQM is all about explained in chapter three. Thus, by adding these concepts together we can represent the multiple aspect of 'soft' TQM in a single measure. The second argument is related to the statistical reliability of these concepts, which allow us to add these items together. More specifically, the diagnostic measure that has been used is *Cronbach's Alpha*, which is the most widely used to test of reliability coefficient and construct validity (Nunnally, 1979). The lower value of *Cronbach's Alpha* that is generally agreed is 0.7. However, this may decrease to 0.6 in exploratory research (Robinson *et al.*, 1991). Thus the ten identified items that compose the summated variables *Soft TQM* presented a moderate level of reliability with alpha coefficient over 0.6. This level of reliability is accepted since our research is an exploratory one.

However, one could claim that this is quite arbitrary approach since there is no confirmed theoretical basis that these ten concepts are parts of a single phenomenon. In respond to this criticism we have chosen to develop a second type measure of 'soft' TQM, which now includes most of the concepts described earlier. Once again the purpose was to explore the 'soft' side of TQM as a whole and not to use each item separately. In contrast, we can select those that they seem to represent most this complex concept. One basic method of achieving this is through the *Exploratory Factor Analysis* (EFA) (Lewis-Beck, 1994).

These analyses provide variables that seem to be the most representative of 'soft' TQM. According to the standard practices of EFA with rotation to an *orthogonal solution* by variemax method (Hair *et al.*, 1998) was used.

After the purification procedure the following factor structure emerged as shown in the table below. *Quality Driven Culture* as the first factor of 'soft' TQM concepts. *Management Commitment and Customer Satisfaction* was the second factor, whereas *Continues Improvement* the third one. The first factor is composed of the concepts of *training, teamwork, employee empowerment and quality culture*, the second factor is composed of *strategic quality, customer orientation & management commitment* and the third by the concepts of *continues improvement, scientific decision making & quality improvement*.

The table below shows that alpha coefficient for each emerged factor that confirms the statistical reliability of the three new variables. Thus, the measurements of the new variables can be obtained by a simple summation of the items included in each factor. From the three identified factors, one (Factor A – *Quality Driven Culture*) and second (Factor C - *Continues Improvement*) present regular levels of reliability with alpha coefficient values over 0.7. The other factor (Factor B – *Management Commitment and Customer Satisfaction*) presents also alpha factors greater than 0.7 but it are lower in comparison to other two factors. In addition, moderate and accepted level of reliability with coefficient alpha is between 0.6 and 0.7 (Nunnally, 1979; Churchill and Peter, 1984; Robinson *et al.*, 1991).

Table 2 Names of Emerging Factors and Included TQM’s ‘Soft’ Elements

Factors	TQM Philosophies & Concepts	Name of new variables	Alpha coefficient
A	1. <i>Training and education on the job is promoted by management</i> 2. <i>Teamwork is favored</i> 3. <i>Employees are empowered to get involved on decision concerning work</i> 4. <i>Quality Driven Culture</i>	Soft TQM 1 <u>Quality Driven Culture</u>	0.758
B	5. <i>Quality is strategically based</i> 6. <i>The organization is customer oriented</i> 7. <i>Top Management commitment and support</i> 8. <i>Continuous Improvement</i>	Soft TQM 2 <u>Management commitment and Customer Satisfaction</u> Soft TQM 3	0.704
C	9. <i>Scientific approach is used for decision making and problem solving</i> 10. <i>There is long term commitment towards quality improvement</i>	<u>Continues Improvement</u>	0.740

Based on the above test we notice that Soft TQM 1 or factor A gained higher alpha coefficient but also worthy to mentioned that it consisted of four items / principles of TQM that are closer and belong to *Quality Driven Culture* with alpha coefficient 0.785. The second factor that emerged in ‘soft’ side or with other words the second most familiar factor is *Continues Improvement*, with 0.740 alpha coefficients. Finally the lowest factor in this case gained *Management Commitment and Customer Satisfaction*, with 0.704.

The next step in our analysis is to examine how we can measure the ‘hard’ side of TQM. As mentioned this side consists of a variety of management practices that can be found in many Quality Management books, they are globally accepted as useful quality improvement techniques.

Again a purification procedure was needed for the ‘hard’ side in order to classify the emerged factors. The first factor that emerges from the ‘hard’ side is *Quality Systems. Lean Operations* and *Quality Planning & Control* emerged as the second and third factors. Now, the first factor is composed of *HACCP. ISO 9000 series* and *EFQM*. The second factor is composed of *Benchmarking, Kaizen Approach, Scatter Diagrams, Fishbone Diagram, Pareto Analysis, Just In Time, 5 S’s and Histograms & Process Charts*. Finally, the third factor is composed of *Statistical Process Control, Run & Control Charts, Six Sigma* and *Critical Path Analysis*.

Accordingly, from the tests shows in the table below, we can automatically notice that ‘hard’ side gained higher alpha scores compared to ‘soft’ side of TQM. Thus, the alpha coefficient for each emerged factor as said earlier confirms the statistical reliability of each variable. The summations of each factor provided the following reliability based on from the greater one from the three identified factors and that, first (Factor B – *Lean Operations*), second (Factor C – *Quality Planning & Control*) presented high level of reliability and validity as well, the cronbach’s alpha for both factors is higher than 0.9. The other factor (Factor C- *Quality Systems*) presents also reliable coefficient 0.8 which solid in this case.

Table 3 Names of Emerged Factors and Included TQM's 'Hard' Elements

Factors	TQM Tools, Techniques & Systems	Name of new variables	Alpha coefficient
A	1. HACCP 2. ISO 9000 series 3. EFQM	Hard TQM 1 <u>Quality Systems</u>	0.837
B	4. Benchmarking 5. Kaizen Approach 6. Scatter Diagrams 7. Fishbone Diagram 8. Pareto Analy 9. Just In Time 10. 5 S's 11. Histograms & Process Chart	Hard TQM 2 <u>Lean Operations</u>	0.945
C	12. Statistical Process Control 13. Run & Control Charts 14. Six Sigma 15. Critical Path Analysis 16. Quality Function Deployment	Hard TQM 3 <u>Quality Planning & Control</u>	0.909

Therefore, the results show that firms in SEE region general are familiar and in particular more with Hard TQM 2 or Factor B – *Lean Operations* tools with 0.945 alpha coefficient and then comes the Hard TQM 3 or Factor C- *Quality Planning & Control* with alpha coefficient 0.909. Finally in this test Hard TQM 1or Factor A – *Quality Systems* gained less alpha score 0.837 but this is also considered to higher than the normal scores.

5 Conclusion

To sum up, firms in SEE region are more familiar with 'hard' side than with the 'soft' side of TQM. This might also mean that firms in SEE region are not implementing and working on 'soft' side as much as they work on the 'hard' side. Nevertheless, the 'soft' side incorporates people and it is more difficult to manage, for this reason it is recommendation that SEE firm focus more toward the 'soft' side of TQM in the future.

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Improving the Efficiency of Sci-tech Novelty Search Based on EndNote *

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Abstract: EndNote is a good reference management software, widely used over researcher, but not popular in the novelty work. The functions of EndNote in the Novelty work are introduced. EndNote has the comparative advantage relative to NoteExpress in the work of papers record searching report. This work also can promote the Novelty staff to keep up the advancement of modern technique. This work suggests that EndNote will play an increasingly important role in Sci-tech novelty search.

Key words: EndNote; Reference manager software; Sci-tech novelty search; Academic evaluation

1 Introduction

As powerful management software for bibliographic references, EndNote was developed by the U.S. Scientific Information Institute. By using Endnote, users can easily create their personal reference libraries, which are known as EndNote Libraries. In addition, users can not only classify the various references stored in their personal reference libraries, but also can edit the stored documents efficiently when necessary. Furthermore, the bibliographic fields can be modified following the requirements for distinct bibliographic styles and contents, and then the proper citations and bibliography can be inserted into word processing documents in hand^[1].

EndNote is widely used in scientific communities, mainly for managing bibliographic, writing scientific papers, and applying projects. Example, The applications of EndNote in bibliographic management and thesis writing were discussed in literature^[2]; EndNote can be used to improve the efficiency of editing work^[3].

When receiving a novelty subject, we need search a lot of literature relevant to the subject based on the technical points and novelty points, and then compare and analyze the literature. For the great amount of libraries and their literature, the outstanding talent of management literature is necessary. Reasonable management of literature can greatly improve the efficiency of the work of the sci-tech novelty, which gives novelty consultant more time to focus on filtering and comparing the relevant literature. Hence it indirectly improves the quality of science and technology novelty reports.

Even though the software of NoteExpress was applied to improve the efficiency of novelty search in literature, the authors failed to edit their own styles for the document requirements^[4]. In this paper, we produce a variety of output styles based on the Templates in EndNote. It is noted that the foreign literature databases only support the EndNote data output format, and therefore EndNote has the comparative advantage relative to NoteExpress in the foreign Novelty work.

When evaluating the personal academic level or applying the key disciplines, we need search the scholar's papers in ISI and Ei village databases, which only have the EndNote data output format. Hence EndNote has the comparative advantage relative to NoteExpress in the work of papers record searching report.

2 Using EndNote in Writing Novelty Report

We need to manage a large amount of literature during searching, analyzing literature, and writing report in the novelty. By Using EndNote, a great bibliographic management software, we can manage the literature efficiently and orderly.

2.1 Using EndNote in searching literature

Receiving a subject, a novelty consultant should communicate with clients about the content of subject, and then develop search strategies. The novelty consultant searches the related literature in the major databases, and pastes the related information of literature into word document manually, which

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makes the information of the literature messy and disorderly.

By using EndNote, we can create the client database, store the literature in EndNote format, and import all literature into the client database, once for all. All foreign databases support EndNote format, which provides a great convenience for using the software in novelty.

The repetition rate of the retrieved documents is very high, during searching the literature in databases. For instance, the journals in VIP and CNKI overlap severely (about 43.795% for VIP and 86.956% for CNKI^[5]). This situation also occurs in the English databases, such as ISI and Ei village. Deleting the duplicated literature manually is tedious and time-consuming. On the other hand, by using the ‘automatic check the duplicate literature function’ of EndNote, We can remove the duplicated literature in the client library, once for all, which is easy and efficient.

2.2 Using EndNote in analyzing literature

In the novelty, the literature that we search includes journals, thesis, conference papers, scientific and technological achievements, patents and so on. By using EndNote, we can import all kinds of the literature into the client library, remove the duplicated literature, classify the literature by types, and sort the literature by time automatically and efficiently, once for all. During analyzing the literature, sometimes the abstracts of the literature do not contain enough information, that is, the abstracts can not adequately reflect the contents of the papers; in such a case, we should open and read the papers. By using the ‘link Library function’ of Endnote, we can open the electronic version of the papers directly, which can save a lot of time and manage the literature efficiently.

2.3 Using EndNote in writing novelty report

We should write the novelty report according to a certain format, right after analyzing the literature. Novelty report is rather different from journal article in that the literature related the novelty subject not only require a specific style, but also the abstracts of the literature. There is no specific style for novelty report in EndNote. Consequently, we need to fully understand the Templates language of EndNote, if we want to program and produce the desired literature output format.

For instance, we can program the format of novelty report’s attachment as follows. Click ‘Edit—Output Styles—Edit’, and then choose a style contained in EndNote that is similar to the required one. Then we program the styles of Journal Article, Conference Proceedings, Thesis, and Patent according to the requirements in EndNote Templates, respectively.

Because the novelty report’s attachment style requires the abstract of the literature, we should program ‘Layout’ in EndNote Templates as follows. We number each reference for [Bibliography Number] in ‘Start each reference with’ of EndNote Templates, and then write ‘Abstract’ at the end of references. The detailed results are shown in Figure 1, Figure 2 and Figure 3 respectively.

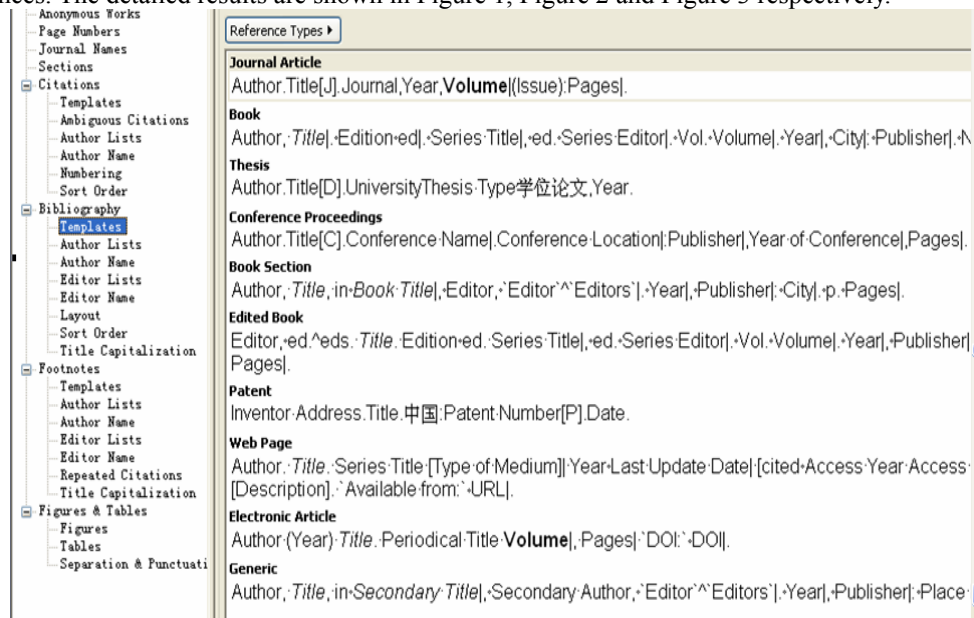


Figure 1 Novelty Report Accessories Output Style

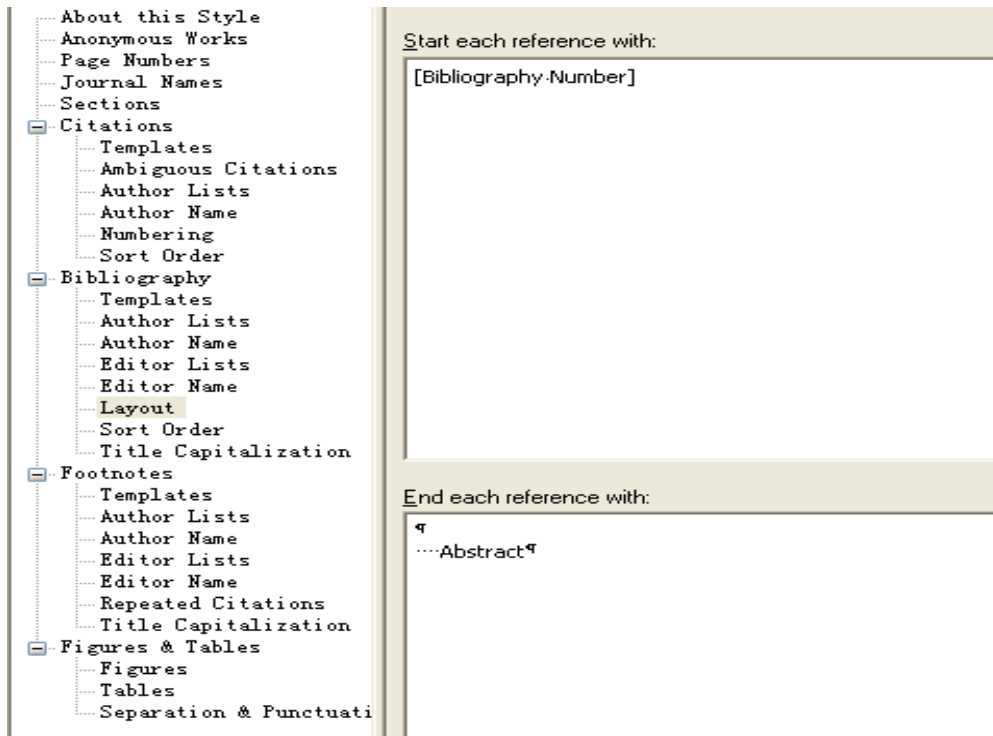


Figure 2 Novelty Report Accessories Output Layout

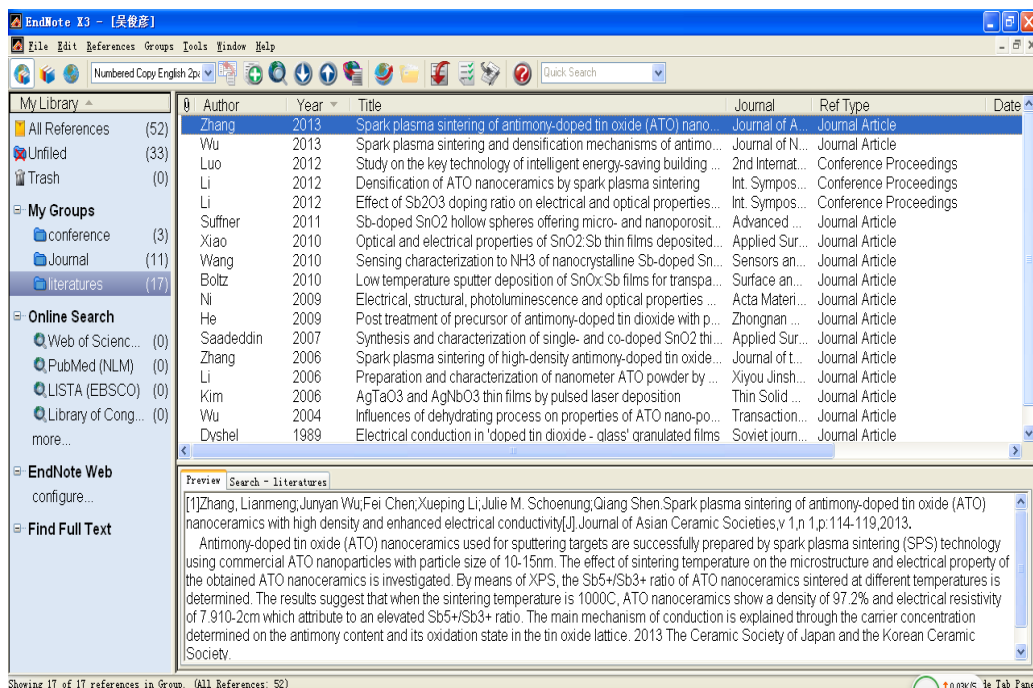


Figure 3 The Instance of Novelty Report Accessories Output

As long as mastering the language of EndNote Templates, we can program whatever output format you want. By using the above prepared output style, we can export the attachments in the written novelty report efficiently.

3 Using EndNote in Searching Scientific Papers

We need to retrieve the papers of scientists in ISI an Ei Village databases for talent introduction,

key disciplines declaration, talent scheme, and other supporting materials. By using EndNote, we can create a personal database, and classify the papers by retrieval type, such as SCIE, EI Village, and CPCI-S. And also we can classify the papers by the types (Journal article or conference papers), and the published time. The important one is that we can program the suitable output format for the papers. By using EndNote, we can improve the efficiency and quality for retrieving papers.

For instance, every year we should retrieve all papers of Wuhan University of technology, which are indexed by SCIE, EI Village, and CPCI-S, and then upload the papers into the library's website according to a certain format. There are about one thousand papers indexed by EI every year. If the papers in the above format are sorted out manually from the database, such work is tedious and time-consuming. On the contrary, by writing the Templates in EndNote according to the desired export format, searching the scientific papers is of great efficacy, which is shown in Figure 4.

Author	Year	Title	Journal	Ref Type	URL
Zhu	2011	Comprehensive evaluation method o...	1st Internati...	Conference ...	http://dx.do
Zhu	2011	Strain measurement in two-dimensio...	2011 Intern...	Conference ...	http://dx.do
Zhu	2011	Resistance responses of polymer-m...	2011 Intern...	Conference ...	http://dx.do
Zhu	2011	Research on lateral shearing deform...	Internationa...	Conference ...	http://dx.do
Zhu	2011	Effect of environmental factors on the...	5th Internati...	Conference ...	http://dx.do
Zhuang	2011	Modeling approach for discharge rat...	2011 Intern...	Conference ...	http://dx.do
Zhuo	2011	Research on logistics informatizat...	2011 Intern...	Conference ...	http://dx.do
Zong	2011	Research on safety evaluation for ov...	1st Internati...	Conference ...	http://dx.do
Zou	2011	Feasibility analysis on digital integrat...	2011 2nd In...	Conference ...	http://dx.do
Abbod	2011	Ensembled neural networks for brain ...	Biomedical...	Journal Arti...	http://dx.do

Preview Search - 2011whlgEI收录

<题名>=Pore structure control of starch processed silicon nitride porous ceramics with near-zero shrinkage
 <著者>=Chen, Fei;Ma, Lingling;Shen, Qiang and Zhang, Lianmeng
 <单位>=Key Laboratory of Advanced Technology for Specially Functional Materials, Ministry of Education, Wuhan University of Technology, Wuhan 430070, China
 <来源>=Materials Letters, 65(9): 1410-1412 2011
 <年份>=2011
 <语种>=English
 <文献类型>=Article
 <摘要>=Zirconium phosphate (ZrP2O7) bonded silicon nitride (Si3N4) porous ceramics were prepared using starch powder as the pore forming agent and pressureless sintering technique. The obtained results show that the porosity of the sintered starch processed 25 wt.% ZrP 2O7 bonded Si3N4 porous ceramics is 36-62.3%. All the samples exhibit surprisingly low linear shrinkage. The pores are formed by the continuous reaction of ZrP2O7 at 250 C and burnout of starch at 550 C, during which a large amount of pores with pore sizes of less than 0.5 m and 10 m are formed. 2011 Elsevier B.V. All rights reserved.

Figure 4 The Papers of Wuhan University of Technology Indexed By EI Village in 2011

4 Conclusions

When mastering the various functions of EndNote, we can eliminate a lot of manual steps, and improve the efficiency of the Novelty work and the scientific papers' retrieval. By using EndNote, we can write novelty reports and retrieve scientific papers indirectly, and consequently improve the quality of novelty reports and scientific papers' retrieval reports. This work suggests that EndNote will play an increasingly important role in Sci-tech novelty search.

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Research on Actuality and Countermeasures of Innovative Talents Incubation for RG Petro-Machinery (Group) Co. Ltd

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Abstract: Innovation is the eternal theme of human beings as well as the fundamental way of enterprise development. To enhance the ability of independent innovation, enterprises must pay attention to the innovative talents incubation. In this paper, based on the concept and features of innovative talents, we analyze the current situation of innovative talents incubation of RG. Then point out the main problems existing in innovative talents incubation. At last, we put forward some countermeasures and suggestions about innovative talents incubation for the company.

Key words: Innovative talents; Talents incubation; RG Petro-Machinery (Group) Co. Ltd

1 Introduction

Innovative talents are the enterprise security of productive efficiency and economic benefit, directly related to the survival of enterprises. Innovative talents are the core and backbone for enterprise to innovate, directly related to the sustainable development of enterprises. Moreover, innovative talents are the solid foundation for the enterprise to develop, directly related to the competitiveness of enterprises. Only adapting to this changing trend and speeding up the cultivation of innovative talents, the enterprises can hold long-lasting competitive advantages.^[1] Although the innovative talent is very important, Chinese enterprises have not paid enough attention to it. At present, most of Chinese enterprises tend to recruit employees in the way of “Adverse demand”, aiming to reduce the cost of human resources. They think there is no need recruiting highly educated and high intellectual talent as long as the work can be done. Let alone the consciousness of innovative talents cultivation.^[2] This is one of the main reasons why Chinese enterprises’ competitiveness is not strong. Therefore, to change this situation and make full use of human resources, enterprises should take the innovative talents incubation as the development strategy and focus on the implementation of it. Here, this paper will take the RG for an example, and prove how enterprises should cultivate innovation talents from the perspective of practice.

2 Types and Characteristics of Innovative Talents

2.1 The concept and types of innovative talents

To understand the connotation of innovation talents comprehensively, we should learn it from three aspects: talent, innovation and creative thinking. Innovative talent is the one who have strong innovative consciousness and unique innovative thinking and strong ability to innovate. They are able to get innovative achievement and create value for the enterprise through their innovative labor.

Innovative talents include scientific and technological personnel engaged in R& D activities^[3], Compound talents who both have certain professional knowledge and international vision, managerial and administrative personnel engaged in the management work, as well as senior workers, technicians, senior technicians and other professional and technical and skilled talents who have specialized knowledge and the corresponding operation skills in the first post and can solve the practical problem.

2.2 Characteristics of enterprise innovative talents

First, the strong innovative consciousness. Generally speaking, innovative talents should have the strong sense of innovation and the courage to break conventional rules to make innovations. Innovation consciousness is the prerequisite of innovation^[4]. Only under the guidance of the innovation consciousness, can we have the strong motivation to innovate, and then set up the goal of innovation, make full use of creative potential^[5].

Second, the unique creative thinking. In the innovation process, innovative talents are able to create new thinking. Creative thinking is characterized with fluency, flexibility and rigorous logic. It can be either divergent or concentrated. For creative thinking, creativity and creative thinking is the core of the characteristics of innovative talents. The core of innovation is just the innovation ability and innovation spirit.

Third, the strong ability to innovate. Equipped with creative thinking only is not enough, creative talents should also have the ability to turn creative thinking into innovative achievement. Innovation ability is the basis of forming creative thinking^[6]. Besides, the enterprise innovative talents should also have the ability to gain knowledge and information, knowledge integration capability, the ability to find questions and practical ability, etc.

Fourth, the ability to create value for the enterprise. Compared to common innovative talents, Enterprise innovative talents are characterized with creating value for the enterprise. Traditional innovative talents focus more on theory innovation. But enterprise innovation talents pay more attention to find the actual utility of enterprise profit and put into production.

3 The Current Situation and Problems of RG Petro-Machinery (Group) Co. Ltd

3.1 Overview of RG Petro-Machinery (Group) Co. Ltd

RG is located in Wo Long District of Nan Yang City, He Nan Province. It's the oil drilling equipment manufacturing backbone enterprises of China, as well as a domestic base of major national technology and equipment. RG is high-tech enterprises of the State Torch Plan and the national mechanical brand top 500 enterprises, intellectual property advantage enterprises, patent application top 20 enterprises. Its comprehensive strength in the domestic same industry belongs to "top 10", having an important influence on the market both at home and abroad. The company has 16 production plants, including casting and forging, metal processing, assembly or so and 4 drilling equipment integrated test field. The company has perfect scientific research and development system, and has set up a technology research and development institutions in He Nan province oil drilling equipment engineering technology research center, a state-level enterprise technical centers, post-doctoral scientific research workstation matching and infrastructure. The company adheres to the customer-orient marketing idea. It has set up specialized agencies in each big oilfield nationwide. The company's products sell well in each big oilfield, and export to Britain, the United States, and Canada and other 30 countries or regions.

3.2 The current situation of innovative talents of RG Petro-Machinery (Group) Co. Ltd

3.2.1 The academic structure of RG

Staff education is an important index to measure the quality of innovative talents. In 2011, there were 950 people whose degrees are high school and the following degree personnel, accounting for 59% of the total number of employees, down 4.5% from 2007; 604 staffs are college and undergraduate, accounting for 37.7% of the total number, 5.6% more than in 2007; master degree or above (including Dr.) were 49, accounting for 3.3% of the total number, 21 more than the number 28 in 2007, increase rate is 75%.

3.2.2 The innovative talents structure of RG Petro-Machinery (Group) Co. Ltd

In 2011, RG had 885 innovative talents, accounting for 55% of the number of all employees, among which 164 personnel are science and technology personnel and accounted for 18.53% of innovative talents. The number of compound talents were 117, accounting for 13.22% of innovative talents. The number of managerial and administrative personnel were 128, accounting for innovative talents 14.46% of innovative talents. The number of professional technology and skilled personnel in first post are 476 people, accounting for 53.79% of innovative talents.

3.2.3 The title structure of innovative talents of RG

1) The title structure of professional technology and skilled personnel in first post

The professional technology and skilled personnel in first post refers to those who have special knowledge and corresponding operation skills in the front-line positions, and can solve the operation problem as well as key technology problem, including senior workers, technicians, and senior technicians or so. As shown in Table 1, in 2011, the company has 476 such kind of personnel, including 437 senior workers, 37 technicians and 2 senior technicians, accounting for 43.5% of all 1093 senior staffs. Senior workers accounted for 91.8%, technicians and senior technicians account for 7.8% and 0.4% respectively.

Table 1 The structure of professional technology and skilled personnel in first post in 2011 Unit :person,%

	Ordinary workers and below	Professional technology and skilled personnel				total
		Senior worker	technician	Senior technician	subtotal	
Number of personnel	617	437	37	2	476	1093
Proportion	56.5	91.8	7.8	0.4	43.5	100

2) The title structure of managerial and administrative personnel

Managerial and administrative personnel are part of executive staff, they are important to support the good operation of the company. As shown in Table 2, in 2011, RG has 128 managerial and administrative personnel, among which 109 personnel's title are junior or above, accounting for 85.2%. The number of managerial and administrative personnel who have middle or senior titles were 63, accounting for 49.1%.

Table 2 The Title Structure of Managerial and Administrative Personnel in 2011 Unit :Person,%

	managerial and administrative personnel				others	total
	junior	middle	senior	subtotal		
Number of personnel	46	33	30	109	19	128
Proportion (%)	42.2	30.27	27.53	85.2	14.8	100

3) The title Structure of science and technology talents (Engineers)

As shown in Table 3, the engineering and technical personnel of RG are mainly concentrated in the technology center. Among all the 164 employees, 153 belong to the science and technology talents, accounting for 93.4%. Senior engineers account for 18.9% of all engineering and technical personnel, engineers and assistant engineers account for 31.7% and 42.8%. respectively.

Table 3 The Title Structure of Science and Technology Talents in 2011 Unit :Person,%

	science and technology personnel				others	total
	junior	middle	senior	subtotal		
Number of personnel	70	52	31	153	11	164
Proportion (%)	42.8	31.7	18.9	93.4	6.6	100

3.2.4 The structure of high-level talents of RG Petro-Machinery (Group) Co. Ltd.

The company has 79 people with senior professional titles, 6 provincial-level academic technology leaders, and 3 experts who are in the National 863 project planning and enjoy the special allowance of the State Council. Compared with the company's 1093 employees, the proportion of high level talent is not big, but high-level talent in the team to play a leading role. They make the company become a guide-post leading enterprises of technology innovation, as well as an equipment manufacturing enterprises which have great technical strength and strong technical advantages.

3.2.5 The main problems of innovative talents incubation of RG Petro-Machinery (Group) Co. Ltd

1) The lack of awareness of the cultivation of innovative talents

The standardized production and work mode not only counts against the company daily business but also inhibits the innovation of enterprise talents. This is one of the main problems of innovative talent incubation of RG in the regulations of the company; more attention was paid to the standardization of production while the promotion of the cultivation of innovative talents was ignored.

2) The lack of innovative talents

Innovation is an inexhaustible motive force for enterprise development. RG only has 91 high-level personnel, accounting for 5% of the total number of 1603 employees. What's more, there are only 12 experts who are in the National 863 project planning and enjoy the special allowance of the State Council, just accounting for 0.7% of all the staffs. At the same time, the number of middle and above titles in the first operator, administrative management personnel and engineering and technical personnel, are less than half of the total number in these sectors.

3) The lack of training and incentive mechanism of innovative personnel

In the interview of RG, we know that neither the company's compensation system nor employees' occupation planning link to staffs' innovation ability except the sales department. The company did not take innovation as the company's corporate culture and give the appropriate spiritual and material incentives for innovation ability, which weakened the innovation enthusiasm to a certain extent.

4 The Countermeasures of Innovative Talents Incubation of RG Petro-Machinery (Group) Co. Ltd

4.1 Establish culture of innovation

The enterprise culture is the embodiment of corporate values and mission, enterprise culture

will gradually affect employee behavior and values. Excellent enterprise culture is the spiritual pillar of the modern enterprise. The establishments of the culture of innovation makes RG employees focus on innovation, the innovation of enterprise culture has the function of orientation, and cultural innovation will affect every department in the company, not only in the technology center and Engineering Department. Enterprise innovation culture makes the whole enterprise a great improvement, thus achieve a three-dimensional effect of innovation which integrates technological innovation, management innovation and organizational innovation.

4.2 Keep continuous talents innovation

The company should increase the number and proportion of innovative talents. On one hand, the company should pay attention to the cultivation of existing innovative talents, creating the atmosphere of "working for study, learning to work" of. On the other hand, we should also pay attention to the introduction of talents and exchange to outside. In this respect, the company can strengthen technology exchange with research institutes or universities to make up for the lack of knowledge, at the same time; it can also gain talents who have innovative quality and ability for the company.

4.3 Establish incentive mechanism for innovation

To enhance the staffs' enthusiasm to innovation, corresponding innovation incentive system must be established. Specifically speaking, the company should construct evaluation system and perfect appraisal system, then use evaluation index system to measure the company's creative thinking and creative achievements, at the same time, connect innovative achievement with the employees' salary and occupation planning, thus achieve the effect of motivating staffs eventually. What's more, the enterprise should create a good atmosphere of mutual learning, knowledge creation, developing information technology, innovating continuously.

5 Conclusions

The enterprise innovative talent is an eternal topic. With the continuous progress of science and updating of information, the society will make further demands on talents, enterprises are also facing challenge. Facing the lack of innovative talents, in order to allow enterprises to remain invincible in the competition and let the enterprise be long-term sustainable development, enterprises should pay attention to the cultivation of innovative talents, improve staffs' awareness of innovation, strengthen the self-learning and exchanges with universities and research institutes. At the same time, the company should establish and improve the incentive mechanism, keep staffs' innovation enthusiasm and motivation.

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Informally Institutional Reform of Taxi Regulation

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Abstract: There are many informal institutions of taxi regulation causing social welfare loss. The traditional view is that informal institution is a kind of cultural endowments which is essentially immutable or changes very slowly and then can not be created consciously by people. In this paper, the informal institutions of taxi regulation have been found that they are based on the formally regulatory institutions of taxi. This paper argues that the relationship between informal constraints causing social welfare loss and formally regulatory institution of taxi industry and the reform way of informal institution to maximize social welfare.

Key words: Informal institution; Taxi industry; Regulation; Reform

1 Introduction

According to the New Institutional Economics, the institutions provide people with the incentive, and then determine the result. Many scholars taking this view have carried on research on institutional innovation of taxi regulation including entry regulation, fare regulation and quality regulation. But it is a pity that the research scope of these literatures has been confined to formal institution and ignored informal institution which has a strong impact on the taxi market. In fact informal institution plays a so very important role that it can replace formal institution in a certain extent. As North said, "even in the most developed economy, the formal institutional arrangement is decided to choose a small part of the total constraints, people's life is influenced by informal institutional arrangement"(North, 1990). The reason why innovation of informal institution has been ignored is that many scholars consider informal institution as a part of the heritage that we call culture(ibid.: 36-40), in which formal rules have been embedded. So in their opinions, informal institution is essentially immutable or taking centuries to change (Williamson, 2000), so it is called as slow-moving rule while formal institutions as fast-moving rule (Roland, 2004). But the counterevidence have been found by a few researchers that some informal institutions can change faster than formal constraints such as the informal land tenancy rules in Philippines (Ruttan 2006). In Chinese rural area, there are some informal rules permits the private sector of the economy to exist before its reform and open-up which disappeared after collapse of planned economy (Chen 2000). This suggests that there may be both fast-moving informal institutions which would be influenced by informal rules(which we called as operation rules) and slow-moving informal institutions (what Ruttan calls cultural endowments) (Kingston and Caballero, 2009). The purpose of this paper is to discuss the relationship between informal constraints causing social welfare loss and formally regulatory institution of taxi industry and the reform way of informal institution to maximize social welfare. Several key questions are addressed: What are the informal institutions of taxi regulation? How do they cause social welfare loss? Whether they can be corrected through the formal institution reform?

2 The Informal Institution of Taxi Regulation

What is the informal institution? What is the difference between the formal institution and informal institution? The scholars generally recognized institution can be divided into two kinds: the formal institution and the informal institution, but due to the ambiguous concept of institution, so there is no clear definition of the formal and informal institution which has been given by anyone. The vast majority of informal institution is hard to be accurately described, although they are widespread and very important (Noth). According to Christopher Kingston and Gonzalo Caballero (2009), it is impossible to define the informal institution accurately, but most scholars convince that the difference between the formal institution and the informal institution is clear: the term "formal" is often taken to mean that the rules are made explicit or written down, particularly if they are enforced by the state, whereas informal rules are implicit and enforced endogenously by the members of the relevant group. As a matter of fact, there are three important informal rules in the taxi market.

2.1 The rule of discriminative access

The rule of discriminative access means that the government issued a taxi license to the special

people or organization. Most Chinese cities' taxi office does not give permission to the taxi drivers but to the taxi company. There are some literatures discussing the rule of access discrimination, but they regard the rule as a formal institution. This is a kind of wrong view because the rule of discriminative access is a violation of the law. Taxi license permission is from "management measures of the city taxi". According to this law, both the taxi drivers and the taxi company can take the taxi license. So the rule of discriminative access adopted by the taxi administration is illegal and invalid. In fact, there are few public documents about the rule of discriminative access which evolves spontaneously.

2.2 The rule of renting license

The rule of renting license is the so-called "daily rent" which is widely popular in most cities of our country. In this way, the taxi companies owning licenses don't actually engaged in a taxi business, but rent taxi licenses to the taxi drivers who pay the rent to the former daily. The taxi drivers are not the owners of taxi licenses, and they only can pay high rents on schedule to get into this business.

2.3 The rule of secondary rent-seeking

The entry regulation of taxi leads to taxi demand exceeding supply and the price raising that attracts many drivers without taxi licenses to entering into taxi market illegally. In order to avoid this kind of situation, the regulatory officers ought to punish the unauthorized cab. But in fact, the unauthorized cars exist widely in the taxi market in which the game between regulatory officers and the non-registered drivers have formed equilibrium. In this game, the unofficial drivers obtain illegal income, while the officers pursue rent-seeking. Any change of the equilibrium will lead to the loss of the players. After the first rent-seeking through the distribution of taxi licenses, this rent-seeking is called "secondary rent-seeking".

3 The Social Welfare Loss Caused by Informal Institution

3.1 Increasing the cost of taxi supply

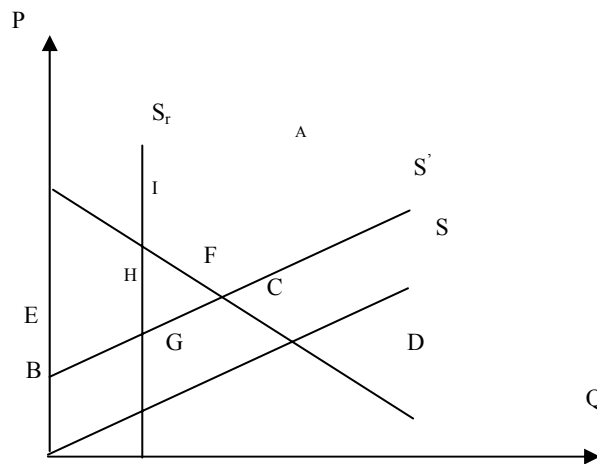


Figure 1 The Loss of Social Welfare Causing by the Access Discrimination

As shown in the figure 1, with the absence of quantity control, the demand curve of taxi market is expressed as D and the supply curve expressed as S, the total social surplus expressed as triangle ABC. In this case, the rule of discriminative access will oblige the taxi drivers to join taxi companies. But the corporate supervision cost will be too high to suffer because of the dispersing, liquidity and privacy of taxi. So the taxi companies prefer to rent their taxi license than for the higher income. The reorganization of taxi companies can not improve taxi industrial income but increase administrative cost, which makes the supply curve S move up to S', and the total social surplus becomes a triangle AEF, quadrilateral BEFG for additional unnecessary management cost.

With the quantitative control, taxi supply is not decided by market but by the government, the supply curve is expressed as S_r which is perpendicular to the horizontal axis. At this time the total social surplus is expressed as quadrilateral AEHI, quadrilateral BEHG is additional management cost. This part of the additional costs is commonly known as "daily rent", which means a taxi driver need pay 200-300 Yuan to the taxi company everyday. Taking Shanghai as an example, according to the investigation of Zhu Jiaguo who is a member of the Shanghai political consultative conference (CPPCC), a Shanghai common taxi driver has to pay 380 Yuan everyday that occupy 50% his gross

trading income to the company as “daily rent”. That is to say, the taxi drivers have to work over half a day for no productiveness.

3.2 Reducing the quality of taxi service

As stated above, the rule of discriminative access causes the rule of renting license. Monopolizing the taxi licenses, the taxi companies have two kinds of choices: one is to operate independently; the other is to lease their licenses to the drivers. The main difference between the two options is who has the residual claim. In the independent operation, the residual claim belongs to the taxi companies which will gain the operating income, while the drivers are only employees who obtain salaries in accordance with the contract. In the license-rented case, the taxi companies will charge the rent of taxi licenses and pay no for managing companies, while the taxi drivers bear the cost of operating and acquire the relevant residual claim. If the taxi companies choose the first option, they will find their supervision cost be so high that the effective superintendence can be assured. Because the taxi companies can't effectively supervise their drivers, operating independently will greatly increase management cost and can not improve the driver labor's enthusiasm. As a result, their net profit declines. On the contrary, those companies choose renting taxi licenses will obtain higher profit because the taxi drivers would rather work for themselves. Therefore the rule of renting license becomes widely popular.

The rule of discriminative access forces the taxi drivers to join in the taxi business. But compared with before, the reorganization of taxi companies altered nothing except increasing additional unnecessary management cost. The quality of taxi service does not improve. On the contrary, it becomes worse. In order to pursue maximal advantages, the taxi companies Prefer to replace the existing taxi drivers with the farmers and migrant from low-income area because they would be more willing to accept higher rents than the existing taxi drivers. With acquisition of more experience, these previous farmer and low-income earners want to increase income. As a result, they will be replaced by new farmer and low-income earners. The continuous unstable state of taxi drivers results in descending of the taxi drivers' path finding ability, service skills and whole level of service of taxi industry.

3.3 Causing secondary rent-seeking

In taxi market, the rule of access regulation unbalances supply and demand, causes price to rise, leads to availability reduce, makes passengers wait longer. All of these have attracted a large number of profit-driven non-registered cars joined in transport and to a certain degree. As a matter of fact, it is actually a kind of spontaneous corrective actions by the taxi market. However, these illegal immigrants violate the law of access regulation, and cause the licensed operators' loss. Consequently, they were severely punished by law enforcement agencies. But the law enforcers find that they can benefit from the unofficial drivers through rent-seeking, if not all of the cabs without licenses forces to leave. For this purpose, the law-executors are not willing to kill the goose that lays the golden eggs. The illegal entrants realize that they can make a profit after pay the rents to the officers. And then, their game attains equilibrium. Therefore, the rule of secondary rent-seeking is actually a system of allocation of rents. In this system, the potential operators can pay bribes to break the law of taxi regulation. This means that the taxi supply increases. On the other hand, it also increases the supply cost of unlicensed cars, forces a few drivers to leave from the market so as to reduce the supply of taxi.

4 Innovations of the Informal Institutions

The core of these informal institutions is economic rent. Supply shortage resulting from quantitative restriction of taxi generates economic rent. The taxi regulators and the taxi companies' owners become rent-seekers. In the rent-seeking game the informal rules evolve spontaneously. So they are not cultural endowments but fast-moving rule, which will disappear if quantitative restriction of taxi is deregulated. The quantitative restriction of taxi has been criticized by many scholars due to reduced availability of taxi and inefficient correcting externalities. In their views, the main reason of traffic jam is not taxi but creasing private cars. Substitute for taxi is private car instead of a bus (Yang KaiZhogn and Chen LiangWen, 2008). So restricted the number of taxi and rising incomes will lead to sharp rise in the number of private cars. Therefore, deregulating taxi quantitative restriction will both cut congestion and create the informal rules causing social welfare.

5 Conclusion

As stated above, the informal institution in taxi market causes the loss of social welfare on the whole. Although in a certain extent the rule of secondary rent-seeking makes up for it, this problem is not solved far away. Furthermore, secondary rent-seeking which also caused the bribery and other

illegal behaviors wouldn't be the most constructive solution. These informal institutions including the rule of discriminative access, the rule of renting license and the rule of secondary rent-seeking which originates from the rule of quantitative restriction of taxi are not cultural endowments, but operation rules which could be changed fast, and they will vary if their base—the formal rules change. So as long as the elimination of quantitative control, these problems can be solved.

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Research on Sports Resources Development and Management Countermeasures in Rural China

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Abstract: By applying literature review, questionnaire investigation, and mathematical statistics, this paper studied the current situation on the sports resources allocation and consumption market in rural China. The results showed that the sports resources were lacking in rural areas in China and there were region differences as well. On the other hand, the sports resources consumption market was highly potential there. In order to create better environment for the proper usage of rural sports resources, management countermeasures were put forward as taking advantage of existing resources; improving the rural sports consumption potentials; and exploiting more natural sports resources.

Key words: Rural areas; Sports market; Sports resources; Sports consumption; Management countermeasures

1 Introduction

Sustainable development of rural sports, culture and sports culture in rural areas, a new concept of development, in accordance with the requirements of the CPC Central Committee and State Council, the development of sport in rural areas should always adhere to scientific development. This requires to follow sustainable development of rural sports, culture and scientific development concept, which upholds the integrity of the development, sustainability, innovation and coordination principles.^[1] The State Council recently issued “National Fitness Program (2011-2015)”. The Program requires that local people’s governments at various levels shall bring the sports resources development in rural areas under the plan of building a well-off society in an all-round way and the construction of new socialist countryside, so as to gradually build a urban-rural integration public service system for national fitness, and improve public service ability of community sports in rural areas. The development and management of sports market in rural areas will not only promote national economy, but also enrich farmer’s spiritual life, thus further improve their quality of life, which also meet the goal of building a new socialist countryside.

2 Current Situations of Sports Resources in Rural China

2.1 The current situation of sports resources allocation in rural areas

In accordance with different existing forms of sports resources, we can divide sports resources into two categories, namely sports resources in physical form and sports resources in non-physical form. The former category includes sports products, sports natural resources, sports venues and facilities as well as sports funds, while sports information, sports technology, sports organization and sports events belong to the latter one.

Rural China is now facing a complex process that will transit from a traditional society into a modern one, although the rural economy has been greatly improved, with the fact that China has long put too little investment on sports in rural areas, that the sports investment system in these places is not rational. Therefore, if take a look at the allocation of sports resources in rural China, both physical and non-physical ones are in great need. according to “the fifth general survey of national stadiums”, the total number of stadiums in China is 850,000, among which 91.82% is located in cities and towns that account for 16.50% of national territorial area and 29.92% of population, only 8.18% located in the vast rural areas that account for 83.5% of national territorial area and nearly 70% of population. Although the rural areas have an overwhelming majority of the population, say close to 70%, the sports resources in these places just account for a small proportion^[2]. The sports instructors in rural areas are still in great shortage. Now in rural China, the lack of sports fitness organization and sports instructors is becoming a prominent problem, which cannot meet farmers’ growing demand for physical fitness. Moreover, there are very few channels to get sports information, and only the houses in the main streets have access to internet.

The different geographical conditions in rural China, the huge gap in economic development level, and the diversified needs of rural residents for sports are the main factors that determine the discrepancy of sports resources allocation in rural areas geographically, especially in the field of venues and facilities,

fund input and scientific guidance. Generally speaking, the rural areas adjacent to cities are richer in sports resources than remote areas, while the wealthy eastern areas richer than western areas.

2.2 The developing potential of sports resources in rural areas

2.2.1 The current situation of existing basic sports resources in rural areas

The sports resources in rural areas are in shortage, as for the problem of existing sports resources scarcity in rural areas, many local governments have paid attention to and begun to improve on this point. Take Laiwu City, Shandong Province for instance, under the main line of promoting the urban-rural integration in sports, the Laiwu Sports Bureau have continually extend the sports resources from city to countryside by carrying out the project of “bring facilities, organizations, activities and guidance of national fitness to the villages” (called “si jin cun” for short). In 2008, this city has invested over 20 million *yuan* in sports alone, bringing 230 basketball courts, 460 Ping-Pong tables and 1,500 fitness equipment for 230 villages, meanwhile, 1 community fitness center, 5 township recreation and sports centers were completed and put into use, more than 400,000 square meters of land were designed for sports use. The sports facilities in villages were greatly improved, creating idea conditions for farmers to take exercises^[3]. Another case in point is Xinjiang, Xinjiang is an agricultural district with most of the residents living in the remote rural areas. Launching an extensive exercise campaign in the countryside has played an important role in enhancing physical fitness, improving farmers’ health and enriching their cultural life. From 2006 to 2009, China and the province have set up 2500 sports venues with the fund from the non-profit foundation of sports lottery. During the 11th five-year plan, the new “project of sports fitness for farmers and herdsman” has planed to build 3,000 more sports venues. At the same time, more and more sports associations focused on the rural areas with throngs of sports instructors went to the village to give guidance of scientific exercise to farmers.

2.2.2 Develop the sports natural resources in rural areas in a rational way

The rural areas are boasted with abundant sports natural resources. The natural material elements have provided an important physical carrier for sports activities. Through the development and utilization of these resources, it can generate great economic benefits while achieving sustainable development among resources, environment and economy.

Sports tourism is a branch of tourist industry. China started late on this field, there is a huge business opportunity in the development of sports tourism resources and opening up of the market^[4].

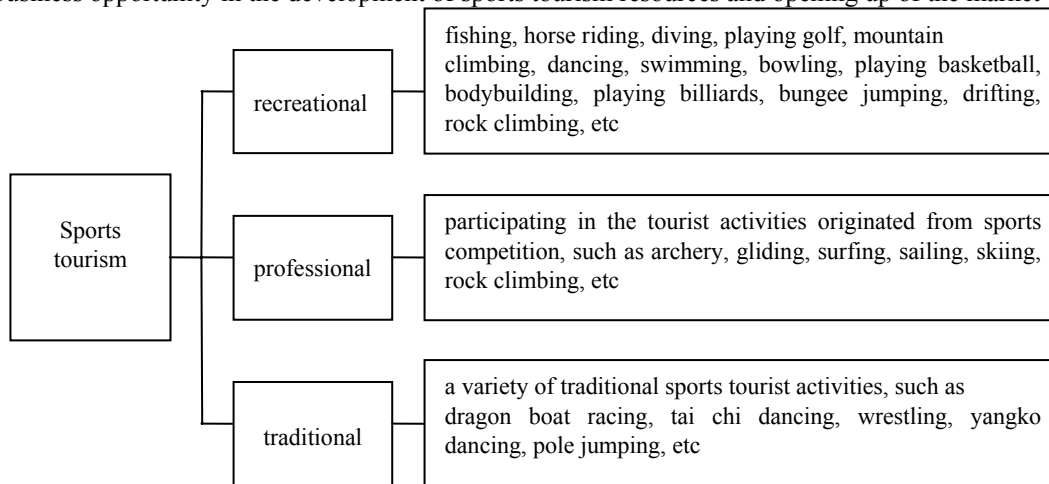


Figure 1 The Structure Chart of Sports Tourism

In recent years, city landscape sports come up to China quietly. Shanghai can be a good example: the National Beach Volleyball Tournament has held in Century Square, Nanjing Road, Shanghai; the Jin Mao Tower saw the organization of World Low-altitude Parachuting Competition; F1 China has held in Shanghai for 7 years in a row from 2004 to 2010. If bring the landscape sports from city to countryside with the use of extensive natural conditions there, such as extreme sports, motorcycle races and water sports which can be based on the rich natural resources, it will provide a new opportunity for the development of sports market in rural areas.

2.3 The current situation of sports consumption market in rural areas

2.3.1 The main form of sports consumption in rural areas

The rural population accounts for about 70% of the total population, theoretically analyzed, it can

be a large sports consumption group for the sports market in rural areas with huge consumer-market potential. Along with social progress, economic development, and the improvement of people’s living standards, there has been a fundamental change in rural lifestyle and consumption concept. Sports consumption has increased greatly compared with before, but the amount is less than 30% of the total amount and has not yet formed a certain scale.

Sports consumption refers to the personal consumption expenditure related to sports activities, it is an important and integral part in living consumption, belonging to development consumption and recreation consumption. This kind of consumption is based on the precondition that people’s material life condition can meet their basic living demand, and then the higher need stemmed from seeking individual development and recreation requires such an option. It is a new consumption type that forms under the subjective understanding to the functions of sports. In accordance with the different purposes and external manifestations of the sports consumption goods obtained from purchasing, the behaviors of sports consumers can be divided into material sports consumption, spectator sports consumption and participatory sports consumption^[5].

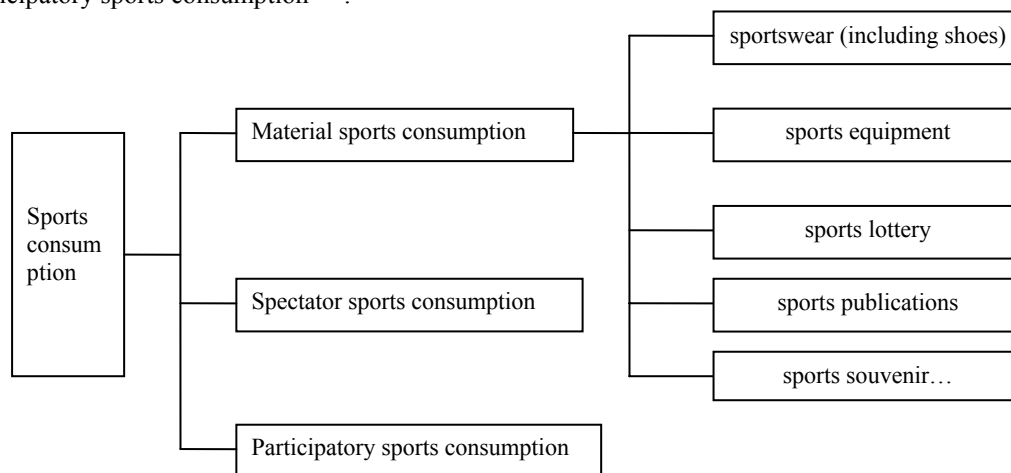


Figure 2 The Structure Chart of Sports Consumption

The material sports consumption refers to personal consumption for material consumption goods related to fitness activities, such as sports apparel, sports lottery, sports equipment, sports drink and sports magazines and newspapers. As can be seen from Table 1, the main consumption of farmers is centered in material sports consumption, including sports apparel, sports lottery, sports equipment and sports magazines and newspapers. Nowadays, sportswear is very popular among farmers which can meet their requirements for comfort and practicability.

The spectator sports consumption means to purchase sports tickets and watch sports matches or performance. From Table 1 we can see only a few farmers go to stadiums to watch games.

The participatory sports consumption refers to the consumption for physical exercises and corresponding services, such as the fee charged for attending martial arts, bodybuilding, qigong and fitness classes. As can be seen from Table 1, such consumption is also poorly ranked.

The statistical data of Table 1 is based on 1200 questionnaires on farmer's sports consumption pattern, the result is as follows:

Table 1 The Sports Consumption form of Chinese Farmers

Consumption patterns	Ranking	Number
sportswear	1	852
sports lottery	2	369
sports equipment	3	332
sports republications	4	216
sports-related classes	5	196
watching games	6	185
other	7	178

2.3.2 Factors affecting sports consumption in rural areas and the existing consumption potential

There are several main factors that affect sports consumption in rural areas:

First, the imbalance of economic development restricts the development of sports consumption in

rural areas. Farmer's income level is the most important factor affecting their consumption, among which permanent income matters most. Farmers in the regions with low income levels can hardly afford sports consumption, while those with higher and stable income intend to spend more in both material sports consumption and participatory sports consumption.

Second, the irrational sports resources allocation is another factor that affects the sports consumption in rural areas. The sports consumption can not exist without specific living environment, however, the sports market in these areas can be featured as single business, low grade, limited scale and fewer choices. The shortage of sports consumption goods and undeveloped sports consumption market restrict the development of sports consumption. The per capita income in the villages of Jiangsu and Zhejiang, southern Jiangsu, Guangdong and other coastal regions is much higher than that of cities, farmers in these areas have strong purchasing power, and as a culture, sports have already become one part of their life. However, the fact is that hardware facilities are mainly centered on more developed medium-and-large-sized cities, only 20% of them are built in rural areas. The sports consumption in various patterns is in great demand.

Third, farmers are unaware of the importance of sports. In many places, traditional morality and value still have an influence on their understanding to sports. With the idea that traditional manual work can replace physical exercises, farmers do not catch the real notion of sports consumption culture from the perspective of keeping fit, so they do not intend to participate in physical exercises, leading to the low level of sports consumption.

Fourth, farmers are scattered and hard to manage them..

2.3.3 The potential of sports consumption in rural areas

Material sports consumption is dominant in the sports consumption pattern in rural areas, but the potential of participatory sports consumption is huge. With the development of sports consumption market, participatory sports exercise and recreational consumption will become the major part, including bodybuilding, swimming, mountain-climbing, sports tourism, fishing, billiards and national traditional sports, so as to meet the farmers' requirements of keeping fit, amusing themselves and constantly improving their quality of life.

Today, more and more sports activities are held in rural China with many towns and villages have formed their own fitness groups. These activities include yangko dance, bodybuilding exercise (dance), tug of war, dragon and lion dances, winter swimming, basketball, gate ball, long-distance race and waist drum. Special competitions are launched among different villages. Some fitness organizations grasped this business opportunity and set up sports association training centers, driving farmers to spend more on sports consumption. The biggest farmers' sports competition is the National Farmers Games, which started from 1988. It is held every 4 years with more and more farmer know this event and participated in it. The Games are a driving force to sports development in rural area, which have greatly boosted the sports consumption.

3 The Sports Resources Development in Rural Areas and Management Countermeasures

The rural areas are blessed with a huge sports market, the development and management of this market is both the need of national economic construction and socialist ideological and ethical progress in rural China.

First, we should put more investment in sports infrastructure and work hard to develop sports natural resources in rural areas. As for the development of sports resources, we should strive to find out new ideas, new methods and new experiences to build sports market. The government should take responsibility for the basic construction of sports resources while mobilize and rely on the power of social groups, thus pushing the sports operators to extend the development and management of sports market from city to countryside.

Second, we should increase farmers' purchasing power in sports. The low purchasing power in sports in rural areas is jointly caused by a subjective reason and an objective reason. The former is related to farmers' awareness, and the latter to sports allocation. In this condition, we should pay attention to rural economic development; establish rural sports centers, strengthen the transmission of sports market information and improve farmer's sports consciousness;

Third, we should develop the sports cultural market in rural areas, and actively promote our national, traditional sports. The development and extension of rural sports cultural market can only rely on the support from local government. The government should adjust measures to local conditions,

develop traditional strong sports, use traditional sports to drive the progress of new ones, and ultimately make the sports cultural market in rural areas filled with scientific, civilized activities.

4 Conclusion

The attention paid to the issue of farmers and rural areas has made fundamental changes to rural lifestyle. Although China's rural sports market is still in the development stage—the scale has not yet formed, sports consumption consciousness still needs guidance, information is not well transmitted and laws and regulations are not so sound, the adjustment of farmers' demand structure and consumption structure brings good opportunities for rural sports market, and huge potential of rural sports resources creates conditions for the overall development of this market.

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The Structure of Theoretical Framework about Strategic Management Audit*

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Abstract: Strategic management audit is an upfront and novel field in audit which attracts numerous scholars' attention from the very beginning of its development. It is one of the ten major tendencies of internal audit to convert from operational management audit to strategic management audit. This paper reviewed the development and revolution of the theory of strategic management audit, analyzed the differences between strategic management audit and traditional internal management audit, and proposed constructive ideas for enhancing the theory frame and appraisal system.

Key words: Strategic management audit; Theoretical framework; Appraisal system

1 Introduction

Strategic management audit is a newly-developed field in audit, therefore, there is no strict definition yet. In 1956, Shockman proposed the concept of marketing audit, which is the origination of strategic management audit. Since 1960s, some developed countries vigorously carried out strategic management, in which internal audit is not only engaged in the evaluation of service efficiency and effectiveness, but also develops strategic audit to evaluate strategic management. Strategic audit is integral, overall, but high-risk, which requires internal audit to fully understand operational procedure, as well as the strategic management theory and practice of the company. More importantly, internal audit should be at the top of the management team to possess the authority of audit.

Since 1970s, management environment of enterprises became more and more complex, while scale turned bigger and bigger. Meanwhile, the government formulated strict law to protect investors and public interest, which dramatically expanded fiduciary duty of the executives. This transition produced enormous demand for strategic management audit by managers, investors, and other profit relevant, which boosted the development and revolution of strategic management. Therefore, Shockman believed that strategic audit should focus on proposing motion plan on the base of comprehensive, systematic, independent and routine investigation to improve strategic management of the audited enterprise. Ever since its orientation, strategic management audit has attracted attention of countries worldwide, it has already been applied in operations practice by enterprises.

Since 1980s, more and more research has been carried out on strategic management audit. However, Wheeler and Hunger pointed out that the practice of strategic management audit is far from fully developed. While audits lack the divergent thoughts, many companies still focus strategic management audit onto routine service and function, rather than the comprehensive audits from the aspect the company strategies. They also analyzed the characteristics and the vital roles of strategic management audit. Alfred Rappaport further analyzed in both theory and practice the feasibility of strategic management audit by independent audits. He believed that strategic management audit should be carried out by external independent audits who can help enhance the strategic surveillance function of the board of directors through strategic audit. While strategic audit could bring in profits for the enterprise on one hand, it also increases cost correspondingly. Therefore, the decision on whether or not to implement strategic audit should be based on overall evaluation of the cost and profit.

Since 1990s, even more scholars studied strategic management audit. In 1992, Neish and Jackson analyzed the roles of internal audit department in enterprise strategic management and necessary conditions to implement strategic management audit. In 1995, Gordon Donaldson published "A New Tool for Boards: The Strategic Audit" in Harvard Business Reviews. The article addressed that strategic management audit is a pivotal tool for company management, which could appraise overall development and operations of the company. The article also pointed out that strategic audit is composed of setting up operational standard, designing and maintaining database, setting up strategic audit committee, as well as coordinating with executives.

2 Differences Between Strategic Management Audit and Traditional Internal

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Audit

Strategic management audit is a special field in audit that has expanded the scope of internal audit, promoted internal audit to a higher level. Strategic management audit primarily focuses on the appraisal of enterprise operational strategies. It is a key part in enterprise strategy management, aiming to make sure that the enterprise strategies are effective, reasonable and economical, so as to help enterprises reach operational targets. Strategic management audit is an advanced phase of the development of internal audit

However, the practice of strategic management audit is quite different from that of traditional internal audit. The traditional internal audit focuses on transactions and account balance. It carries out risk appraisal with traditional audit procedure which requires accounting and audit knowledge correspondingly. However, audit personnel must understand company operation thoroughly, be familiar with company culture and interest conflicts, have strategic management theory knowledge and solid practice experience, as well as good communication skills and divergent thoughts to carry out strategic audit (Liao Hong, 2005). In addition, only when the enterprise has a good strategic management audit culture, audit personnel directly report to and are fully trusted by executives, can strategic management audit be smoothly carried out. Therefore, strategic management audit focuses primarily on the overall operations of the company.

Table 1 Comparison of Strategic Management Audit and Traditional Internal Audit

	Traditional Internal Audit	Strategic Management Audit
Basic Idea	Transactions, account balance	Overall strategies
Risk	Audit risk	Strategic risk
Specialty	Accounting, audit	Management, audit, accounting, system theory
Foci	Information collection	Company operations

3 Theory Frame Of Strategic Management Audit

3.1 Strategic management audit subject

The key to guarantee the effectiveness of audit is to maintain independence and authority of the audit subjects (Yu Yumiao and Huang Binghai, 2004). Strategic management audit should adopt a procedure guided by the board of directors (Mei Dan, 2004). This is determined by the special property structure of the companies in China. The majority companies are state owned, therefore, executive directors on board are representatives of the state, not the true property owner. Thus, it is hard for the audit committee composed by the board of directors to make optimum decisions on enterprise strategy. Therefore, an independent committee composed by representatives of minor shareholders is necessary for surveillance and appraisal of strategic proposal. In the audit system guided by the board of directors, some options to implement strategic management audit are: internal audit reporting directly to the board of directors, audit committee of the boards, and independent audits.

3.2 Strategic management audit object and content

The objects of strategic management audit committee or external registered accountants are all information and documents regarding enterprise strategy management, including, but not limited to financial information and documents (Yu Yumiao and Huang Binghai, 2004). Effective strategic audit requires the board of directors to not only set up the standard for strategies appraisal, but also control the sources of the information to produce the data. In particular, the content of strategic management audit includes:

3.2.1 Strategy setting basis and process

Inspection on whether the company strategies were based on comprehensive recognition and understanding of company goals, market, environment, competitors, as well as interior resources (Mei Dan, 2004). Strategic audit also assess whether strategic goals conform to national economical condition, reflect market demand, coordinate with environmental alteration tendency, and balance with adaptability of company interior resources.

3.2.2 Background and procedure of strategies setting

The enterprise strategies include growth strategy, profit strategy, centralism strategy, shift strategy, as well as withdrawal strategy. Audit to the growth strategy occurs at the developing stage of a company product or market, it inspects whether the company has an effective way to acquire market resources, to finance, and to cope with the intense competition. Audit to profit strategy applies at the mature stage of a

company product or market, it examines whether the company is shifting from market development and financing to market specialization and assets operation. Audit to the centralism strategy takes place at the mature and declining stages of the company product or market, it aims to investigate whether the company has started to decrease operation scale, to reduce investment, and to concentrate on the specialized market on which the company has competitive advantages. In a declining stage of a company product or market, audit to shifting strategy is meant to improve the operations of original strategies, or to adjust new strategies appropriate to current market.

3.2.3 Process of implementing enterprise strategies

First, audit to the implementation process is to inspect whether all divisions of a company have set up divisional strategies to achieve the overall enterprise strategic goals. Second, it examines whether the company has smooth mechanisms to communicate and coordinate internally, to pass information on strategies feedback to the board of directors in time. Third, it investigates whether the company has appropriate standard and procedure to appraise strategy operations, yearly target, financing strategy, and resources allocation to implement the enterprise strategies. Fourth, it also examines whether the company has detailed strategy implementation plan, organizational preparation, as well as controlling and reporting system.

3.2.4 Strategic Achievement

Strategy audit inspects whether the company growth strategy has increased the company market share, or enhanced company reputation and/or status in the industry and/or market; whether the profit strategy has increased the company resources and profit, realized profit maximization; whether the centralism strategy re-organized company operations scale and investment, to increase short-term revenue and long-term profit; whether shift strategy has turned around the declining company market share and profit; whether the withdrawal strategy has helped the company cautiously withdraw from the market and recoup the investment.

3.3 Functions of strategic management audit

The functions of strategic management audit are analysis, appraisal, and surveillance (Liao Hong, 2005). Appraisal and surveillance are basic functions of audit, which help companies set reasonable strategies and appraise the effectiveness of the strategy implementation, as well as fulfill fiduciary duty of executives. Analysis is also included in the functions of strategic management audit because of the pivotal roles of strategy analysis. It is a key part of strategic management audit, which is the precondition for accurate strategic appraisal and surveillance.

3.4 Discipline attribute of strategic management audit

Strategy management is at the highest level and the most important managerial activity in a company, therefore, strategic management audit should be attributed to management audit (Liao Hong, 2005). So far, most scholars agree with this. On the other hand, achievement audit is the advanced phase in audit development (Liao Hong, 2003), a branch of management audit. Since strategy management is the most important factor for enterprise operations and management achievement, strategic management audit could also be attributed to achievement audit.

3.5 Influential factors for implementing strategic management audit

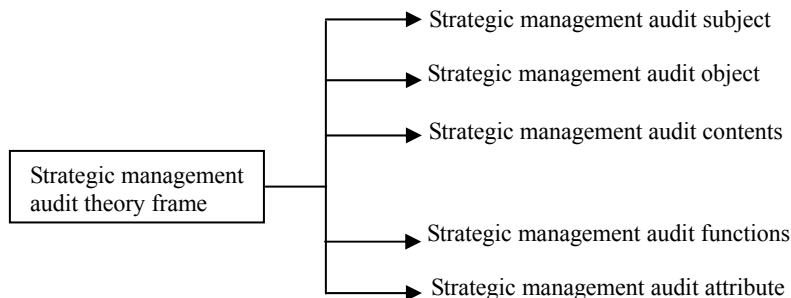


Figure 2 Strategic Management Audit Theory Frame

First, organizational structure should be improved to enhance the construction of the independent system of trustees (Peng Zhengxin, 2003). The trustee's independence must be maintained through system arrangement. A reward mechanism should be institutionalized to avoid interference by management team.

Second, the members on the board of directors should be specialized, and clarified of each

individual's responsibility. A board of directors with various background and specialties should be constructed to set up appropriate enterprise strategies. Meanwhile, a strategic management audit committee under the board can help clarification of responsibility and participation of independent trustees. A minimum share amount should be met to be eligible for trustees, and shares of trustees should not be transferred while they are on the board.

4 Construction Of Strategic Management Audit Appraisal System

4.1 Financial performance is the core indicator in strategic management audit appraisal system

Strategy audit appraises the influence of company strategies on shareholder's investment, financial performance therefore is crucial for the evaluation. Meanwhile, since management team is more familiar with the company and the specialized market, they have the advantages over trustees to have more access to available performance information. A standard financial statement is easy to understand for everybody, it is therefore the critical tool for strategy management appraisal. In addition to traditional financial performance indicators, such as net income, net income verses assets ratio, sale growth, cash flow, net income verses investment ratio, other indicators should also be considered, including investment cash return ratio which is realized cash return divided by investment amount. This indicator focuses on cash flow instead of net income, which can be compared with return ratio of other company or market. With this indicator in the appraisal system, companies will pay more attention to cash flow. Yearly economy growth should be taken into consideration as well. It is revenue minus investment, dynamically describe economy growth by bringing in the investment term. Lastly, return ratio on account investment should be considered too, it is calculated as profit divided by investment. Both shareholders and trustees are familiar with this indicator, but its original data has to be adjusted to be able to compare with other companies, since it is influenced by accounting practice.

4.2 Customer is the leverage of strategic management audit appraisal system

The identification and evaluation of customer-related performance achievement should be closely coordinated with marketing strategies to really reflect customer-centered market. It should include customer satisfaction, market share, product delivery, product return, days of product warranty, customer retention, customer loyalty, and customer profitability to attract and obtain customers on target market to reach performance goals. A detailed appraisal system should be set up to evaluate departmental performance and find out areas for improvement.

4.3 Internal operations performance is the basis for strategic management audit appraisal system

The reason that operational performance is the basis for the appraisal system is that it indicates product manufacturing cycle period, product design level, process innovation capability, productivity, safety, and inventory etc, which all reflect the enterprise capability to create value and the impacts on financial performance, the basis of strategy management. In this process, the enterprise analyzes potential demand to develop new products and new customers to create value increase via innovation. The key appraisal standards for this process are the sale ratio of new product, sale ratio of patented product, the capability to release new product ahead of competitors, as well as how long it takes the company to develop the new product, etc.

5 Conclusions

In brief, a company must consider its own development phase, industry situation, as well as performance of main competitors to determine the standards of all measurements, and compare its performance with the standard to find out gap and the reasons. In addition to the appraisal standards cited above such as financial performance, customer, internal operation, learning and growth, a company should also take into consideration of internal monitoring system analytical standard, operational system analytical standard, as well as information system appraisal standard etc. This is a comprehensive appraisal system to realize profit maximization along the value chain by internal operation specialization and coordination, effective organizing manufacture and purchasing system, and producing and delivering the product based on market demand via specific channel.

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A Study on the Relationship Between Organizational Ethical Climate and Employee's Anti-Ethical Behavior*

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Abstract: The topic about the employee's anti-ethical behavior is now a hot theoretical discussion. Based on the existing research, this paper put forward organizational ethical climate and employee's anti-ethical behavior hypothesis. And by carrying out questionnaires to enterprises' employees, SPSS software is used to make system analysis to confirm that care guide, independent judgment guide and rule of law guide have negative influence on employee's anti-ethical behavior, utilitarian orientation a positive impact on employee's anti-ethical behavior, and the care guide organizational ethical climate the strongest impact, which provides a new angle of view and path to solve the problem of employee's anti-ethical behavior.

Key words: Organizational Ethical Climate; Employee's Anti-Ethical Behavior; Organizational Ethical Climate Types; Correction Analysis; Regression Analysis

1 Introduction

With the intensification of economic globalization and market competition, the value of the employees tends to be more diversified. Their interests and demands are more intensely affirmed. Traditional ethics moral concept starts to get serious challenge and impact. Scholars begin to pay attention to research of employee's anti-ethical behavior, and its influence factors as well. This paper attempt from the perspective of organizational ethical climate, discuss deeply of whether different types of organizational ethical climate have impact on employee's anti-ethical behavior, and whether the effect intensity is equal, thus to provide suggestion for organization to avoid employee's anti-ethical behavior.

2 Definition and Theoretical Assumptions

2.1 Employee's anti-ethical behavior

It had been found in the early last century. But people can't explain its nature systematically because of the fragmented research. Until the 1990s, scholars began to conduct further research on it. Gruys (1999) views the employee's absence or being late as employee's anti-ethical behavior^[1]. Spector & Fox (2005) argue that whether or not employees cause loss to others or organization is employee's anti-ethical behavior^[2]. Bordia et al (2008) analyze that employee's anti-ethical behavior not only causes loss to the organization itself, but will also have bad effect on organizational stakeholders^[3]. O'Boyle et al (2011) confirm that employee's anti-ethical behavior will change with the environment changing forms. The advanced information technology makes them more convenient, normal and subtle^[4].

Although research perspective of the ethical behavior is different, people agree that it is negative work behavior in essence. Based on the will of people, against organizations and other members of the legitimate rights and interests, is called employee's anti-ethical behavior.

2.2 Organizational ethical climate

The research of it not only helps predict employee's performance, and also provides a new path to solve the problem of employee's anti-ethical behavior. Victor and Cullen (1987) first put forward organizational ethical climate this concept. The staff perception in dealing with ethical behavior problems is referred to as organizational ethical climate^[5]. Cullen (2003) suggests that it is one of the dominant ethical behavior models within organization^[6]. Grojean (2004) argues that this concept exist misunderstanding. He claims to call it "about organizational ethical climate"^[7]. This study concludes that organizational ethical climate is specific performance of the dominant ethical climates within organization which is perceived and followed by staffs.

2.3 Organizational ethical climate types

Victor and Cullen (1988) accord to normative ethics and ethical value orientation analysis of the types of organizational ethical climate, thus theoretically derive the nine types of organizational ethical

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climate, namely, self-interest, friendship, personal ethics, corporate interests, group interests, norms and procedures, efficient, social responsibility and the rule of law^[8]. Then on this basis, they research and develop organizational ethical climate questionnaire namely ECQ scale. Based on this scale, scholars conduct empirical research in different industries and parts of the world organization. The research results show the scale itself is stable, but ethical climate type concluded is extremely unstable. Only four types of organizational ethical climate are verified. They are care guide, independent judgment guide, the rule of law guide and utilitarian orientation.

2.4 Research hypothesis

The study find that present Chinese related research only from single perspective measure influence of organizational ethical climate on employee's anti-ethical behavior, and mostly stay in theoretical research level. The existing empirical study background is mainly foreign enterprises. In view of this, Chinese enterprises are used as research object. Care guide, independent judgment guide, rule of law guide and the utilitarian orientation these four widely verified stable organizational ethical climate types are selected to research effects on employee's anti-ethical behavior, to provide reference for enterprise's management ethics practice in China.

2.4.1 Care guide affects on employee's anti-ethical behavior

In care guide this ethical climate organization pays attention to every employee's vital interests, and shows care in the interactive process between departments and employee individuals. Ethical climate dominated by "cares" means "solidarity" between various departments, and also more mutual love between individuals. In this climate, employees in the pursuit of self-interest will also benefit groups. Employees facing the ethical dilemma choice will also be affected by the organization in the ethics of care, love climate. Okpara (2002) study finds that when the organizational ethical climate is care guide, employee's satisfaction on promotions, co-workers and supervisor is higher, employee's anti-ethical behavior reduced^[9]. Peterson (2002) research also confirms care guide is negatively related to employee's anti-ethical behavior^[10]. Based on above analysis, the following hypothesis is put forward:

H1: Care guide is negatively related to employee's anti-ethical behavior

2.4.2 Independent judgment guide affects on employee's anti-ethical behavior

Independent judgment guide fully respects and affirms employee's ability in judging things. Staff can make choices and free from the influence of ethics climate, which increases employee's ability to judge things and loyalty to organization. In this climate, staff respect and trust each other in decision-making, show strong self-discipline to reduce occurrence of reaching purpose through anti-ethical behavior. Wimbush (1997) indicated that the independent judgment of ethical climate is negatively related to the employee's ethical behavior^[11]. Taiwan scholar Zhang Renwei (2004) showed that under the independent judgment orientation, the anti-ethical behavior reduced while employees strictly follow the rules of ethics^[12]. Based on above analysis, the following hypothesis is put forward:

H2: Independent judgment guide is negatively related to employee's anti-ethical behavior

2.4.3 Rule of law guide affects on employee's anti-ethical behavior

In this rule of law guide climate, staffs follow the laws and rules, professional standards. Organization uses "laws, rules and systems" as the group ethical value orientation. Employees follow rules, and make their actions conform to norms. Trevino (1986) identifies that employee's moral cognition has influence on ethical behavior^[13]. Craig et al (2006) confirm that, under the rule of law climate, the moral cognition of staff is higher; their ethical behavior conforms to the organization of ethics^[14]. Based on the above analysis, the following hypothesis is put forward:

H3: Rule of law guide is negatively related to employee's anti-ethical behavior

2.4.4 Utilitarian orientation affects on employee's anti-ethical behavior

In utilitarian orientation employees pursue their own interests and individualism. If all staffs act according to "self-interest" principle, only caring about their self-interest regardless of overall interests, the binding for employees' anti-ethical behavior is almost zero. Sackett et al (2006) confirmed that binding for employee's anti-ethical behavior is the smallest in enterprises dominated by utilitarian orientation^[15]. Taiwan scholar Zhong Rongjun and Xiao Jinfen (2007) found that employee's anti-ethical behavior has the highest frequency in utilitarian orientation climate^[16]. Based on above analysis, the following hypothesis is put forward:

H4: Utilitarian orientation is positively related to employee's anti-ethical behavior

3 Empirical Analyses

3.1 Sample and data collection

The background of this investigation is Chinese enterprise situation. Based on Victor's ECQ scale and Stewart's employee's anti-ethical behavior scale, forecast questionnaire is designed^{[8][17]}. Before a thorough investigation, we chose on-the-job graduate student in a university in southwest China, got 50 effective questionnaires, analyzed and tested items according to the obtained data, deleted items not conforming to the measurement specification, modifying and improving the questionnaire thus to form the formal one. When official research started, we mainly chose objects from the private manufacturing enterprises in Guangxi, Henan and other 10 private manufacturing enterprises in China where employee's anti-ethical behavior is more prominent.

The formal questionnaire takes paper and Internet two forms. 250 questionnaires doled out, including 150 online, 219 recycled. Recovery rate 88%, effective questionnaire 190, effective rate 87%. Questionnaires recovery is between March and May 2013. This sample (N = 190) features are as follows: gender, male 43.7%, female 56.3%; Age, under the age of 25 (33.2%), 25 to 30 years old (53.7%), 31-40 accounted for 12.1%, over 40 accounted for 1.1%; Degree, high school or technical secondary school, and the following accounted for 6.8%, 43.2% college, bachelor degree or above accounted for 50.0%.

3.2 Statistical tools

This paper analyzes sample data with SPSS16.0.

3.3 Variable measurement

3.3.1 Organizational ethical climate measurement

Developed by Victor and Cullen ethical climate scale (ECQ) is recognized in academia, and its stability is verified in empirical study^[8]. Based on the ECQ scale, parts items is modified to conform to our country's enterprise. The organizational ethical climate scale with 13 items is formed.

3.3.2 Employee's anti-ethical behavior measurement

Stewart et al (2009) use the theory of projection, in the form of reference point shift, asking staff to point out anti-ethical behavior of colleagues, to reflect his anti-ethical behavior^[17]. Cole et al (2008) analyzed that colleagues' anti-ethical behavior can affect others^[18]. Combination of Stewart's scale formed 6 terms employee's anti-ethical behavior scale.

3.4 Empirical results analysis

3.4.1 Organizational ethical climate factor analysis

Organizational ethical climate perceived by employee with reference to Victor and Cullen care guide development ECQ scale, used five items measured, such as "Your company attaches great importance to all members' interests" etc^[8]. Organizational ethical climates perceived by employees such as independent judgment guide, rule of law guide and the utilitarian orientation with reference to Victor and Cullen ECQ scale, adopt 3 items, 2 items and 3 items on the measurements, such as "Your company staff has his standard to decide right or wrong", "Your company wants employees to comply with rules and regulations", "Your company staff have preferred their own interests" etc^[8]. The above questionnaires self-report by Likert 5 score. Upon examination, Chi - Square value is 604.847 ($p < 0.01$), KMO value is 0.681, inventory item load is over 0.5, the eigenvalue: 3.006, 2.098, 1.137 and 3.006, each table's interpretation of the cumulative contribution rate: 23.124%, 16.141%, 8.746% and 12.552%, which indicates that we adopt the organizational ethical climate scale conform to the requirements of the factor analysis test.

3.4.2 Employee's anti-ethical behavior factor analysis

Employee's anti-ethical behavior scale mainly refers to Stewart's scale, using 6 items to measure such as "Your colleagues in the company for overtime work and delay time" etc.^[17]. Upon examination, KMO value is 0.778, Chi - Square value is 347.078 ($p < 0.01$), inventory item load is over 0.5, eigenvalue is 3.021, the cumulative explain contribution rate reaches 50.347%, suggesting that employee's anti-ethical behavior scale meet factor analysis test requirements.

3.4.3 Correction analysis

Correlation analysis resulting from employee's anti-ethical behavior and ethical climate such as care guide, independent judgment guide, rule of law guide and utilitarian orientation shows that the coefficient correlation: 0.239 **, 0.208 **, 0.209 ** and 0.209 **, the significance level is less than 0.01, and also shows that employee's anti-ethical behavior and care guide, independent judgment guide and rule of law guide organizational ethical climate has significant negative correlation, and the utilitarian orientation has significantly positive correlation.

3.4.4 Regression analysis

Hierarchical regression analysis is used to delve into relationship between four types of organizational ethical climate and employees' anti-ethical behavior. Correlation of the empirical research shows that there is significant correlation between the two. Hierarchical regression model of employee's

anti-ethical behavior and four ethical climate types is built mainly to explore impact and impact strength of ethical climate against the anti-ethical behavior. It's shown in table.

Table 1 Hierarchical Linear Regression Analysis

Independent Variable	Adjust R Square	F	Standardized Coefficients	Co linearity	Statistics
			Beta	Tolerance	VIF
STEP 1:	- 0.002	0.872			
Gender			0.038	1.000	1.000
Age			0.053	0.979	1.021
Degree			0.016	0.979	1.026
Step 2:	0.162	6.219			
Care Guide			- 0.230**	0.975	1.026
Independent Judgment Guide			- 0.212**	0.989	1.101
Rule of Law Guide			- 0.209**	0.975	1.026
Utilitarian Orientation			0.205**	0.989	1.011

*P<0.05 **P<0.01 ***P<0.001

The regression proves there is linear regression relationship between two variables. The value of VIF less than 5 shows the model has no significant co-linearity problem. Based on regression coefficient, the impact strength of care guide is the highest.

4 Conclusions

4.1 Theoretical contribution

Through empirical analysis, we found care guide, independent judgment guide and rule of law guide ethical climate are negatively related to employee's anti-ethical behavior and confirmed the utilitarianism orientation ethical climate is positively associated with it. Through proved assumptions, research content of employee's anti-ethical behavior is enriched; understanding of management ethics study is more comprehensive.

4.2 Practical implications

Organization management ethical issues as attention of domestic managers are mostly macro institutional development. Practice proved above behavior deficiencies in the actual operation process. Construction and improvement of organizational ethical climate provides a new thought for managers to solve the ethical issues. Managers in the process of construction and improvement can start from the following aspects: First, managers create care guide, independent judgment guide and the rule of law guide these positive organizational ethical climates to let staff feel care and respect from organization, specifically, through economic means such as employee share out bonus, share holding, through lecture on management ethics, laws and regulations, through learning of laws and regulations and organization ethics. Second, managers should pay attention to avoid the utilitarian orientation of negative organizational ethical climate. Enterprises through a culture of teamwork encourage employees to help each other and bear its corresponding social responsibility, to make model for staff and let them feel enterprises are not purely for profit.

4.3 Research Prospect

Shortage lies in that the source of the sample is limited by regional research scope. Meanwhile, paper only explores its impact on employee's anti-ethical behavior from ethical climate this organizational level. Other levels or individual variables impacts are still needed further system research in the future.

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An Empirical Analysis on the Coordination of Interest Allocation among Employee-Stockholder & Government in Japan

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Abstract: In an attempt to investigate the coordination of interest allocation in the actual businesses this paper selected three parties of employee, shareholder and government as one of the simplest and most representative distribution systems and evaluated the coordination between their interest allocations. The measurement of coordination degrees revealed their relationships and possible effect. Based on the financial data of Japan's 66 listed companies in the past five years, the preliminary analysis on the coordination showed that the smaller the sales of company was, the lower the coordination of its interest allocation was; In contrast, companies with a larger sales had a relatively higher coordination of their interest allocations. The relationship between the coordination degree and the performance became more tightly with the rise of business scale. In the lower level of coordination of interest allocation, its correlation to its ROE was lower and in the higher level of coordination its correlation to its ROE was higher also. Especially in circumstance of large scale of business, regardless of which stakeholder dominated the distribution of benefits, the coordination and corporate performance had a significantly positive correlation.

Key Words: Coordination; Interest allocation; Stakeholder; Complex System

1 Introduction

How to distribute benefits among stakeholders has always been a core issue in handling stakeholder relations. In theory, most of researches are focused on how to reach more reasonable or effective results in an allocation of interests, and for this purpose various methods are introduced into such researches, among them the Shapley Value method^[1] and Nash Game^[2] are extensively used in the analysis of interest allocation among stakeholders who have formal contractual relationship, such as supply chain partners^[3], the strategic alliance and cooperators in R & D^{[4][5]}, and distribution channel of corporate incomes^{[6][7]}. However, little attention is paid to the real status of the internal distribution of benefits, especially to the coordination between distributions; almost no concern can be found about it.

Traditionally, the coordination methods are generally applied to larger composite system, such as the environment and energy development, education and economic growth^{[8][9]} etc. The previous studies on coordination of enterprise development are mainly confined to the strategy of the diversified businesses or allocation of interests between enterprises^{[10][11]}. So far, the coordination method has nearly not been used to analyze the systematic relationship between the actual distributions of corporate benefits, also very few researchers try to do so. In fact, the distribution of the corporate interests is a typical complex system, between its subsystems existing intricate relationships such as coordination, causal and overlay effects. In view of this, the paper tries to select employee, shareholder and government as one of the simplest complex system, based on a survey into the actual interest allocations in companies, and to discuss the relationship between their benefits. Its major purpose is to make an analysis on the coordination of allocating benefits among these three parties and its possible effect. This paper selects the financial data from 66 listed companies in five consecutive years as a sample, and then calculates the dominant economic interests distributed respectively to employee, shareholder and government, and by virtue of coordination degree model examine the coordination of the interests between the three parties, verifies if there is a correlation between business growth or performance and the coordination. Finally, it does a brief explanation and summary.

Here are several considerations for only selecting these three parties from the stakeholders involved in distribution of benefits. First, these three parties are crucial for companies, other may not be unimportant but their actual benefits are difficult to obtain based on the existing financial report; Second, if too many stakeholders involved in this paper, it will result in excessive data processes; Third, a complex system is usually composed of three elements, so this study has applicability to more stakeholders.

2 Samples & Data

In order to avoid the influences of such factors as industrial types, the business scale and cycle, and to increase the comparability, this study selected the listed companies in the same industry with similar sizes and at a mature stage, then taking their financial data in the same period as the samples. The selected 66 companies meet the following three criteria: in the category of manufacturing industries; medium-sized; in a relatively stable operating state. As a manufacturing company, any of the 66 companies has a certain amount of know-how capital, with the dependence on human resources in excess of dependence on natural resources, and thus they are likely more responsive to the coordination in their distribution of benefits.

Although “interest allocation statement in category of stakeholders” has been proposed by some scholars from the perspective of corporate social responsibility^[12], the disclosures of the existing corporate annual reports almost do not support this kind of specialized statement. Thus, the benefits involved in this study are mainly the dominant economic interests obtained through observation of existing financial reporting, which may reflect their vast majority of interests, where interests of the employees = wages + bonus + pension welfare fund; interests of shareholders = interim dividend + year-end dividend; government interests = corporate tax + resident tax + enterprise tax + tax relief or refund. Involving financial items mainly cover the debit balance sheet, income statement and dividend policy.

In a business, stakeholder’s interest obtained is reflected through its share of the total amount of benefits. Only their proportion is there a relative comparability between companies. Here the absolute amount of the above three benefits to be derived proportion of sales is taken as a measurement of how much interest one party of three to obtain, that is, the proportion of employees' interests(E%) = interests of employees / sales; proportion of shareholders interest(S%) = shareholders' interests / sales; proportion of government interests (G%) = government interest / sales.

All original data are collected from the Company's annual financial report in 2007-2011 announced by the FSA website EDINET. The original data are processed by using the following standardized method:

$$U_{ij} = \frac{X_{ij} - \min\{X_{ij}\}}{\max\{X_{ij}\} - \min\{X_{ij}\}} \quad i = 1 - n; j = 1, 2, 3 \quad (1)$$

The formula 1: X_{ij} is the proportion of the interests of stakeholder j of the sample company i. U_{ij} is the normalized value after the data conversion.

Table 1 Descriptive Statistical Results of Samples

Year	Stakeholder	N	Minimum	Maximum	Mean	Sd. Deviation
2007	E%	66	5.3375	63.8570	14.47552	8.570751
	S%	66	0.0000	73.4400	3.525084	9.436103
	G%	66	-0.8359	9.3282	2.7696	2.410086
	ROE%	66	-15.5983	20.8445	7.134224	5.92925
2008	E%	66	5.4440	43.4514	16.67777	7.727988
	S%	66	0.0000	55.0087	2.994043	7.085201
	G%	66	-3.8504	27.8913	2.0053	4.295932
	ROE%	66	-87.0206	14.8563	-7.14483	20.86153
2009	E%	66	5.7425	53.8996	18.96188	8.210471
	S%	66	0.0000	69.2093	2.752309	8.487429
	G%	66	-9.6063	9.5094	0.54374	2.74624
	ROE%	66	-33.3346	12.8764	-0.50774	9.80766
2010	E%	66	1.6730	39.4486	16.48803	6.318877
	S%	66	0.0000	65.8293	2.941568	8.102202
	G%	66	-6.4791	39.3314	1.7394	5.248988
	ROE%	66	-46.3078	16.2503	3.72088	8.606038
2011	E%	66	1.5745	33.7996	16.42051	6.161687
	S%	66	0.0000	69.0073	2.99017	8.399558
	G%	66	-3.1340	9.8015	1.7164	2.345141
	ROE%	66	-28.9253	22.1744	3.380306	8.21928

The above process, in the case of maintaining the data relationships, can further increase comparability in the dimensions and magnitude. Meanwhile, in accordance with the level of sales, 66 samples were divided into three groups, each consisting of 22 companies. Group 1 average annual sales <570000 million yen; 1,280,000 one million yen> Group 2 average annual sales > 570,000 million yen; Group 3 average annual sales > 1,280,000 million yen. Due to the too large amount of the original data, here is omitted. Its descriptive statistical results are as follows:

Seen from Tables 1, in the 5-year observation term, proportions of employee benefits accounted for among three parties showed a decreased trend, either in the highest value (63.8↘33.8) or in the lowest value (5.3↘1.5), but the average is basically stable, may be because the government revenue has played the role of "automatic stabilizers". In the recession year of economy, the reduction in taxes ensured the basic stability of the interests of employees assigned. At the same time, the share of government taxes showed a significant fluctuation, a year high after a year low, a huge difference for the companies. The average taxes proportion for the past five years has decreased significantly (2.7%↘1.7%). Probably affected by the financial crisis, the average ROE in 2008 is negative 7.14%. In comparison, the average of interests shareholders shared in the sales (Return on capital) is the smallest among three parties, but have very large diversification between the companies. But the interests of the shareholders is also relatively most stable, the average for the several years was stabilized at around 3%.

3 Assessment of Coordination of Interest Allocation

3.1 Weight calculation

Weight of distribution of each stakeholder is a quantitative expression of its relative importance in a complex system for interest allocation among all stakeholders; a measurement of the weight will affect the results and quality of the coordination evaluation. Under normal circumstances, the importance of the various distribution subsystem may not be the same, here is divided into two cases to consider.

Case 1, each subsystem of distribution to employees, shareholders and the government is treated equally, that is, their respective weights are 1/3 in the system integrated by the three subsystems.

Case 2, to calculate their respective weights by the method commonly used to determine weights. There are two kinds of methods, subjective weighting and objective weighting, the former are mainly determined by the experts' subjective judgments based on their experiences, including expert analysis method, the Analytic Hierarchy Process (AHP) etc. the latter according to the correlation between the indicators and the variation coefficient of the indicators, such as principal component analysis, factor analysis, correlation, entropy value method. Standard deviation coefficient weighting method based on statistical methods is used here to reduce subjective uncertainty. The steps are as follows:

(1)The average of the standard value of the proportion of each stakeholder interests

$$\bar{U}_j = \frac{1}{n} \sum_{i=1}^n U_{ij} \quad (j = 1, 2, 3) \quad (2)$$

(2)The standard deviation of the standard value of the proportion of each stakeholder interests

$$\sigma_j = \sqrt{\sum_{i=1}^n [U_{ij} - \bar{U}_j]^2} \quad (j = 1, 2, 3) \quad (3)$$

(3)The standard deviation coefficient of the standard value of the proportion of each stakeholder interests

$$V_j = \frac{\sigma_j}{\bar{U}_j} \quad (j = 1, 2, 3) \quad (4)$$

(4)The weight of the distribution system for each stakeholder

$$\bar{W}_j = \frac{V_j}{\sum_{j=1}^3 V_j} \quad (j = 1, 2, 3) \quad (5)$$

Where \bar{W}_j is the weight of Stakeholder j. n is the number of each group of samples, here n = 22 for these three groups. The weights represent the degree of variability of the sample data, which are derived from the benefits distributed to each stakeholder, reflecting the relative importance of the stakeholders in the comprehensive distribution system. A comparison can be made between the results of case 1 and case 2.

The weight calculated by the above steps as follows:

Table 2 The Every Year Weight of Employees (E),Shareholders (S) and the Government (G)

	2007	2008	2009	2010	2011
E weight	0.215866	0.135567	0.101588	0.093322	0.113432
S weight	0.593900	0.445984	0.468551	0.431630	0.576983
G weight	0.190234	0.418449	0.429861	0.475048	0.309585

3.2 Model for Assessment of Coordination

There are mainly four common coordination degree evaluation models [13]. Through the analysis of the applicability and merits and in compliance with the practical and simple principle, a coordination model is structured on the basis of membership function model. The coordination degree of a complex system is given as follows. Supposing the distribution system is composed of the employees' interests subsystem (H₁), the shareholder interests subsystem (H₂) and government interests subsystem (H₃), the actual level of the interest allocations for each subsystem is represented by E₁, E₂ and E₃ respectively, they are a function of their respective components, and the development level of the overall distribution system is represented by E*. Then a single system coordination degree of each subsystem H_j is defined as:

$$H_j \begin{cases} = \exp\left(\frac{dE_j}{dt} - \frac{dE^*}{dt}\right) & \frac{dE_j}{dt} < \frac{dE^*}{dt} \\ = 1 & \frac{dE_j}{dt} = \frac{dE^*}{dt} \\ = \exp\left(\frac{dE_j}{dt} - \frac{dE^*}{dt}\right) & \frac{dE_j}{dt} > \frac{dE^*}{dt} \end{cases} \quad j = 1, 2, 3 \quad (6)$$

In its calculation the development level of the various interest subsystems is represented respectively by its t-year average. That is, E₁ = \bar{U}_1 ; E₂ = \bar{U}_2 ; E₃ = \bar{U}_3 . The integrated system level is evaluated with subsystem weighted E* = $\sum_{j=1}^3 w_j E_j$. The coordination degree of the complex distribution system can be accomplished through the consolidation of subsystem coordination, by use of the geometric mean algorithm, namely:

$$H_s = \sqrt[3]{\prod_{j=1}^3 H_j} \quad (7)$$

In the formula (6) dE_j / dt represents the growth rate of interests of each subsystem inherent to the composite system, and as a whole dE^* / dt indicates the growth rate of interest of the composite system. $\frac{dE_j}{dt} > \frac{dE^*}{dt}$ indicating the subsystem E_j enhances at a greater speed than the overall speed of the system, that is, subsystem E_j grows too fast; $\frac{dE_j}{dt} = \frac{dE^*}{dt}$ indicating the speed of subsystem E_j development is equal to the speed of the overall system, and in the state of the coordinated development; $\frac{dE_j}{dt} < \frac{dE^*}{dt}$ indicating subsystem E_j advances slowly and its improvement is behind in the overall advancement of the composite system. As Formula (6) defined, H_j is a single system coordination degree of each subsystems of the composite system E_j, H_j ∈ [0,1], and only if $\frac{dE_j}{dt} = \frac{dE^*}{dt}$, H_j reaches a maximum. In general, H_j > 0.8 it is in coordination. H_j < 0.5 is regarded as uncoordinated [14].

According to the above formula, the distribution system is in a certain state of synergy with stakeholders at a different level of interest allocation. A definition and measurement of the state of synergy provides a prerequisite for our analysis of the interaction between interest allocation subsystems

and the possible effect of their coordination on CFP.

4 Results & Analysis

For the above three groups of sample data, respectively calculated by advantage of the above model, the results obtained are as follows:

Table 3 The Coordination Degree of Interest Allocations for Employees, Shareholders and the Government under the Same Weight of Each Subsystem

	Group 1				Group 2				Group 3			
	H1	H2	H3	Hs	H1	H2	H3	Hs	H1	H2	H3	Hs
2007												
2008	0.36368	0.71417	0.62200	0.54463	0.88089	0.96804	0.82499	0.88938	0.77705	0.94396	0.89776	0.87001
2009	0.50829	0.39727	0.10096	0.27318	0.90221	0.92460	0.76033	0.85919	0.99820	0.92235	0.92997	0.94957
2010	0.58359	0.65740	0.68874	0.64170	0.71086	0.84111	0.74888	0.76504	0.81418	0.77391	0.92273	0.83463
2011	0.74983	0.55171	0.36983	0.53484	0.94398	0.79522	0.80743	0.84629	0.89633	0.82876	0.68785	0.79946

The results can be seen in Table 3, in Group 1 the coordination of the interest allocation to employees increased year by year, and the coordination for shareholder interest allocation showed the overall downward trend over these several years, the coordination for government distribution of benefits fluctuated at some extent. In general, the distribution of benefits is not very harmonious, but basically stable. Meantime, in Group 1 coordination and performance was negatively correlated (see below), indicating that there exist leading roles in the distribution of benefits, despite the coordination was not high, a certain performance can be still maintained. Under the smaller market scale of Group 1, the coordination of the interest allocation does not make much sense for enterprises to improve their performance.

In Group 2, the degree of coordination has been improved with enlargement of the business scale. In Group 3, with a slight decline of the coordination the ROE of the companies has decreased slightly, but overall kept at a higher degree of coordination and rather stable. Further calculation shows that the coefficients between the integrated coordination Hs and the corresponding ROE of group 1, Group 2 and Group 3 were respectively -0.58855, -0.05237, 0.455087. In case of Group 3, the coordination was positively related to ROE instead of the negative correlation, the coordination of interest allocation is of more importance, with a result of that the effects of a particular stakeholder who alone play a leading role are weaken. In this specific case the role of the interest allocation for shareholders was relatively reduced, performance improvement was more dependent on the interest allocations for government and employee.

Table 4 The Coordination Degree of Interest Allocations for Employees, Shareholders and the Government under the Different Weight of Each Subsystem

	Group 1				Group 2				Group 3			
	H1	H2	H3	Hs	H1	H2	H3	Hs	H1	H2	H3	Hs
2007												
2008	0.37907	0.74439	0.59676	0.55221	0.78552	0.86323	0.9251	0.85605	0.78873	0.92998	0.88447	0.86569
2009	0.34908	0.27283	0.14701	0.24102	0.78014	0.79950	0.87930	0.81855	0.93968	0.86516	0.9914	0.93064
2010	0.48914	0.55101	0.82173	0.60503	0.59235	0.99069	0.89872	0.80794	0.79882	0.78879	0.90532	0.82935
2011	0.75944	0.55879	0.36515	0.53712	0.85369	0.71916	0.89283	0.81840	0.77984	0.72106	0.79059	0.76321

Through a further observation on Table 4 it can be found that in the case of resetting the weight by the statistic method, that is, weights of government and shareholder are heavier than employee, and simultaneously business being in a smaller market, the overall coordination of its interest distribution was not so high also (average about 0.5). An additional calculation shows that the correlation coefficients are respectively -0.51163, 0.517082, 0.495279 between the overall coordination Hs of Group 1, Group 2 and Group 3 and the corresponding ROEs. It implies that although the coordination has not much correlation to the performance at a small market size and there may be larger influences of other factors on performance (ROE), with the expansion of the market size, the coordination has greatly

improved, and the correlation of the coordination to performance was increased to 0.5. The coordination degrees of group 2, group 3 were higher and more stable than group 1. This shows that in the case of larger sales, compared with cases of equal weights, the change in stakeholder's weight has little impact on relation between coordination and performance. On the whole under circumstance of larger sales, relationships become quite close between the coordination of the interest allocation and corporate performance.

A further measurement shows that there is a significant difference between the annual average ROE of the 10 companies with the lowest annual average coordination and the 10 companies with the highest annual average coordination, as seen in Table 5. Thus it further illustrate that the coordination is closely related to performance.

Table 5 The 10 Companies with the Lowest Annual Average Coordination and the 10 Companies with the Highest Annual Average Coordination

No	Company	Annual average coordination	Annual average ROE	No	Company	Annual average coordination	Annual average ROE
1	FUJI ELECTRIC CO.,LTD.	0.61582	-0.51061	1	GLORY LTD.	0.87503	5.05687
2	ADVANTEST CORPORATION	0.71665	-5.45742	2	Mitsui Engineering & Shipbuilding Co.,Ltd.	0.87588	7.89132
3	Yokogawa Electric Corporation	0.77170	-11.65203	3	TAIYO YUDEN CO., LTD.	0.87595	-6.03072
4	DISCO CORPORATION	0.79615	5.88533	4	SYSMEX CORPORATION	0.87716	6.94650
5	Asahi Diamond Industrial Co., Ltd.	0.80258	6.05993	5	Stanley Electric Co., Ltd.	0.87847	8.23898
6	ANRITSU CORPORATION	0.80761	-1.12294	6	TOYODA GOSEI CO., LTD.	0.87912	4.61862
7	A M A D A C O., L T D .	0.80859	1.49733	7	NIHON KOHDEN CORPORATION	0.88063	9.28878
8	ISUZU MOTORS LIMITED	0.81654	8.41833	8	M I U R A C O., L T D .	0.88307	6.85470
9	HINO MOTORS, LTD.	0.81942	-7.48765	9	TOKAI RIKI CO.,LTD.	0.89249	4.80289
10	Fuji Heavy Industries Ltd.	0.82274	-3.99256	10	Kurita Water Industries Ltd.	0.89666	9.85663

5 Conclusion

With the growth of business, the system of benefits distribution evolves. The economic interests of a company available for distribution are linked to the growth of business, and change with the change of the system of benefits distribution. Conducted for the same industry in a similar environment and in a mature market environment, this study on the 66 company samples shows that the relationship between coordination and performance become more tightly with the rise of business scale. In smaller-scale businesses, the coordination of interest allocation is also lower; in larger-scale businesses, the coordination is also relatively higher. When the coordination is at the lower level, its relevance with the performance is not prominent; at a higher level of coordination, its correlation to performance is also increased. And large enough in size, no matter who dominate, roles of different stakeholders have been little distinguished, the harmony of interest allocation within a company has obviously positive significance on corporate performance.

Unfortunately, there are less of empirical studies in this area. The purpose of this paper is merely to examine if there is the coordinated relation (consistent relations) between interest allocations and potential effects of the coordination degree on corporate performance. Owing to the limited sample data,

lack of consideration on factors such as the industrial sectors, economic cycle, this study is still relatively preliminary. It is necessary for more depth studies to use the wider stakeholders and more samples.

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Research on the Guarantee of Efficient Operation on Teaching System to Cultivate Excellent Talents in International Cooperation

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Abstract: The international cooperative education in China began in 1990s. After over 20 years' development, the international cooperative education has become an important part of higher education and the development direction of teaching reform in China. How to efficiently operating teaching system has attracted more and more attention. This paper tries to discuss the guarantee of the efficient operation from the excellent talents of international cooperative education teaching system mechanism.

Key words: International cooperative program; Teaching system; Efficient operation; Guarantee

1 Introduction

With the gradually mature of cultivating system on excellent talents in international cooperation, its management has tended to internationalization, standardization, systematization and scientific direction. And the key to successful international cooperation project lies in the effective operation and improvement of teaching system. Whether the teaching system is efficient or being adapted and improved with the environment will not only affect the quality of teaching and teaching order, but also affect the stability and development of cooperation programs. It is definitely necessary to discuss and research on the operational mechanism of teaching system in order to promote the quality of teaching and the cultivation of internationalized excellent talents.

2 Analysis on Teaching System Construction in Cultivation Excellent Talents in Int'L Cooperation

The motion of the system is determined by its mechanism. "Teaching system operation mechanism" in cultivating excellent talents in int'l cooperation is referred to that, in the process of teaching, the teaching participants constantly summed up with its own characteristics, effective teaching management system and its internal elements interaction feedback. International cooperation of excellence talent training mechanism teaching system mainly includes two aspects.

The first is to establish the teaching management system based on the mode of cultivating excellent talents in international education cooperation. The operation mechanism of teaching system is based on teaching management system, which mainly includes the system of teaching objectives, the supervising system of teaching quality, the teaching reforming system, and various teaching management regulations, including management regulations on teachers, students, teaching facilities, teaching service, teaching incentive, teaching resources allocation, teaching supervision, teaching evaluation and so on. These systems are procedures and methods that the staff should follow. The teaching management systems are integrated to form the object mechanism, monitoring mechanism, incentive mechanism, restraint mechanism and effect evaluation mechanism in cultivating excellent talents in international cooperation education teaching system. Altogether, it makes the teaching system operate effectively. Teaching management system must be improved and perfected in the process of teaching to ensure the characteristics of cultivating excellent talents in international cooperation, to ensure sustained and stable development.

The second is the management of teaching process. The management of teaching process mainly refers to the mutual cooperation between the various links of the management system. Any failure of effective cooperation will have a negative effect on the system operation. It will ultimately affect the implementation of teaching effect. That is to say, interaction between each link of the teaching management system is the guarantee of achieving the objectives and effect, making effect on guaranteeing, promoting, giving feedback and controlling teaching system. Those came to a dynamic system. The system mainly includes two aspects: one is the coordination between the teaching departments; another is combined with teaching management, which is based on the cooperation in teaching departments. These aspects are independent of each other and mutual connection, mutual influence, and have a certain logical relationship. Clarifying the relationship between teaching and management will make the teaching system run effectively.

3 Analysis on Operational Mechanisms of Teaching System in Cultivating Excellent Talents in Int’L Cooperation

Analysis and research on operational mechanisms of teaching system in cultivating excellent talents in int’l cooperation will set a further goal and help clarify ideas so that the cooperation of division of labor can be achieved. Following is the fig. of “Operational mechanisms of teaching system in cultivating excellent talents in int’l cooperation”

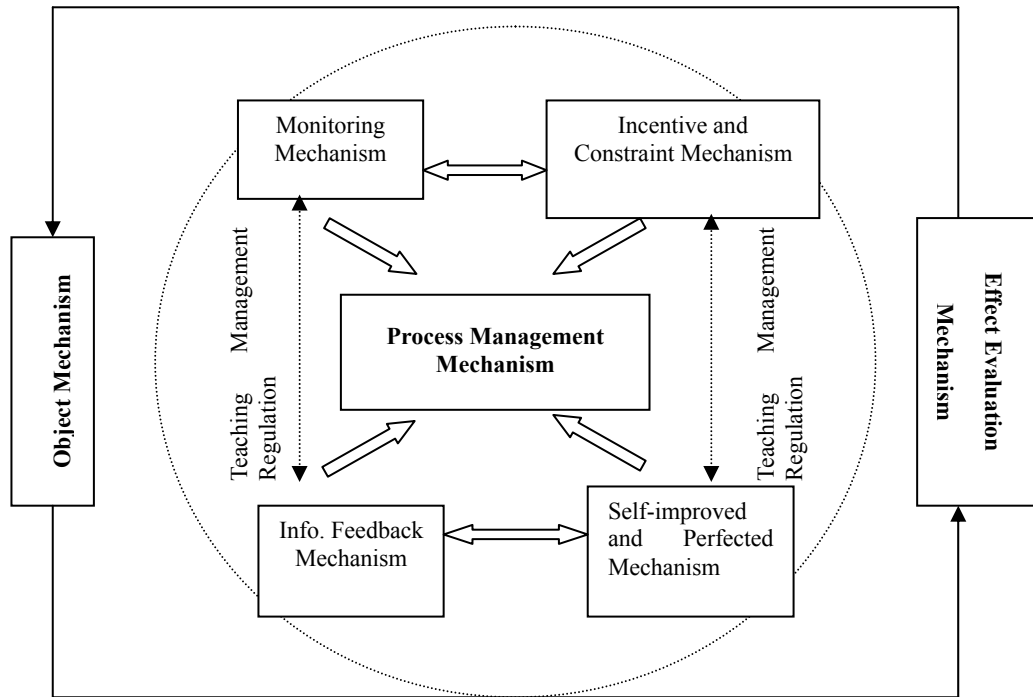


Figure 1 Teaching System Operational Mechanisms in Int’L Cooperative Education Programs

Object mechanism: the aim is to cultivate excellent internationalized talents in international cooperation education. Specifically, it is to cultivate abilities in knowledge application, innovation and internationalization. Object mechanism is to ensure the realization of the target of cultivating internationalized talent. It is set to fulfill the management indicator.

Process management mechanism: each department (project department, teaching affairs department, and instructors departments) is involved in the implementation of process management in international cooperative teaching. It contains the setting and assessing of international cooperative cultivation plan, teaching plan, disciplines arrangement, and practical teaching plan, supervising the implementation of teaching plan, employing teachers, and examining and evaluating students learning effect.

Monitoring mechanism: it is a necessary part in international cooperative teaching management system, aiming to ensure the teaching quality goal. The monitoring is composed of teaching information resource, teaching process, teaching conditions, teaching object, teaching staff and teaching administrative staff.

Incentive and constraint mechanism: the smooth running of teaching system of international cooperation is due to the cooperation among various departments. Only when combining teaching management, responsibility and interests together, can it form an effective dynamic effect so that the incentive and restraint will play its due role. Positive encouragement and negative punishment complement with each other to form the incentive and constraint mechanisms.

Information feedback mechanism: it is to collect, store sort and dispose relative information on international cooperation teaching in the management. This mechanism controls and gives feedback on teaching system and teaching management. It helps check whether the object mechanism is scientific and whether teaching process management is appropriate. It also guarantees the teaching effect.

Self improvement and perfect mechanism: self improvement and perfect mechanism is mainly to strengthen self correcting ability of international cooperation in teaching management through the information feedback mechanism, trying to optimize and improve the teaching system.

Effect evaluation mechanism: Evaluate the effect of international cooperation teaching management at any time to constantly improve the teaching management. Establishing a set of perfect teaching effect evaluation system is very necessary to evaluate the effect of teaching management.

4 The Guarantee of High Efficiency on Cultivating Excellent Talents in International Cooperative Education Teaching System.

The operating power of a system comes first from the inner side, including the policy goals, leadership attention, and clear division of responsibilities, the process detection and control. The second is the ability for continual improvement of the system and self development, self optimization, are fully reflected in the process of the establishment and operation of the system. The third is the surveillance audit of the third party on the operation of the system.

(1)The teaching system must have a clear goal. The teaching system management activities can be divided into the formulation of policies and objectives, responsibilities, establishing regulation system, implementation plan, control and improvement activities, among which policy and objectives composes of the purpose of the organization. All the management activities in teaching system are achieved on the principles and objectives. That is to say, the international cooperative education system's goal is the basis to ensure the normal teaching activities. The teaching policy and goal not only reveal the purpose and direction of cooperative education, but also is the power of management system operation and reforming. All teaching activities will be developed with the teaching goal. This can improved steadily the schooling level and teaching quality.

(2)Attention on identification and control of teaching process and the process elements. In order to make the effective operation on teaching system, teaching management process must be identified with interrelated teaching management, especially to make clear the relationship between process and elements, to facilitate on effective control and improvement on the teaching system operation. Identification of the process or elements, is in fact the analysis and confirmation of the various factors affecting the quality of teaching and the teaching environment, and ultimately achieves effective control of these factors.

(3)Attention on leader's role. In the current circumstance, The implementation and operation effect of teaching system in international cooperative education depends on its leaders' recognition and the role they played in application in a certain extent. Leaders should not only determine the direction of development, be responsible for the discipline construction, make development planning, but also allocate resources, divide duties, create harmonious working environment that the staff can fully participate in. Top administrators should not only carry out and implement the management system, but also focus on teaching effect, applying management review to understand the system operation situation, promote the system smoothly.

(4)Clarify the responsibility of the relevant duties. Clarification of working responsibility of each department and each post plays important role in command, control, coordinate activities, achieve the goal for the organization. Unclear responsibility will lead to chaotic teaching system, increase running resistance, or even result in failure of teaching system. Clear responsibilities and authority is benefit for a smooth transition for each link of the teaching system, so as to make the management more effective.

(5)Attention on the monitoring mechanism of teaching system. The establishment of a teaching system is not easy. It is even harder to make it run effectively, which requires all relevant teaching activities are under control: formulate standards of evaluation index and teaching quality criteria; strengthen supervision and inspection and information feedback mechanism; construct international cooperative education teaching quality monitoring mode; carry out regular self-examination and self-assessment to solve the problems and shortcomings in teaching activities. Self-examination and self-assessment is a driving force of teaching system. Self evaluation helps both administrators and staff understands teaching system running status, recognize system improvement opportunities and form self-improvement and perfect teaching system mechanism.

(6)Rigorous third party supervision mechanism. Effective operation of teaching system needs not only scientific regulations, rigorous third party supervision mechanism of continuous improvement and perfection of teaching system has played a very important role, makes the implementation of teaching

system a powerful safeguard, so that it enters to a virtuous cycle standard operation. Therefore, when facing all levels of supervision power, the international cooperative education teaching point should not make fraud, assault motion type, but transfer the pressure of market competition and supervision and inspection from the outside as a powerful driving force to promote teaching system operation, seize the opportunity to improve the shortage, to fulfill the teaching system of the vigor and vitality, to achieve the teaching goal.

(7) Guarantee the stability of high-quality teaching staff. The building of the contingent of teachers is an important guarantee for normal operation of the teaching and teaching quality improvement. In order to ensure the effect and quality of international cooperative education, cooperative education program should set a goal to build a high level teaching team, mainly in independent training and working improvement, to strengthen the cultivation of high-quality teachers, to improve the existing teaching team level.

(8) Perfect the relevant management regulation in teaching system. Economist Wu Jinglian once said ‘the idea is more important than the regulations, while the regulations are even more important than technology’. Cultivating excellent talents in international cooperative education should follow the internationalization of education idea, establish and perfect the system of teaching management, to ensure the effective operation of the implementation of teaching methods, teaching work and the development of teaching system. Regulation is the rules that certain procedures, organization members to abide by, including a variety of requirements, working methods and procedures, policies and regulations. Regulations are in the form of performance management manual and a variety of documents. Only fair, reasonable, scientific, perfect teaching management system can be the staff recognized, in order to ensure the effective operation of teaching system.

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The Role Positioning and Countermeasures of Local Government Process Reengineering Based on Administrative System Reform*

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Abstract: Government Process Reengineering (GPR), which is produced in the new public management movement in western countries, is a new government reform initiative. It is the combination of "reinventing government" thinking and business process reengineering. Building the government process system, which makes the public demand as the core, is the fundamental requirement to adapt to the current trends of government reform. Meanwhile, the meaning of GPR is not only limited to the simple business process optimization, also reflected the concept of government organizations upgrading and the changes of organizational structure and management mode. It fully enhances the efficiency of government administration through these innovative measures. In this paper, the author focuses on the four hot issues of the China government reform: e-government construction, the super-ministries construction, government performance management and the transformation of the government function. Then, the author discusses on the inter-relationship between above four aspects and the GPR. At last, from the theory and operational levels, fully exploited the demands from "the government process" which based on specific measures of the administrative system, the author positions the roles of GPR in our administrative system reform.

Key words: Government Process Reengineering; Administrative System Reform; Role Positioning; Countermeasures

1 Introduction

At present, China is facing the economic system transition, from the original plan economy to the market economic transformation gradually. As the traditional inertial impact, the transformation of political is far behind its economic development, which cannot meet the requirement of economic development. The disadvantage of government management is especially significant, of which the diffusion effects very rapidly, so, the social attention is gradually shift to the effectiveness of the administrative system reform from the local government service ability. There are some apparent problems on government's public service and administration ability, such as: information asymmetry, which caused by information that the government wants and the enterprise needs can't deliver timely between them. The high costs of government management, as many public service procedures are still stay in the original "face to face, hand to hand" way, so that there are so much waste of the time and space cost that both enterprise and government had to pay, which caused inefficiency. Discretion and black-box operation, which are the old problems in our traditional bureaucracy system reform, is because working processes are not fixed and standardized in our government, especially the processes directly extending to the enterprise, even that the positions and responsibilities of staffs are stable. No standardized processes takes a series of problems that the same enterprise may have different public service standard, where the unfair treatments happened.

These management problems are the main factors causing the low efficiency, and become the obstacles in China's economic and social development. Aimed at finding a model of GPR that meets our social environment, political background and economic conditions, our government, from central to local based on "service-oriented government" concept, takes a lot of attempts with "the government process" in GPR in our the current the new round of reform^[1]. Our objectives are maximizing the government's administrative efficiency within China's government at present management mode, Reform is a kind of trend, so the GPR is the reform operational measures but the purposes. Therefore, the current problem which the local government faced is that how we make GPR adapted to others reforms and meet the trend of the reform. In other words, what role that the GPR in the process of reform should play and what kind of affect it should achieve is the problem which managers should make clear above all.

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2 The Government Process Reengineering: From Concept to the Operational-Level

2.1 The connotation of GPR

The definition of government process reengineering is no unified, but the researchers had reached a basic agreement. The operating process of GPR is the redesign or reschedule of the original administrative management process and government administrative procedures, based on the relations of all the interests and responsibilities. As a result, GPR replaced the old one process with a new one, or modified, merged and simplified the old ones. The purpose is that, firstly, to optimize administrative organizations or government operation system and operation mode.

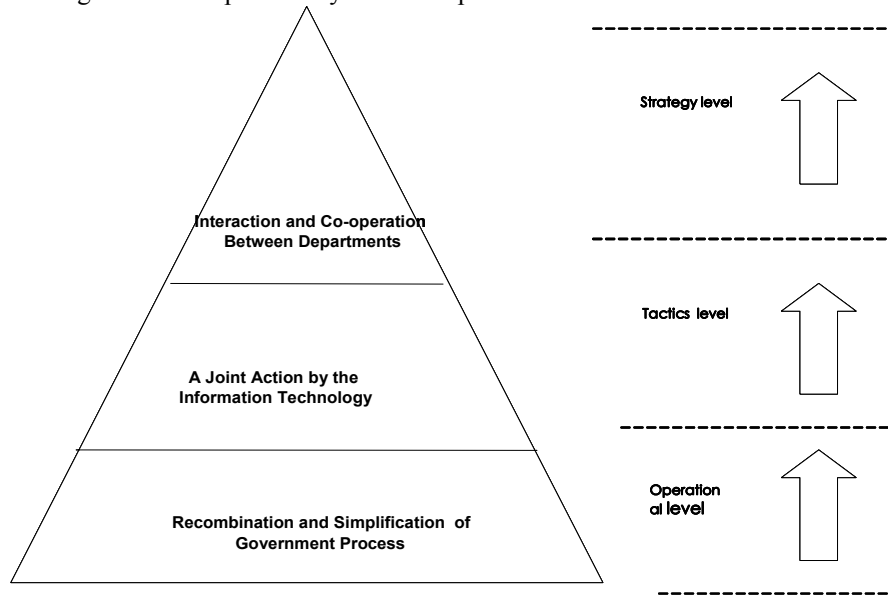


Figure 1 The Connotation of GPR

Secondly, the government should transform government function and improve the efficiency of the administrative management, performance and quality. Thirdly, the government should realize the maximization of social welfare. Taking the guiding ideology and tools as the perspectives, from satisfied the public service needs as the starting point. GPR is a process by which we can organize the public service in a certain way to form a complete service process, using the modern information technology and based on the system thought as the foundation^[2]. To create a service-oriented government is the important way to change the government management function and management mode via the GPR.

There are three levels to understand the meaning of GPR (The figure 1 follow). First, the operational level of GPR is visual simplified or restructuring the government management process. Second, extended upward to the tactical level is to use information technology to promote department linkage. Third, strategic level is to realize the interaction between government departments without boundaries.

2.2 The development Trend of GPR

Compared with "government reengineering" movement in western countries, the study of GPR in China is required to further strengthen, quoted a scholar's words, is "a burgeoning field". Recent studies focused on the theory system of GPR, such as the concepts, principles and significances of operating the GPR, meanwhile, the empirical research is seldom on how to solve specific administrative problem and organizational restructuring, the transformation of government functions, government management change and government services paradigm change through the GPR. From the research situation perspective, our government also took the GPR practically earlier than theory research. There are some forms of it in our e-government construction, the super-ministries reform and other countries major administrative system reform. Now, our study aim is to summarize the experience, then analysis the relationships among the GPR and e-government construction, administrative system reform, government performance evaluation, government transformation project, and so on. The research in this respect is more lack. In addition, the influence, which came with the GPR, of institutional, structural, management, and human resources, technology level are the hot issues in this field.

Overall, the GPR projects in China's government departments already had successful models, even

though not very popularization, but its development speeds up soon. Along with the development of China's public management and administrative system reform^[3], the GPR from the connectional level had concentrated the attentions of public society, and received common recognition; the current development is toward exploration experience.

3 The Position of GPR in the Administrative System Reform

The goal of Administrative system reform is to improve the administrative efficiency, and enhance the government service capability. The government process reengineering, as part of the reform, has connected and influenced the present reform measures in the long Reform process. Therefore, the government process reengineering which had service for reform, should coordinate with the ongoing reform measures, adapt to the already done measures, so as to promote administrative system reform smoothly and directly.

3.1 The links between the Government Process Reengineering and the E-government

E-government is part of the development and innovation of the traditional working mode^[4], because the changes of government affairs must cause the working procedure alterations, so, electronic government has a large interactions with the government process reengineering. On the one hand, the government process reengineering is a way to promote e-government to a certain extent; On the other hand, the electronic government affairs raise a claim for the government reengineering.

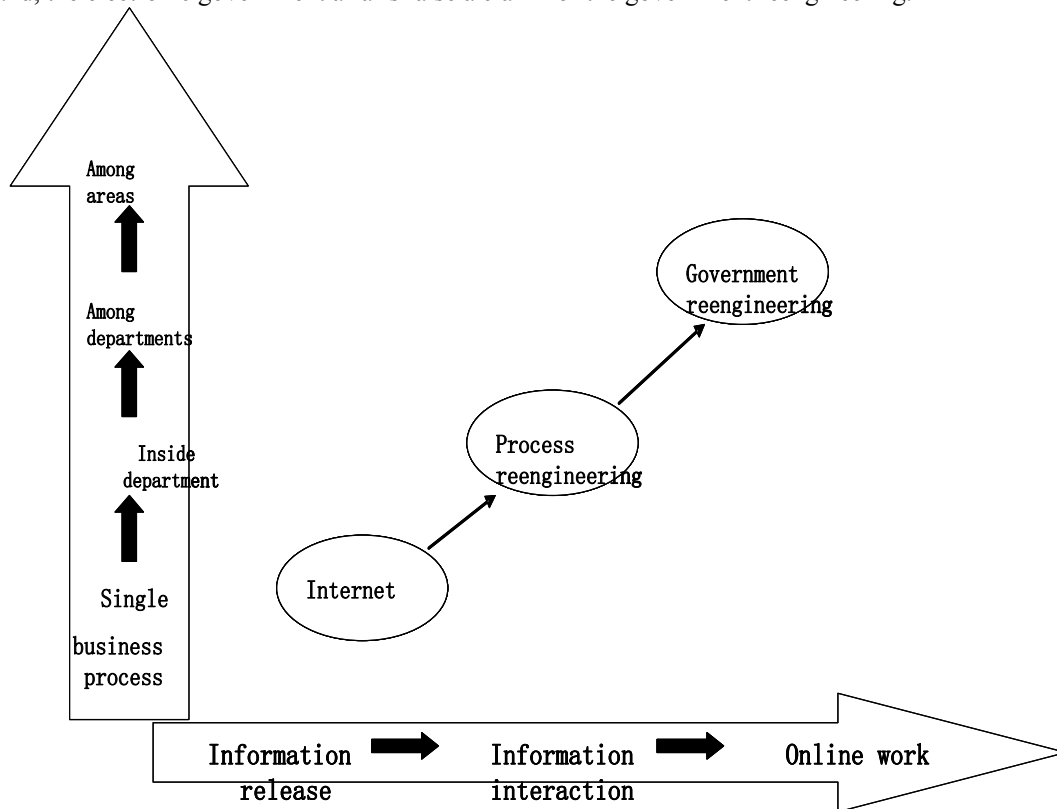


Figure 2 The of GPR and the Application of E-Government

The application of electronic government affairs should take the process reengineering as organizational guarantee. As the levels of electronic government affairs application is continuously improved, the requirements for process reengineering are also increasing after the section of information released^[5]. The electronic government pointed out clear direction for process reengineering, and put forward the requirements. Due to the administrative process reengineering also is to structure the government process form which is adapt to requirements of informationization development by the information technology, it should re-design and optimize the traditional organization structure mode, the mode of management, business process and the way of providing service, and take the integrity business process to replace fragmentation process split by any government department formerly based on information technology and from the system point^[6].

The e-government and process reengineering are interacted and influenced each other, as the government can optimize management function, save administrative cost and improve the efficiency of executing the government mission to promote public satisfaction, in this way, the electronic government is technical support for process reengineering. Moreover, the restructuring of government business process plays a meditative and promote role for e-government, as a result, the combination of both one has the significant practical meaning^[7].

3.2 The links between government process reengineering and "the Super-Ministries" of China

The seventeenth national congress of the communist party of China focused on reducing the administrative levels, reducing administrative costs, and strives to resolve the problem on overlapping organizations, cross responsibilities, and divided policies from various sources. In the new round of reform, the main point falls on "the super-ministries" construction, the essence of "the super-ministries" is that to reconstruct government authorities structure and establish the new government operation system and operation mechanism^[8], but not merge government agencies simply. "The super-ministries" gets departments which has the similar business and same function together so as to accomplish unified management by one department according to "decision-making, execution and supervision" coordination and mutual constraints of the principle. Aimed at avoid overlapping functions, many supervisors to one subordinate, it had to reduce the amount of department agencies so that to improve the administrative efficiency and reduce the administrative cost.

The value of government process reengineering is to constantly improve the ability of the government management to meet the social public increasing development needs, and maximize the public interests. The integration of the super-ministries directly related to the reconstruction of government process, which the institutional changes lead processes to a new level. It requires the goal of evolutes to flat-style and simplifies the process further through the reduction of administrative level. Along with the advancement of the super-ministries, government process reengineering is droved.

3.3 The links between government process reengineering and government performance management

The definition of government performance management is that evaluating actual performance and achievements of the government authorities as accurately as possible by the scientific methods, standards and procedures, so as to improve and enhance the government working efficiency^[9]. The government performance management is a series of activities that make the government's long-term and short-term goal, the strategy, and the assessing standards, so as to achieve the administrative agency operational management and evaluation.

It mainly includes four basic function activities: performance planning, performance implementation and management, performance evaluation and performance feedback and improvement. Specifically, the government performance management could be understood from the three aspects as follow, the micro level, the medium level, and the macroscopic level. It includes the identification of civil servants personnel performance and contribution; the assessment on management of every government departments and the government institutions; the performance evaluation of the whole government^[10]. Because the cognition of performance management and extension does not come to an agreement, and the definition of it is not clear, it could not establish a complete set of government performance evaluation index system and method. As the expression of the content, it is the one-sided will that the economic performance is equal as the government performance. So, it uses more qualitative evaluation than the quantitative index, such as "leader's attention", "satisfaction", and "standard level". These qualitative indexes are easy to be adjusted by the government department, which makes the assessment results hardly to be objective and fair enough, so it becomes formalization^[11].

The core issue of public sector process reengineering is to solve the government efficiency and performance, and its revolutionary significance takes continuously improvement of the executive ability and working efficiency to achieve the high quality and efficiency of public service finally through the practice.

3.4 The links between governments process reengineering and build a service-oriented government

The definition of service government is that a government which achieve the service functions and bear the responsibility of the service, refers to a "citizens as core-oriented, under the guidance of the concept of social standard, being built in the entire society under the framework of democratic order, according to citizens will legal procedures to set up, aimed at citizen services^[12]." The subjects of The service-oriented government service is all levels government, the object is a citizen, social organizations and society, the aim is to promote social benefit and stable development, the content is decided by the

public opinion, the mode is in the open and transparent way.

At present, because the government's decision is not divided with the executive function, the government departments may make the policy for local interests, so administrative performance evaluation is instead of maximizing internal interests, the chaos of management mode lead to government micro management and intervention overmuch, which fell into specific economic affairs in management's mire and hindered the transition of government function. The government process reengineering will re-settle the government internal function by integrating the business process which faced public demand^[13], re-design management pattern by improve the public service network system as the foundation, re-evaluate the administrative performance by the satisfaction degree of the enterprise and public. So as to realize the transmutations from traditionally consciousness of centralized management, controlled subordinate and regulation completely to scatter decision, serviced subordinate and sensitive feedback. A service-oriented government indicate he direction for the government process reengineering. With the construction of e-government, the traditional government process and operation mode no longer meet the needs of practical application under the concept guidance of "one-stop" service^[14], so it requires re-designing the government's public service mode. Service program reflect internal pattern of the government's public service activities, which is logical sequence of the activity. The quality and efficiency of public service directly comes from whether concise the public service program is or not. The government process reengineering and service program transformation are two part of one body, the latter is the core content of the former, meanwhile, the actual result of former expressed as the change of service program^[15].

4 Case Study of Government Process Reengineering of Harbin Bureau of Quality and Technical Supervision (HBQTC)

4.1 The status description

Harbin Bureau of Quality and Technical Supervision (HBQTC) as a municipal government agency, is responsible for the implementation of the laws and regulations of standardization, metrology, quality and safety supervision of special equipment, etc within the scope of the city. the main business and office system of HBQTC includes two categories, ten events for examination and approval matters, Six administrative licensing and one non-executive permission.

There are seven main responsibilities faced to the public, such as to carry out national and provincial quality and technical supervision guidelines, policies, laws and regulations; to take response for quality management in the region, to supervise The quality management of the region, to take response for the local management of standardization, to unify management of metrological work in the region; to integrate management of the region of boiler, pressure vessel, pressure piping, special equipment's safety supervision, to carry out and implement relevant laws and regulations; to organizes development and implement for quality and technical supervision in our region business plan.

The business relevance of HBQTC takes the proportion of 3% in the all 297 items of administrative services announced from 41 departments, which is closed to the main business and the public and the companies. HBQTC is an important position in the e-governmental network, on the vertical direction there are the National and Heilongjiang provincial Bureau of Quality and Technical Supervision on the top, and other units subordinate and inspection department under the district. Horizontally, HBQTC has a lot of businesses cooperation with other governmental departments, such as public security, business administration, bureau of health, consumer advocates etc.

4.2 The objectives description

The main goal of government process reengineering, is to optimize restructuring the original process, to achieve chartered process, to Pursue process reengineering under the rule of law, to achieve institutionalization and sequencing, behavior standardization, to give prominence to the humanistic care, to achieve process human, to pay attention to public services and products supply of indifference, quality standardization. Taking the view of the reengineering process, the objectives of HBQTC government process reengineering can be divided into short-term and long-term goals.

Short-term goal, which is also the microcosmic goal, is to solve the problem which the requirements of this unit each department in administrative activities, neither dereliction of duty, but not excessive, neither doing their duties, nor disorderly, not only emphasis on power, fails to perform the responsibility, but also only do their jobs when it make benefit and give up responsibilities as nothing happened.

Long-term goal is macro goal, which solves the problem of the government process reengineering

standardized the administrative behavior^[16], changing from the almighty government to limited government power. The administrative process reengineering of HBQTC emphasizes the government provide public products and service quality.

4.3 The implements of the project

The project team investigates on government functions, institutions and sections, responsibility and division of administrative authority, finds out the positions and relations of the functions, responsibilities and authority of operation offices, teams and institutions by tracking mining their government processes. On this basis, we conduct a comprehensive combing of decision-making, information transferring, supervision, assessment process and the law enforcement process thoroughly.

We take the government process reengineering from two aspects of demand, the enterprise and the public, then carding the process and making improvement according to the requirements. The design mainly divided into three steps:

The first step is to research and comb. Investigating on the administrative functions, powers operation and public demand then carried out the administrative power level, as a result of power sorting catalogs and function adjustment opinions, which are assessed by the expert argumentation.

The second step is to adjust function and reform the system. To formulate and organize the implementation of the government institution reform, to carry out the adjustment function; to issue administrative rights to county departments, ready to handover of the district, county (city) authority and cohesion; and to adjust the public finance system.

The third step is to carry out the execution process reengineering and perfect security mechanism. To optimize the administrative law enforcement procedures, and establish and perfect the safeguard mechanism, to take fully implementation of government performance evaluation, and establish administrative supervision network platform, exercise network supervision over administrative power operation.

Comparing the before and after, the main process improvement reflected in the following aspects:

First, the payment system was optimized. The original payment shall be handled directly by the window, and then turn to fiscal revenue system, now the applicant can choose the one step payment way, leaves out the window of doing business and save intermediate link.

Table 1 statistical Comparison Table of Process Optimization

	Applicant Actions	Transactor Actions	Interactive Process
Before	5	7	8
After	6	6	3

Second, the information acquisition way has some adjustment. The original of the applicant's information collection need to fill in manually and typed-in by the acceptance, as now we changed the process that the applicant directly entering the application information, which reduce the back and forth in the audit, make the information acquisition as one pace reaches the designated position.

Third, to reduce number of times of material between both sides and it reduce the energy input and improve process efficiency. On both sides of the interaction, process by eight times reduced to 3 times, as the figure of the arrow line between the two columns, fully illustrates that the handling process, both sides need to communicate the completeness of information, for people to do work is necessary to review, and some of them is not limited to face-to-face interaction, which can take a variety of forms such as network, telephone, SMS, make full use of technology to support the process.

Fourth, the applicant can accord the information public service guide, learn to deal with process, and can clear the progress of the process after a phone call or SMS notification. Form now on, they only need to carry documents, can be a successful get their card, reduces the time cost, and the business is no longer difficult.

Fifth, the increase of action times shows the more applicants to participate in the conduction of greater autonomy, improve the degree of public participation and transparency; the number of transactor action decreased, shows that higher efficiency of handling affairs.

5 The Countermeasures of Local GPR

5.1 To Reshape a Conception of Administrative Value as Initially, driving the changes of administration culture, to provide culture environment of GPR

The implementation of GPR, first to do is remodeling personal administrative value, then, taking

transformation of whole administrative culture. Based on the current situation of a service-oriented construction in government, the government should set up "the public interest is supreme", "hearty service", "full service" and "service is the productive forces" concept, by building the service center to the public. So, the government could make an "public demand" oriented service values^[17].

5.2 To take the government organizational reform as an opportunity, driving the transition of government function, providing the GPR a reasonable organizational framework

Structure transformation lead to change of process, it is also the other hand of driving the implementation of GPR. Therefore, the current government reform can reduce stress and resistance for the GPR; often it makes more the effect. Government organizations change to "flat type" from originally the "pyramid" of institutions, make the government network structure as longitudinal breakthrough and lateral coupling, and expand the management range, reduce the administrative levels, decentralize the authority appropriately, then change the traditional almighty government image. The transition of government function lead to government organization adjustment, by which this adjustment to integrate the government process: through the government reorganization merger, we can integrate process which scattered in different departments, and make it full and fluent^[18].

5.3 To take the performance evaluation as a safeguard, driving the government management innovation, providing system platform for government reengineering

The change of new government process requires new performance evaluation content to adapt to performance management of the new process, which drives the reform performance management. The new performance evaluation based on process as the center, is the improvement of performance evaluation system by which the traditional department functions evaluated. It will accurately convey the direction, responsibility and audit standard from the strategic decision-making level to each specific actions or tasks, focused on the interaction between people, procedures, and the performance, which make the process easier to observe, control and adjust. In this way, it not only makes the evaluation more scientific, equitably, persuasive, but also can reflect more broad vision as "flow as the core" new ideas and "horizontal integration"^[19], thus forming the healthy operation mechanism that government process improved itself.

5.4 To take the informatization Construction as the means, driving the government process change the way of thier work, to provide the technical support for GPR

Information construction is much closed to the government process reengineering, the informationization is trends of government management, which support the government process reengineering is the flow of support behind. At the same time, the results of government process reengineering are embedding the process into technology measures as far as possible, which are different from traditional written review form of "face to face, hand to hand", instead of simple "window type" or "one-stop" office form taking the online services office model, by which the public could receive government information and services via many channels¹⁴, so the government authority and all sectors of the community could communicate from each other, and the government also could provide various services public choice. Therefore, we must continue the GPR through government informationization, such as promoting departments' official online and wide-area network construction of government, regulating and innovating the administrative behavior and procedures; promoting the e-governmental network construction and unified data standard, practicing the resources integration to promote information sharing^[20].

6 Conclusion

To sum up, the government process reengineering thought is the references for Chinese administrative system and operation mode reform, but at the same time, we should understand that the government process reengineering thought itself is yet to be practiced and completed constantly. So, it makes us not only to reference the advanced thinking of sparkle, but also to base on the actual situation. After that, we could find the suitable the reform mode to promote the construction of service-oriented government in our country, combined with the improvement of the government work process. The government process reengineering is completely revolution in government operation pattern, also is the great measure of deepening the administrative system reform. It has the inherent consistency with other reform measures or reform ideas, therefore, only through the idea, organization, system and technology support, will we exert better government process reengineering performance, so to play a bigger role in the reform.

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Policy Research on Human Resource Development of Disabled Persons in Our New Period

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Abstract: The disabled person is an important force that allow of no neglect in human resource development. Under the main idea of qualitative research, this thesis interprets and analyses Chinese government's policy on disabled persons' human resource development in the aspect of special-education, employment services and motivation system from the year of 2000 to 2012 by using the method of literature search and data collection. It has been found that problems exist in unfulfilled requirements of special-education for all disabled groups and the low utilization of training resource; single orientation of employment policy service and the lack of a policy system for employment training of people with disabilities, and so on. In view of the above problems, this thesis puts forward six proposals, including organizing cultivating and training for special-education teachers to meet the different types of disabilities and requirements; introducing an assessment system of special-education teachers' training effectiveness for the rights of the disabled; strengthening the maintenance and management of configuration related to the employment information network for the disabled; enhancing efforts to support disabled persons in their own businesses; developing periodic and standardized training of employment for the disabled; enabling more disabled people to benefit from the incentive scheme.

Key words: Disabled persons; Human resource development; Policy; Descriptive statistics

1 Introduction

With the development of modern economy and society, the utilization of human resource, as an economic development factor, is getting more and more attention from enterprises, even the government. As is known, there are objective differences in working capability and employment environment etc., between the disabled and the healthy people. This difference is one of the reasons which leads to the fact that the human resource of the disabled is not fully valued and optimized. However, most of the disabled just partly appears physiological function disorders, and the capability of undamaged parts of body can still be called human resource, which has been underdeveloped so far. According to the Second National Sample Survey on Disability in China, 82.96 million people or 6.34% of the country's population has a disability. There are researchers pointing out that based on the survey, of these disabled over 15-year-old, 27.42% has complete working capability, and 42.99% has partly working capability, which means the total number of the disabled can participate in the labor runs up to 70.41%. In recent years the employment rate of the disabled keeps rising in China, and the employment service for the disabled is enhanced. But at the same time, employment situation of the disabled is still severe: there are 8.58 million disabled people without job at their working age and with working capability, what's worse, the annual increase reaches 300 thousand; besides, most people with disabilities can only undertake simple manual work with low income and straitened living circumstances, which makes the low level of employment; the differences between regions, urban and rural areas and various types of disabilities can also result in the imbalance of employment of the disabled. The disabled people are disadvantageous in competitive employment, and they should not only be treated fairly, but also get special protection from the society. At present, the social environment has great adverse impacts on the disabled. Discrimination and prejudice of the disabled severely obstruct the equal rights in employment competition and the implementation of related laws and policies. As for the human resource development of the disabled, it needs the contribution from family, government and the enterprises, while the enterprise is the ultimate taker. We have set forth a series of related policies and methods dating back from the year of 2000 and basing on these, the writer makes a research on the disadvantages and improvements.

2 Analysis on the Policies of the Human Resource Development of the Disabled from 2000 to 2012

2.1 Summary of the policies of the human resource development of the disabled from 2000 to 2012

According to related government documents and information the author collected, it was found that,

since 2000, there was 62.9% human resources development policy in relevant disabled persons undertakings in our country, which fully shows the disabled persons development have received attention in human resources development. Detail statistics are shown in table 1:

Table 1 Total Number of Statistics of Each Policy

Subjects	Special education	Employment service	Incentive mechanism	Human resource development	Relevant policies on Disabled persons undertakings
Numbers	29	38	53	276	439

However, the 276 human resources development policy documents already issued and implemented for disabled people mostly focused on special education, employment services, incentive mechanism. Among these three aspects, the special education policy of human resource development accounted for 10%, the employment service policy accounted for 14% of the total, and the related policy of incentives accounted for 19%, which took nearly half of the total (Detail in Figure 1).

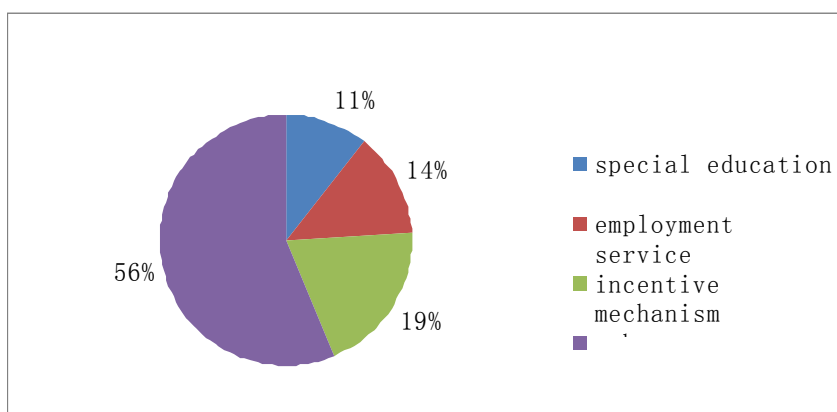


Figure 1 Proportion of Various Policies

The relevant policy of special education is mainly to solve the problems of special education schools' construction and management, special education talents cultivation and transportation, promotion of college admission for disabled candidates, etc. Employment service policies are mainly on disabled persons' current investigation and statistics of outstanding, the disabled persons' employment guidance and training, and encouragement and support for the disabled starting their own business. The relevant policies issued around incentive mechanism mainly include the selection and recognition of self-improvement disabled persons, disabled workers and demonstration areas of disabled undertakings, and enterprises which accept disabled persons.

2.2 Problems and analysis on the policy of disabled persons' human resource development from 2000-2012 in China.

2.2.1 Special Education

1) The special-education has not satisfied all the disabled.

Special education policies mainly focus on serving the visual disability, hearing disability and speech disability, for the physical disability, mental disability and mental disability groups, there are fewer supportive policies for special education. Few appropriate special education teaching training can meet the requirements of various disabled people. In the projects which the Disabled People's Federation of China cooperates with the Li Kashing Foundation, they concentrate on training a large number of graduates major in hearing and speech rehabilitation technology, language training teachers for deaf children, while the training of special-education teachers offering the special services for the visually impaired people and people with intellectual disabilities are not organized and conducted by the government.

2) Low training resource utilization.

The effective results of special-education teachers' training base on policies of stimulating the scale of various types of teaching, while not the satisfaction of the training for the disabled. How to increase the shortage of special-education resource has been paid more attention when making policies, rather than focusing on the quality evaluation and consideration of previous stage of special education training,

which ignores the different characteristics of the people. For example, after cultivation and settlements of a large number of language-training teachers for deaf children, there are no policies indicating the presence of underlying evaluation mechanisms for collecting and summarizing the training effect and the feedback opinions of the educated hearing disabled and speaking disabled, so the effectiveness of the policy which is based on local conditions for certain problems is weakened.

2.2.2 Employment services

1) Single orientation of employment policy service.

Most of these policies are made to help people with disabilities to get employed in the enterprise, ignoring the assistance given to the disabled entrepreneurs, which causes that most disabled people who have conditions to start an undertaking rather look for jobs than grasp the opportunity of being self-employed and even helping others.

2) The lack of a policy system for employment training of people with disabilities.

Vocational education is the key to improve employment opportunities for people with disabilities, and the appropriate vocational skills training carried out by CDPF is far from satisfaction catering to different types of disabilities, and at the same time relevant system instruction and work supervision are not offered for the local vocational skills training, some locational intermittent vocational skills trainings are unprofessional and out of the specifications, which is not only unable to obtain the desired effect, but also wastes the resources and frustrates the disabled.

2.2.3 Motivation system

The coverage of incentive policies is limited. There are seven categories of disability including hearing disability, visual disability, mental disability, intellectual disability, speaking disability, physical disability. And the disabled who have the ability to receive these honors concentrate on physical disabilities and visual disabilities, while the remaining parts are difficult to weigh the former whether in business or in employment. So the existing motivation system will not work entirely for stimulating the potential of disabled people's human resource unless some special recognition awards can be established for these five categories.

Without doubt, special education, employment service and motivation system are not the only contents of policies on human resource development of the disabled in China. In February 2009, the CDPF issued Circular of Establishing Leading Group and Office of Social Security System and Service System for the Disabled, this circular represents the beginning of social security system and service system for the disabled in China. Thereafter the CDPF organized a series of meetings to make the list of the leading members, work arrangements in provinces and cities, aiming at promoting the construction of the system. Then in May 2011, the CDPF issued the Guide to Formulating and Implement of Regulations for Employment of the Disabled. In 2007 the state council formulated and promulgated Regulations for Employment of the Disabled, which marked the disabled employment is on track of legislation, and formulating local regulations is an important signal of the progress made in the local governments' work of human resources development of the disabled.

3 Proposals to the Human Resources Development of the Disabled In New Period of China

3.1 Making training policies of special education teachers catering to different types of disabilities.

Considering the fact that the diversity and specific conditions of persons with disabilities are complex, it is essential to set up relevant targeted special-education teachers' training and programs. The targeted special education with high quality for the disabled children will certainly accelerate them to pursue a good career planning and development when entering manhood from childhood. So pay attention to the special education of persons with disabilities, meaning that ensure the quality of human resource development from the source. As the special education teacher training mechanism set for language training for deaf children with hearing disability has been relatively mature, the experience gained in this area can also be applied to other types of special education teachers' training. For there exists disabled people with visual impairment, physical disability, mental retardation, etc., special education teachers training mechanism and schedule for standardized training should also be established, to form a necessarily steady special-education teachers' training and mechanisms.

3.2 The policy of special education teacher training effect evaluation from disabled people's perspective

It's not enough to focus only on the training of special education teachers. The training effect appraisal and the feedback is also an important guarantee to improve the quality of teaching. As for the

teaching quality of ordinary teachers, the Ministry of Education has a mature evaluation mechanism. And this is a mechanism that can be used to reference. According to the evaluation of teaching quality of special education teachers, not only to improve the teaching ability of the teachers themselves, but also to ensure the quality of special education, which paved the way for the development of disabled human resources. The system of special education teacher training effect evaluation can choose special teaching schools as the test point, formulating a set of written examination standard. Among the important part is to collect and collate the feedback of education students, including the interview and survey of disabled students, the statistical analysis of disabled students' test scores and etc. After the pilot work in special education school achieved certain results, this mechanism can be promoted in other settings of special education services.

3.3 Improve the policy support for the self-employed of disabled people

Among all social roles, the government is the final undertaker of the human resources development of people with disabilities.¹ In making the policies to encourage the employment of disabled people, the key point is to consider the self-employed of disabled people, laying a convenient way for the self-employed of disabled people and offering them corresponding financial and policy support. When the disabled counsel the employment, the staff should have a brief idea of the basic skills of object who need employment demand. Persuade those disabled people who have special job skills to become self-employed and inspire them with the idea of "self-saving". At the same time, visit the successful self-employed disabled people and collect their information, invite them to give lectures to those disabled people who need employment, show them the spirit of entrepreneurship and motivate the advantage of disabled human resources. All these can encourage the disabled people to give play to their skills to "self-help" and "help others".

3.4 Working out policies to organize and conduct periodic and standardized training of employment for the disabled.

Vocational skills of people with disabilities play an important role in their employment. Choosing what kind of job and deciding their abilities and inabilities base on their vocational skills, so employment training for the disabled is a key point in human resources development. Local small-scale vocational training for the disabled has always existed, but the selection of trainers, curriculum and training effectiveness is not guaranteed standardly. The trained handicapped often express that these training not only wastes their time, but also does not teach them any practically skills. While in the view of government, this is also a waste of the government's human and material resources. Therefore, legitimately regulating the job training of people with disabilities is imperative. Firstly, the primary CDPF draw up a questionnaire to the disabled within the jurisdiction as the investigation object, mainly asking them what type of vocational skills training they need, and then arranging training and the length of time according to their free time. After delivering the unified report to the parent organization, the CDPF or provincial CDPF directs teachers and funding in the light of the reported situation, and if there is a demand for small-scale, the subordinate organization can make flexible arrangements on training content and time. Finally, a quarter or a year can be a cycle for the assessment of all trainings, the content of the assessment may include a trainee's return visit or employment situation, etc. All these assessment results provide the orientation of improvement for the next cycle of training.

3.5 Formulating efficient motivation system policy to stimulate the potential human resources of the disabled

Widen the range of the disabled under the motivation system including reward and commendation. And make different standards and types of motivation according to different kinds of disabilities. For example, the hearing disability have certain impairment, so we can commend those who overcome difficulties and make outstanding performances with strong mind. As for those who cannot make this because of objective realities, we can encourage them to optimize their features, and also set up rewards to commend those who have outstanding performances in art, sport and professional skills etc. The ways of motivation can be more various and can suit different kinds of disabilities to make them feel been cared about and become confident, to realize the potential of human resources of the disabled and to help those who have been developed or to be developed find the direction and increase the possibility for further development.

4 Conclusion

From 2000 to 2012, many policy documents on disabled persons' human resource were unveiled by

¹ Mao Ailin 2008

Chinese government, which made great progress in advancing the cause of disabled people and improves the quality of their living condition. However, there still existed some problems in the process of making and implementing this kind of policy. Thus, we must take feasible and exact response to solve the problems without hesitation. Only in this way can the large quantity of Chinese disabled persons' human resource be fully used. Moreover, it will promote the economic development and social progress in an all-around way.

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Cross-Border Spillovers from Local Fiscal Expenditure: Evidence from Cities in the Yangtze River Delta *

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Abstract: The adjacency of geographical space and that of economic space play an indispensable role in the fiscal expenditure of each city in the Yangtze River Delta, and this impact directly determines the progress and path of local government cooperation of this region. Based on 16 core cities in the Yangtze River Delta, this paper estimates the spatial externality of the expenditure of each city in capital construction projects and such livelihood projects as science, education, culture and hygiene and social welfare, so as to provide empirical evidence for each local government here to determine cooperation projects in capital construction and livelihood fields and their priority order, and thus achieving a breakthrough for local government cooperation and coordinated development in the integration progress of the Yangtze River Delta.

Key Words: Adjacency; Local Fiscal Expenditure; Regional Cooperation; Yangtze River Delta

1 Introduction

The spatial correlation of fiscal expenditure behaviors of neighboring areas is a research focus of the applied public economics. Zhao and Cai(2006),Baicker(2005),Revelli(2003),Case et al .(1993)have demonstrated the channels through which the fiscal expenditure of an area generates spatial externality on the fiscal expenditure behaviors of neighboring areas and corresponding results. The spatial relationship of local fiscal expenditure covers both circumstances of positive externality and negative externality. The inter-local tax competition is a typical embodiment of negative externality. Domestic researches on such an aspect were relatively centralized, and all emphasized that the tax competition among neighboring areas had various negative impacts on regional coordinated development (Li and Zhou, 2009; Shen and Fu, 2006;). On the other hand, the fiscal expenditure behaviors of neighboring areas also have demonstration effect and linkage effect, which constitute the positive externality of fiscal expenditure in space.

The Yangtze River Delta has the highest city denseness in China. According to the demarcation in “Yangtze River Delta Regional Planning”, 16 cities are defined as the core area including Shanghai, and Nanjing, Suzhou, Wuxi, Changzhou, Zhenjiang, Yangzhou, Taizhou and Nantong in Jiangsu Province, and Hangzhou, Ningbo, Huzhou, Jiaxing, Shaoxing, Zhoushan, Taizhou in Zhejiang Province. How to realize cooperation among local governments to achieve integrated development in the Yangtze River Delta is a major issue concerning whether such an area can take the lead in developing and realize coordinated development. This paper unveils the specific impact of such spatial factors as the adjacency of geographical location, proximity of economic scale, and similarity of urbanization level on the fiscal expenditure of each city, and provides a new perspective for the regional integration of the Yangtze River Delta, namely removing regional planning obstacles in the integration process by regional cooperation.

2 Data Processing

The research sample is the panel constituted by the data from the year of 2001 to 2008 concerning 16 core cities in the Yangtze River Delta, and then the paper tests the impact of several kinds of adjacency on the subdivision items of the fiscal expenditure of each city. Since the adjustment of classified subjects of fiscal expenditure, the data term of capital construction expenditure is 2001-2006. The explained variables are capital construction expenditure, expenditures of science, education, culture and hygiene and social welfare.

The explanatory variables include two categories. On the one hand, we take spatial adjacency or similarity as endogenous variable.

The first is weight matrix of geographical space. If city i is not adjacent to city j , $w_{ij} = 0$; if city i

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is adjacent to city j , $w_{ij} = 1/S_i$, where S_i refers to the number of cities that are adjacent to city i .

The second is weight matrix of economic space. According to the taxation scale and the similarity of urbanization level of 16 core cities, specifically speaking, taking per capita tax revenue and the proportion of built-up area to land area as proximity weights, the calculation method is as follows:

$w_{ij} = \frac{1}{|Z_i - Z_j| S_i}$, Where, $S_i = \sum_j \frac{1}{|Z_i - Z_j|}$, Z_i refers to per capita tax revenue of city i and proximity index of built-up area.

On the other hand, in order to reflect the impact of different economic characteristics of the areas on each fiscal expenditure item, we introduce a series of control variables.

(1) Use per capita GDP (PGDP) and tax revenue (TAX) to express economic scale. The per capita GDP determines the economic resources of an area available to be utilized; in areas with relatively high per capita GDP, the tax revenues and scales of fiscal expenditure are larger too.

(2) Use population density (PD) and built-up area (BA) to express city size. The population density is a conventional index to measure city size, while the built-up area is an important embodiment of urbanization level. The larger the built-up area of an area is, the larger public function borne by the government and the demand for public products and service are.

(3) Use the proportion of population over 65 years old (OLD), the proportion of population less than 15 years old (CHI) to represent population structure. The higher the proportion of population over 65 years old, the more the expenditures will be borne by the government in annuities and social welfare. The rise in the proportion of population less than 15 years old will increase governmental expenditures in fundamental education.

In this paper, the weight matrix W of economic space is calculated through MATLAB software, the built-up area comes from *China City Statistical Yearbook*, while other variables all come from *Yangtze River Delta & Pearl River Delta and Hongkong & Macao SAR Statistical Yearbook*. To reduce data heteroscedasticity, we have made smooth data processing in a way that natural logarithm is taken for other variables except for the proportion of population over 65 years old and that of population less than 15 years old.

3 Cross-Border Spillovers of Capital Construction Expenditure

We shall select SEM model when we apply spatial weight matrix of geographical proximity, and select SLM model when we apply spatial weight matrix of per capita tax and built-up area proximity. The estimation equations for SEM model and SLM model are respectively as follows:

$$\ln CC_i = \alpha_1 OLD_i + \alpha_2 \ln PD_i + \alpha_3 \ln BA_i + \alpha_4 CHI_i + \lambda(I_T \otimes W_j)\varepsilon_i + \mu_i \quad (1)$$

$$\ln CC_i = \alpha_1 OLD_i + \alpha_2 \ln PD_i + \alpha_3 \ln BA_i + \alpha_4 CHI_i + \rho(I_T \otimes W_j) \ln CC_i + \varepsilon_i + \mu_i \quad (2)$$

According to the estimation results of Table 1, the capital construction expenditure of the Yangtze River Delta has significant spatial positive externality, no matter SEM model based upon geographical proximity or SLM model based upon per capita tax and built-up area proximity, the spatial externality statistics λ and ρ are significant, and the coefficient is positive. The significance of λ coefficient means, the capital construction expenditure shows evident demonstration effect and linkage effect among different cities, whichever cities are prefecture-level cities affiliated to the same province or different provinces. The significance of ρ coefficient indicates that positive externality also exists between provincial-level areas in capital construction expenditure. From the perspective of other control variables, the aging degree and the population density are also significant factors affecting the capital construction expenditure of local governments. The pricking-up of aging degree and raising in population density will surely make the government increase public investment, such as investment in the construction of infrastructures in traffic, communication and electric power, as well as public welfare facilities in culture, education, hygiene and public service.

The generation of significant demonstration effect in capital construction expenditure in the Yangtze River Delta is not only because local government officials compete for promotion to imitate and even contend with capital expenditure for fear that their political reputation is affected, but because local governments are afraid that the economic resources flow into neighboring areas. The adjacency and high density of cities and towns in the Yangtze River Delta make the economic activities of such area have evident space continuity. For instance, the traffic network, especially the construction of “one-hour city economic circle” drives the development of the areas and increases the fiscal expenditure

of traffic infrastructure. Accordingly, water conservancy, communication, electric power and energy related with the traffic network also present significant linage effect. Since the Yangtze River Delta has evident spatial positive externality in capital construction expenditure, prior cooperation among local governments is basically defined as jointly advancing integration construction of cross-region major infrastructures and upgrading construction, share and interconnection level of such infrastructure as energy, water conservancy and information so as to enhance the support capability of regional development.

Table 1 The Estimation for the Spatial Externality of Capital Construction Expenditure of 16 Core Cities in the Yangtze River Delta

Variables	Geographical Proximity		Built-up area Proximity		Per capita Tax Revenue Proximity	
	(1)	(2)	(1)	(2)	(1)	(2)
OLD	0.2186*** (3.9731)	0.2079*** (3.5688)	0.1795*** (3.6501)	0.1734*** (3.5659)	0.1478*** (3.0438)	0.1541*** (3.2005)
LnPD	11.6411*** (3.6934)	13.0383*** (4.9637)	10.3888*** (3.3433)	11.6911*** (4.5880)	7.1013** (2.4355)	6.5022** (2.2793)
LnBA	0.2240 (1.0930)		0.1603 (0.7900)		0.17774 (0.9485)	0.2043 (1.1043)
CHI	6.1711 (1.1566)	7.5583 (1.4905)	5.5044 (1.0309)	6.2196 (1.1828)	4.4213 (0.8861)	
λ	0.2048* (1.8094)	0.2840*** (2.6349)				
ρ			0.2770*** (3.0048)	0.3030*** (3.4642)	0.4620*** (4.9995)	0.4660*** (5.0478)
R-squared	0.9537	0.9520	0.9588	0.9587	0.9640	0.9638
Log-likelihood	-25.1383	-25.5485	-21.7909	-22.0792	-16.9413	-17.3331
No.Obs	96	96	96	96	96	96

Note: ***indicates 1% significance level, **indicates 5% significance level, *indicates 10% significance level; the values in parentheses is *t* statistic.

4 Cross-Border Spillovers of Livelihood Project Expenditure

The spatial model of education, science, culture, hygiene expenditures (ES), SEM model shall be applied under three spatial weight matrixes: geographical proximity, built-up area proximity and per capita tax proximity, and the estimation equation is as follows:

$$\ln ES_i = \alpha_1 \ln PGDP_i + \alpha_2 OLD_i + \alpha_3 \ln TAX_i + \alpha_4 \ln BA_i + \alpha_5 CHI_i + \alpha_6 \ln PD_i + \lambda(I_T \otimes W_j)\varepsilon_i + \mu_i \quad (3)$$

As for the spatial model of social welfare expenditure (SW), SEM model shall be applied under the spatial weight matrixes of geographical proximity and built-up area proximity, while SLM model shall be applied under per capital tax spatial weight matrix. The estimation equations of SEM and SLM models are respectively as follows:

$$\ln SW_i = \alpha_1 \ln PGDP_i + \alpha_2 OLD_i + \alpha_3 \ln TAX_i + \alpha_4 \ln BA_i + \alpha_5 CHI_i + \lambda(I_T \otimes W_j)\varepsilon_i + \mu_i \quad (4)$$

$$\ln SW_i = \alpha_1 \ln PGDP_i + \alpha_2 OLD_i + \alpha_3 \ln TAX_i + \alpha_4 \ln BA_i + \alpha_5 CHI_i + \rho(I_T \otimes W_j) \ln SW_i + \varepsilon_i + \mu_i \quad (5)$$

According to the estimation results of Table 2, both spatial error regression coefficient λ and spatial lag regression coefficient ρ have passed 99% significant test, and the regression coefficient is positive. This shows each city in the Yangtze River Delta has evident positive externality in the expenditures of education, science, culture, hygiene and social welfare.

From the perspective of other control variables, such factors as per capita GDP, tax revenue and urbanization level have significant positive impact on the livelihood project expenditure of the Yangtze River Delta. The per capita GDP and tax revenue represent the economic scale of an area. The more economic resources an area can utilize, the stronger the payment ability of the area for such livelihood projects as education, science, culture, hygiene, and social welfare. Besides, these livelihood project expenditures will increase along with the improvement of urbanization level. That is because the larger the built-up area is, the more public functions and public products and services the government has to bear and provide.

Table 2 The Estimation for the Spatial Externality of Livelihood Project Expenditure of 16 Core Cities in the Yangtze River Delta

Variables	Geographical Proximity		Built-up area Proximity		Per capita Tax Revenue Proximity	
	ES	SW	ES	SW	ES	SW
LnPGDP	0.9088*** (13.3845)	0.9652*** (4.4025)	0.7382*** (9.2717)	1.4078*** (7.0904)	0.8821*** (10.8684)	0.3330*** (2.8166)
OLD	-0.0499** (-2.1511)	0.1018 (1.4328)	-0.0150 (-0.7673)	-0.0515 (-0.9708)	-0.0337 (-1.4164)	-0.0564* (-1.7365)
LnTAX	0.2068*** (4.5316)	0.5700*** (4.4748)	0.2483*** (5.2216)	0.7006*** (5.7560)	0.2812*** (4.2144)	0.2170*** (2.9244)
LnBA	0.3658*** (6.2417)	0.5349*** (3.9794)	0.3618*** (6.1471)	0.6078*** (3.9784)	0.2870*** (4.2144)	0.1868* (1.6547)
CHI	1.0863 (0.8630)	4.1671 (1.5297)	-0.9067 (-0.7530)	0.2065 (0.0647)	-0.0007 (-0.0006)	-0.3834 (-0.1518)
LnPD	1.6951** (2.1903)		1.2770* (1.7496)		1.9450** (2.3533)	
λ	0.4580*** (5.7701)	0.6800*** (12.4352)	0.5980*** (10.7061)	0.4810*** (6.3728)	0.4780*** (5.1843)	
ρ						0.7710*** (18.4273)
R-squared	0.9808	0.8778	0.9746	0.9257	0.9813	0.9707
Log-likelihood	97.8836	-28.2660	100.6636	-29.3818	94.9260	0.1455
No.Obs	128	128	128	128	128	128

Note: ***indicates 1% significance level, **indicates 5% significance level, *indicates 10% significance level; the values in parentheses is *t* statistic.

According to Table 2, the impact of population structure on the livelihood project expenditure of each city in the Yangtze River Delta is generally insignificant. Theoretically speaking, the higher the aging degree of an area is, the larger the medical health and social welfare expenditures of the government will be. However, this impact relationship is not evident among the cities in the Yangtze River Delta. This might be related to health & medical treatment restructuring. The market-oriented reform of China's health & medical treatment system causes the government to transfer its partial liabilities for the elders and health & medical treatment to the market. Also, the higher the degree of child support is, the larger the fundamental education expenditure of the government will be, but this kind of relationship is insignificantly shown in the Yangtze River Delta. The primary reason may lie that the fundamental education facilities expenditure is within the scope of capital construction expenditure. Further the Yangtze River Delta witnesses an increase in immigrated children in the accelerated process of urbanization, reform lagging in registered permanent residence system, however, makes the government still make budget according to the number of children of local registered permanent residences, thus the personnel expenditure for fundamental education and other expenditures of the government fail to increase along with the actual increased proportion of children population.

According to empirical test for the spatial weight matrix of geographical proximity, built-up area proximity and per capita tax proximity, the Yangtze River Delta has evident positive externality in livelihood project expenditure. This conclusion certifies it is feasible to advance in this area the equalization of such basic public services as compulsory education, public health, public culture and social security so as to promote coordinated economic and social development. Considering the problem that the population structure does not have evident impact on livelihood project expenditure, local government shall strengthen cooperation and coordination in fundamental education of the children of immigrated population, medical health security of the aged population, aging population social security integration.

5 Conclusions

This paper takes 16 core cities in the Yangtze River Delta as a sample and defines such spatial adjacency factors as geographical spatial factors represented by geographical proximity and economic spatial factors represented by per capita tax revenue, built-up area similarity. We estimates the spatial external effect of each city in terms of capital construction project expenditure, the expenditure of

education, science, culture and hygiene and the expenditure of social welfare. Then from the perspective of cooperative governance of local governments, approach and breakthrough for regional cooperation of the Yangtze River Delta are put forward to overcome integrated development obstacles caused by administrative divisions and local interests.

The Yangtze River Delta has significant space positive externality in capital construction expenditure. This means the prior cooperation of local governments in the area is to advance the integrated construction of cross-region major infrastructure, to upgrade establishment, share and intercommunication level of such infrastructures as energy, water conservancy and information, so as to enhance the support capability of regional development and to lay foundation for the cooperation and coordinated development of other fields, especially livelihood field. How shall each local government in the Yangtze River Delta to cooperate in the problem of livelihood? The empirical results of this paper certifies the feasibility of advancing the equalization in such basic public services as compulsory education, public health, public culture and social security in this area to promote coordinated economic and social development. Besides, considering the impact of change in population structure on livelihood project expenditure, it finds out the breakthrough of each local government in livelihood field cooperation and coordinated development, namely, to take the lead in realizing the cooperation in the fundamental education of the children of immigrant population, medical health security of aged population and aging population social security integration.

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Study on Influencing Factors and Countermeasures of College Students' Entrepreneurship

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Abstract: College students' innovative undertaking has an important role in resolving the employment problems of college students. Based on the relevant research results, this paper puts forward the main influence factors of college students' innovative undertaking, depth analysis of the main problems of college students venture, on this basis, put forward the countermeasures to the success of college students' innovative undertaking from four dimensions which are college students themselves, society, policies, colleges, has a certain theoretical and practical significance.

Key words: College student; Entrepreneurship; Influencing factors; Countermeasures; Fishbone Diagram

1 Introduction

Due to the continuing of the European debt crisis and the American debt crisis, the increase of global economy continues to slow, the demand for employment posts significantly reduced in 2013. Since the enrollment expansion of colleges and the implementation of education industrialization policy, the increase in the number of college students is far beyond talent growth needed for economic growth, the national fresh college graduates scale up to 7000,000 in 2013, the employment situation is not optimistic. The entrepreneurship can not only solve the employment problem of college students, but also provides more jobs for the society. Therefore, study on the influence of college students' innovative undertaking has a very important practical significance.

In recent years, scholars have carried out corresponding research to the college students' innovative undertaking. Abroad, Miller and Friesen (1997) pointed out that in the entrepreneurial process, the government should actively encourage students to play their own advantages, tap the market opportunities and do entrepreneurship for survivability. In domestic, Lei Lin and Jiang Yongheng put forward the influencing factors of college students entrepreneurship mainly include: student's personal ability and quality, family, college, society and friends. Lin Jie (2002) deeply analyzed the bottleneck of our country's college Students' innovative undertaking, including five big problems, which are focusing too much on the line, lacking of market awareness, lacking of business management experience, lacking of scientific and technological content of the project and it is difficult to attract venture capital.

Therefore, based on the relevant research results from domestic and foreign scholars, this paper summarizes the main factors influencing the success of college students entrepreneurship, and researching the problems and countermeasures of college students' entrepreneurship from the perspective of the factors has certain theoretical and practical significance.

2 The Influencing Factors of College Students' Entrepreneurship

2.1 Self factors

College students' own factors include students' ability and quality. The ability of students refers to the possibility to complete a specific job, including: the ability of seizing the opportunity which is the ability to discovery and capture market opportunities, learning ability which is the ability to accept new knowledge and new things, including the acceptance rate and degree, leadership and cooperation ability which is the ability to efficiently integrate various resources, the ability to maintain good cooperation with members of the founding team and entrepreneurial resource holders, and so on. Literacy refers to the components of college students' personality that is relatively fixed, not easy to change, including: degree of confidence (the degree of believing oneself can win in the fierce challenges and competition), the sense of responsibility, the sense of values, and so on.

2.2 Social factors

Influence of social factors on college students' entrepreneurship is mainly reflected in: social perceptions and attitudes of college students' entrepreneurship also has an important impact on it. From a psychological point of view, there exists a psychological phenomenon of "herd" in the college students.

In the process of individual socialization, givers of socialization use a variety of strong stimulus to make students gradually acquire the desired behavior, attitudes, or habit of the educators. Therefore, a good enterprise atmosphere in society and a wide range of entrepreneurial activities will also affect college students' entrepreneurship.

2.3 Government factors

The government environment is that the government provides legal, policy environment for college students. Because the number of college students in our country is numerous, it is not practical only depend on the input from the State or colleges just like in South Korea. Thus, whether the State can formulate appropriate policies to attract social capital into the assistance system for college students' entrepreneurship is one of the important factors.

2.4 College factors

College's environment: the impacts of this environment can be divided into direct and indirect impacts. The direct impact refers to the infuse of a variety of policies and regulations from colleges entrepreneurship. Specifically, it refers to not only whether colleges provide the necessary time and space for college students in entrepreneurial activities, but also colleges have the appropriate support and service system. The indirect effect is whether innovative education and individualized education will be included in the reform of higher education system.

3 Problem Analysis of the College Students' Entrepreneurship

There still exist many defects and shortcomings in the college students' entrepreneurship in our country, which are reflected in many aspects: self-quality, social environment, policy and colleges etc., and these aspects are mutual influenced and interacted.

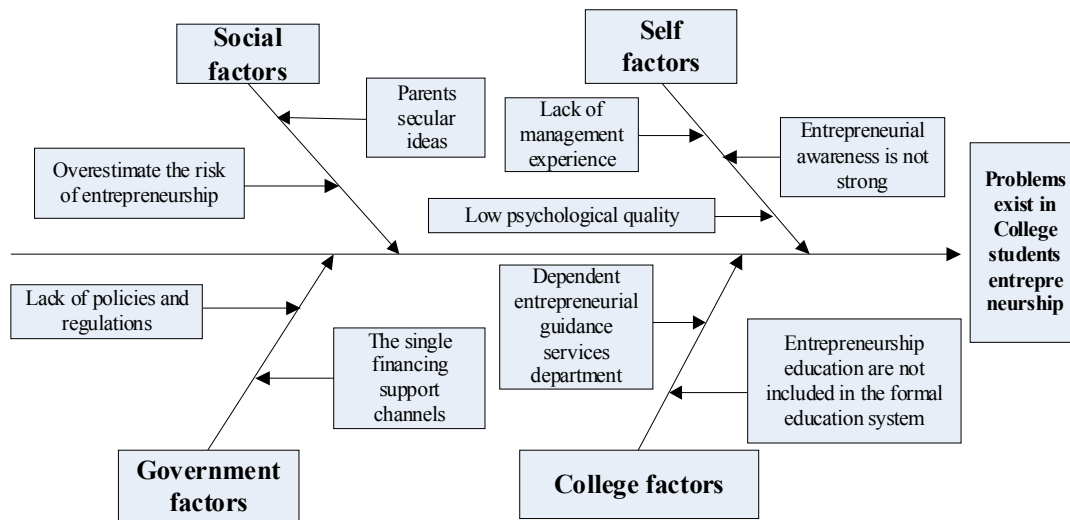


Figure 1 Analysis of College Students' Entrepreneurship

3.1 Own problems

Their own problems in the process of students' entrepreneurship are mainly embodied in entrepreneurship awareness is not strong, lacking of management experience, as well as lower psychological quality. First of all, the formation of entrepreneurial consciousness of college students entrepreneurs stays on the stage of been affected by family entrepreneur culture. And the awareness of grasping the entrepreneurship opportunities, leading to the entrepreneurship awareness is not strong. Secondly, due to the limitation of their own knowledge, Some college students only has the technical knowledge, and know little about enterprises Operation and management. When the business cannot transfers from the technical staff to the management and operating personnel after its establishment, it will makes great obstacles for the survival and development of enterprises. However, after 80, 90, the college students' psychological quality is relatively low, and cannot cope well with setbacks and pressure.

3.2 Social issues

The entrepreneurial culture of the whole society is not strong. Because of the doctrine of the mean

thought deeply rooted in traditional culture, public of China overestimate the risk of entrepreneurship and innovation, do not advocate adventure, holding reservations for entrepreneurs and do not be proud of entrepreneurship, especially the secular concept and package style of parents, which greatly kill the brave spirit of the students. Additionally, public opinion in China generally think that college students belong to the elite, and should be "tight" in society. Entrepreneurship tends to be a desperate option after graduation. All these put pressure and burden on students' entrepreneurs, hindering college students' entrepreneurship.

3.3 Government issues

Delayed development of relevant policies, laws and regulations are related to entrepreneurship. At present, the Policies and Regulations, preferential measures promulgated nationally for entrepreneurship, which lacks a system of legislation specifically for graduate entrepreneurship. Without considering the particularity of university graduates to start a business, college students founded enterprise cannot enjoy equal legal rights and obligations to other enterprises, so the results and property rights are easy to be infringed. Thus reflect in institutions that specially provide financing for the college students' entrepreneurship are less, the single channel of policy assistance. Since these policies subject to various restrictions of conditions, the value of the policy discount do not works as expected.

3.4 College issues

Entrepreneurship education service system is not perfect. At present, China's colleges and universities entrepreneurship guidance service sector still belongs to the employment guidance department and do not independent. And in the actual operation process, the administrative functions are far more than its service function. And entrepreneurship education is not included in the formal education system, also lacking teachers of entrepreneurship education. Entrepreneurship guidance services lack a complete set of system, the mode of operation process, lacking of a comprehensive and detailed guidance on the whole process of university students' innovative undertaking, including the audit, market information, project feasibility and other aspects of the advisory services.

4 A Study on Measures of Successful Entrepreneurship of College Students

4.1 Measures base on the perspective of college students

Develop positive habit of study, and improve their entrepreneurial qualities in an all-round way. College students shall set up positive and modest mentality of study, and foster the concept of active study and lifelong study, master comprehensive knowledge needed in entrepreneurship, enrich their accumulation of entrepreneurial knowledge, convert their entrepreneurial knowledge to entrepreneurial skills required, and constantly reinforce and improve their entrepreneurial abilities.

Participate in entrepreneurial practices actively, and enrich their entrepreneurial experience. In addition to the course study, college students shall actively participate in the social practice related with entrepreneurship during college time, and enrich their entrepreneurial experience in after-class practice. For example, they could participate in entrepreneurial practice activities such as "National College Students Entrepreneurship Challenge", etc.

4.2 Measures based on social perspective

Give full play to the role of correct guidance of public opinion from news media, spread and explain relevant policies on entrepreneurship of college students, and collect opinions and suggestions on the entrepreneurship of college students through network, feedback to the relevant departments, response to the demands of college entrepreneurs in a timely manner, change the partial understanding of the public on entrepreneurship of college students, change the attitudes of the public, thus providing opinion support for entrepreneurship of college students.

4.3 Measures based on the perspective of the government

Integrate entrepreneurial policies, formulate laws and regulations for entrepreneurship of college students specifically. For example, to introduce a Law on the Entrepreneurship of College Students, unify relevant policies that support entrepreneurship of college students, so as to guide the entrepreneurship of college students from a macro perspective.

Set up a department specifically responsible for entrepreneurship of college students, coordinate related work of other departments. Entrepreneurship of college students involves different departments including Industry and Commerce Department and Taxation Department, etc., so a special department is required to take the responsibility of coordinating the work of all relevant departments, so as to implement relevant policies and improve service efficiency. For example, a National Entrepreneurship Foundation for College Students could be set up to provide funds for entrepreneurship, credit guarantees

and employment guidance services, etc., specifically coordinating the relationship between the enterprises established by college students and relevant government departments such as Industry and Commerce department and Taxation department, etc.

Improve the entrepreneurial service policies, and optimize entrepreneurial environment. The government shall pay enough attention to the entrepreneurship of college students, gradually enrich the entrepreneurial services, provide tracking services around the whole process of entrepreneurship, from the training before the entrepreneurship, promulgation of information on related industries and policy information, introduction of legal knowledge, to the registration on Industry and Commerce Department and Taxation Department when the business is started, issuing of business licensing, and the funds and site approval in follow-up enterprise development, and even to the whole-process entrepreneurial service during the business failures and bankruptcy liquidation, to make the entrepreneurial services more procedural, and facilitate the access and exit of entrepreneurship, thus saving the entrepreneurial resources .

4.4 Measures based on the perspective of the college

Strengthening the construction of career guidance services, to improve their service level. Set up a special career guidance services to enrich the content of career guidance service. Open the campus market properly for college students as their entrepreneurship lab. Establish college students' entrepreneurial guidance teachers, colleges and universities can organize rich entrepreneurial theory knowledge and experience of teachers, forming a teaching entrepreneurship team, which offers targeted guidance to college students' entrepreneurship program. Colleges set up college students venture fund. Colleges can dial certain number of venture capital each year or absorb social sponsorship. At the same time, to establish strict management mechanism of the funds and control the use of funds. Select high-quality entrepreneurial projects to ensure that the college students' entrepreneurial success and smooth recovery in investment funds.

Improve the entrepreneurial education and training system. Entrepreneurship education should be included effectively into the professional and cultural education system, formulating detail teaching plan, strengthening the curriculum system reform. Meantime, increase the proportion of optional courses about entrepreneurship to stimulate students' interest in learning and strengthen the construction of teachers. On the construction of teaching force can take two routes that are Go out and introduce in. Extract professional teachers with rich theoretical knowledge and employment guidance teacher to learn in the enterprises, encourage them to actively participate in the practice of social entrepreneurship, study of entrepreneurship theory and cases to improve their teaching level. It is better for colleges to open an easy access for outstanding entrepreneurs, introduce a batch of outstanding entrepreneurs with rich experience as part-time teachers in colleges, to enrich the entrepreneurship education teachers' team. At the same time, colleges should put some policy inclination to the teaching appraisal, title evaluation, budget, etc.. Establish quality tracking system to entrepreneurship education. They should do real-time tracking and feedback of teaching process and problems in the process of students' entrepreneurship, establishing graduates and ungraduated entrepreneurship database, analysis and optimization problems, improve the quality of entrepreneurship education.

5 Conclusion

Entrepreneurship can not only solve the employment problem of college students, but also provide more jobs for the society. In this paper, we summed up the main impact factors of entrepreneurship of college students in China, based on the results of former research. There are four aspects, the students themselves, society, government and colleges. At present, there are still some problems in entrepreneurship of college students ,students their own problems and quality are not competent, social entrepreneurial culture is not strong, the development of relevant government policies, laws and regulations lag behind, service system of entrepreneurship education in Colleges is not perfect etc.. To solve these problems and promote the success of college students' entrepreneurship, we should take measures from four targeted aspects, promote college students' entrepreneurial ability and enrich their experience; give full play to the role of the news media in correctly guiding public opinion to create a good cultural atmosphere; formulate specifically policy for college students' entrepreneurship, improve business service policy, optimize business environment; enhance the construction of career guidance service, improve business service level, improve entrepreneurial education and training system etc.

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Credit Risk Assessment of Commercial Bank of Ethiopia with Special Emphasis to the Prioritized Sectors

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Abstract: Commercial Bank of Ethiopia (CBE) has put Agriculture, Manufacturing and Export as a major priority sector to improve the country's economy. Survey has conducted among crucial members of the Bank to understand the high risk sector among three. As evidenced from the survey agriculture is the most risky sector than manufacturing and export. The main reason is because of unavailability of insurance companies sharing the burden of the risk. Manufacturing is second risky sector; it is because most of less availability of imported raw materials. The survey showed that the Bank has a lack of experts in all sectors to analyze the credit request. Export is a less risky especially if it can be proved the legality of the sales contract.

Key words: Commercial Bank of Ethiopia; Credit Risk Assessment; Growth and Transformation Plan; Priority Sectors

1 Introduction

The banking industry has a long history and has had an important influence on the economic development of the country. Financial results for the 2012 fiscal year show an industry enjoying high growth, high profits, and high dividends. Even in the midst of a challenging environment, all key areas of banking operations—collecting deposits, providing loans, and foreign exchange dealing—showed growth of more than 20 percent. Profits were up 45 percent and shareholders (at banks open for more than a year) received an average return of 27 percent on their investments. Although sharing strong growth, there are of course notable variations among banks in terms of their aggregate size, relative profitability, revenue sources, customer focus, loan concentration, and operational efficiency.

The Commercial Bank of Ethiopia (CBE) has been one of the movers of the Ethiopian economy for the past 70 years. No other strong bank existed in the country when CBE was officially launched in 1942. CBE was a pioneer in the introduction of modern banking services in the country. In the long years of its market existence, CBE has attained the following:

- Ensured sustainable profitability with strong support to the country's economic growth.
- Expanded its branch network covering large geographical areas.
- Employed more than 15,000 staffs.
- Substantially increased its customer base and capital size.
- Become one of the top African banks in terms of assets and capital size.

Building upon these achievements, CBE has massively engaged in transformational activities with the vision of becoming a world-class commercial bank. Business Process Reengineering (BPR) has been chosen as a management tool to support this change initiative. Currently, CBE takes the lion's share of the commercial banking market of the country in terms of credit, deposit, customer base and branch network.

2 Statement of the Problem

Almost all banks established in Ethiopia are involved in providing credit for their customers. CBE is among the banks established in the country that are actively involved in providing credit for their customers. Bank risk is inherent by its nature and the same is true for credit as well. Basically, to recollect the principal and its interest that is lend to customer is the major risk of credit for the bank. CBE has been delivering wide range of credit products for its various customers. Currently the credit policy of the bank is giving a priority for three major economic sectors, namely, the agriculture, manufacturing and export. These sectors by their nature require huge amount of capital for a single project and they are inter-related by nature. This means if agriculture is not successful both industry and export will fall. In the year 2007/2008 87.4% of export earning comes from agricultural products his shows that Ethiopian exports are highly depends on agriculture (Muday, 2010).

These sectors have immense access for large amount of loan from the bank. Such a credit makes

the bank vulnerable for high risks. These caused due to the increasing amount of the credit delivered that will increase the risk of the bank. However, the bank is still providing a large amount of credit for these sectors even if it has a risk of non-collectability. Therefore, in this research an attempt is made to assess the credit risk associated with the priority sectors.

3 Credit

Credit is the use or possession of goods or services without immediate payment. It enables a producer to bridge the gap between the production and sale of goods. Virtually all exchange in manufacturing, industry and service is conducted in credit.

3.1 Risk Management (RM)

Risk management is a central part of any organization's strategic management; it is the process whereby organizations methodically address the risks attaching to their activities with the goal of achieving sustained benefit within each activity and across the portfolio of all activities (IRM, 2002).

Looking at the process below, it shows that before risk can be managed, it must be identified. Once the risk is identified, action will be taken to measure its intensity or to evaluate the outcome of the risk, an assessment of the consequences is being done, control measures are then put in place to avoid or reduce its intensity and after that good monitoring is being done to see whether the expected outcomes are as desired.

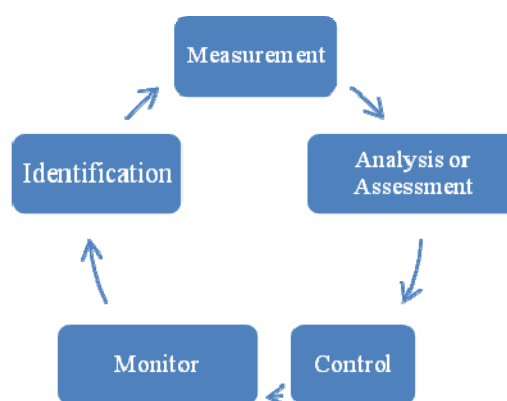


Figure 1 Risk Management Process

3.2 Credit Risk

Credit risk is the most obvious risk of a bank resulted from the nature of its activity. In terms of potential losses, it's typically the largest type of risk (COLQUITT, 2007). The default of a small number of customers may result in a very large loss of the bank because of the amount of loan given for a single project is high. Credit risk is typically represented by means of three factors: default risk, loss risk and exposure risk.

Default Risk is a payment delay of at least three months, in the case of The Loss Risk; it determines the loss as a fraction of the exposure in the case of default and finally the Exposure Risk is a risk that may not be known beforehand at the time of default.

3.3 Credit Risk Assessment

Generally, credit risk assessment is an evaluation of the potential that a borrower or counterparty will fail to meet its obligation in accordance with agreed terms. This considers credit risk is inherent to the entire portfolios as well as the risk in individual credits or transactions, and is typically performed by credit risk specialists.

3.4 Concentration Risk

The term concentration risk in the context of banking generally denotes the risk arising from uneven distribution of counterparties in credit or any other business relationships or from a concentration in business sectors or geographical regions which is capable of generating losses large enough to jeopardize an institution's solvency (Detsche Bundesbank, 2006). In many cases, a concentration in individual economic sectors or certain groups of borrowers also emerged. This resulted in large loan losses, leading to numerous bank insolvencies and in some countries to banking crisis.

4 Priority Sectors in Ethiopia

Since 2010 Ethiopian government has designed a five years Growth and Transformation Plan (GTP), it specifically put Agriculture, Manufacturing and Export are the main economic strategic organs, which require a series attention to realize the goal. In accordance with this massive strategy the Commercial Bank of Ethiopia made available different credit products and widen up its portfolios that able to move forward the country's economy

4.1 Agricultural Loan

Agriculture is one of the priority sector set by CBE. Different loans related to this sector are available to farmers; they may apply for loans to buy inputs for cultivation of food grains as well as horticulture, aquaculture, animal husbandry, floriculture and sericulture businesses. There are also special loans to finance the purchase of agricultural machineries such as tractors, harvesters and trucks. Construction of biogas plants and irrigation system as well as the purchase of agricultural land may also be financed through special types of agricultural finance.

Financing agricultural businesses has its own peculiar characteristics that distinguish the sector from others. Among others one of the major peculiarities is its requirement of long gestation period. As a matter of fact most agricultural productions commonly stretch over long periods of time. As a result, farmers are expected to anticipate expenses that they will only be able to get back after their product is marketed. In such situation farmers are challenged by potential cash flow problems to cover their expenses.

Due to these features, agricultural loan/ financing is prone for various type of risks. An agricultural risk is associated with negative outcomes. The source of risk in agriculture are numerous and diverse. The markets for agricultural inputs and outputs have a direct incidence on farming risk, particularly through prices. A diversity of hazards related to weather, pests and diseases or personal circumstances determine production in ways that are outside the control of the farmer (OECD, 2009)

4.2 Manufacturing Loan

A lender for a manufacturing loan includes a bank, private lender or government agency. A business looking to take out a manufacturing loan should work with a lender who is experienced in providing these types of loans. The interest rates on manufacturing depend on credit worthiness of the loan borrower. A borrower with a good credit score will be able to receive a loan with favorable loan interest rate. The length of manufacturing loan can be short or long term. The loans length is determined by the needs of the business who borrows the loan from a lender. The loan length can be as short as 12 months or as long as 30 years (Scharmok, 2010).

Mostly manufacturing loans tends to be either medium or long term loans. Such loans usually used to purchase an asset that is expected to generate future cash flow and contribute towards the repayment of the loan. The asset being financed by the facility, such as plant or equipment are usually expected to produce other assets, which converts to cash through completion of manufacturing process and sale, will generate sufficient funds to repay the loan. (Fight, 2004)

4.3 Export Loan

Access to working capital is one of the most important components of the export transaction, providing a means for companies to process and acquire goods and services to fill purchase orders, to ship and extend credit to their buyers. To cover their working capital need, exporters mainly use working capital loan programs which are normally associated with pre-shipment financing. Pre-shipment is a loan extended for purchase of raw materials, processing and converting them in to finished goods, warehousing, packing and transporting the goods until the time of shipment. Mostly there are three types pre-shipment export financing. These are pre-shipment export credit, revolving export credit and advance on export bill (Mekbib, 2008).

In financing trade transaction, financial institutions are confronted by at least three types of risks or perception of risks associated with the pre and post shipment export financing: Nonpayment risk or buyer risk, nonperformance risk or supplier risk and third party risk.

To sum up, providing loan to the above mentioned sectors, namely agricultural, manufacturing and export have potential risk. In order to minimize these risks these are various types of credit risk management methods. Among others, three of the traditional approach identified by Anthony and Linda (2002) are Credit Scoring, International Ratings Based and Expert System

5 Analysis

In order to assess the credit risk of CBE, a total of 60 sample respondents were identified to fill the

entire questionnaire. These respondents were selected from three different departments of the bank namely relationships managers, credit analyst and risk managers. From the first two departments, relationship managers and credit analysts a total of 50 respondents were selected 25 respondents from each and the remaining 10 were selected from risk managers.

Table 1 Demographic Characteristics of the Sample

Position	Number of Respondents	%
Relationship Manager	25	41.66
Credit Analyst	25	41.66
Risk Manager	10	16.66
Total	60	100

Source: Own Survey Conducted in 2012

Following the description of the demographic characteristics of the sample, the analyst will proceed to forward results that could help the study to achieve its objectives. The result of the survey questionnaire is presented in three thematic areas below.

5.1 Loan for Prioritize Sector

One of the objectives of this study is to assess the potential and actual challenges that the bank is facing due to prioritizing some sectors for loan disbursement. In order to achieve this objective, four questions are forwarded to the respondents to assess their opinion. The results are presented in table 2 below. As the result of the survey revealed 85.7% of the respondents support the claim that states the bank has qualified personnel’s that are involved in processing the loan. On the other hand the remaining respondents, 14.2% has no opinion on the claim, this could reflect that, though the bank has qualified professionals to process the loan disbursement, there is still some gaps in the area.

The second perceived challenge for the banks is related with mechanisms of credit risk assessment. Accordingly, the idea that states the bank has proper mechanisms to assess the credit risk, has got a wide range of support from the respondents. Out of the total respondents, 91.4% showed their agreement with this claim. On the other hand 5.6% of the respondents expressed their disagreement. The remaining 2.8% of the respondents reflect their response as no opinion.

Table 2 The Actual and Potential Challenge of Prioritized Sectors

N 1	Inquiries to respondents	Response of Officials/experts in %		
		Agree	Disagree	No opinion
	The bank has equipped with qualified personnel’s in each sector to process the loan	85.71	-	14.28
2	The bank has proper mechanism to assess credit risk	91.43	5.71	2.86
3	The prioritization of the loan increases the credit risk	85.71	14.28	-
4	The bank has a proper customer credit rating system	91.43	8.57	-

Source: Own Survey Conducted in 2012

The third potentially perceived challenge is related with prioritizations of some sectors. In relation to this, the claim that states the banks’ prioritization of the three sectors causes’ credit risk on the bank is supported by 85.7% of the respondents. The remaining respondents, 14.2% of them disagree with this claim. From this it is evident that prioritization of the sectors is increasing the credit risk of the bank.

The last perceived challenge is related with the credit risk rating system of the bank, in line with this, the bank is argued that it has an appropriate credit risk rating system. Out of the total respondents, 91.4% of the respondents showed their agreement while, 8.5% of them disagree with this idea.

5.2 Sectors with High Rate of Credit Risk

As it is evident from the data in Table 3, agricultural loans are highly considered as risky. Accordingly 94.2% of the experts support this claim while 5.7% of them argue for the export sector as risky.

Conversely, the document reviewed on the issue revealed a different result that states manufacturing loans are more risky than agriculture and export. The detail of the result from the

document review will be dealt later on. Here however, it is important to note the discrepancy between the results obtained from opinion survey analysis on the sector with a higher credit risk.

Table 3 Sector with High Rate of Credit Risk

Indicate the sector with high rate of credit risk	Agriculture	Manufacturing	Export
		94.28	-

Source: Own Survey Conducted in 2012

5.3 Risk Associated with Agriculture Loan

In this sub section risk associated with disbursement of loan for agricultural projects is presented and analyzed. To do so, two interrelated questions are selected for the discussion.

Table 4 Risk Associated with Agricultural Loan

N	Inquires	Response of the officials in %		
		Agree	Disagree	No Opinion
1	Agricultural product has appropriate insurance coverage	5.71	91.43	2.86
2	Most agricultural loans are given for large scale and mechanized farms	82.86	17.14	----

Source: Own Survey Conducted in 2012

The first perceived cause of credit risk for agricultural projects is related with insurance. Accordingly, the claim that states the existence of appropriate insurance coverage for these projects is hugely rejected by the experts. Out of the total respondents, 91.4% of them disagree with the existence of appropriate insurance for agricultural projects. On the other hand, 5.7% of the experts favor the claim while 2.8% of the remained silent on the issue. From this, it is observable that the lack of insurance coverage for agricultural projects increased the possibility of credit risk. Secondly, the size and nature of agricultural projects are considered as another cause of credit risk. In line with this, it is argued that most agricultural loans that have an access for loan is mainly characterized by large scale and mechanized farms. Out of the total respondents, 82.8% of them showed their support for this argument. On the other hand the remaining 17.1% of the expert refuse the argument. This shows that most of agricultural loans are given for large and mechanized farms than small and subsistent. As a result, the failure of single mechanized farming project has a huge credit risk on the bank.

5.4 Risk Associated with Manufacturing and Pre-shipment/Export Loan

In this subsection, the credit risk related with the other prioritized sectors that the bank provides loan, namely; manufacturing and the export sector is presented and analyzed.

Table 5 Risk Associated with Export

N	Inquires	Response of the officials in %		
		Agree	Disagree	No Opinion
1	The legality of sales contract presented for pre-shipment loan is checked by bank	85.71	14.47	---
2	LC is open in CBE for all sales contact that pre-shipment loan is given	80.00	14.28	5.72
3	There is shortage of raw material for manufacturing	57.14	28.57	14.29

Source: Own survey Conducted in 2012

Concerning the credit risk of the export sector is related with the legality of sales contact. Accordingly it is argued that the bank has a mechanism to check the legality of all sales contract presented for export loan. For this claim, as it is presented in the above table 85.7% of the respondents expressed their agreement while 14.2% of the experts disagree with this claim. This result showed even though the bank has mechanisms to check the legality of the pre-shipment contracts for loan, there is still some gaps that could increase the responsibility credit risk for the export loan.

The second credit risk related with the export sector is the issue of letter of credit (LC). In line with this, is argued that for all sales contact the pre-shipment loan is given LC is open in CBE. Accordingly,

80% of the experts showed their agreement with this claim. On the other hand, 14.2% of them disagree and the remaining 5.7% of the respondents opt to be silent. Though most of the experts agree on the opening of LC in CBE for all contracts that obtained pre-shipment loans; there is still some variations on this issue that may generate the credit risk in the sector.

The last perceived challenge is related with manufacturing sector and in raw materials. In line with this it is claimed that providing loan for manufacturing is risky due to shortage of raw materials. In view of that 57.1% of the respondent showed their agreement while 28.5% refuse the claim. On the other hand 14.2% of the experts are said they do not have opinion on the issue. Unlike the above arguments, there is a huge variation among the experts on this claim. This reflects the shortage of raw materials for manufacturing projects is among the major causes of credit risk in the sector.

6 Conclusion

The total loan dispersed by the CBE has been increasing from time to time. In the same manner, the amount of loan for prioritized sectors also increased overtime. In recent years the bank has been involved in providing large amount of loan for three major sectors namely agriculture, manufacturing and export. Among these sectors, the share of agricultural loan increases remarkably. The trend analysis of total loan disbursement, the share of prioritized sectors and the issue of NPL in the one hand and the data obtained from the survey in the other hand, came up with different results. The trend analysis revealed that the manufacturing is too much risky than the other two. Conversely the opinion survey confirms that agricultural loan is more risky than any other sector. This shows the existence of inconsistency of the results obtained from the two sources. The bank has been facing various challenges due to prioritizing the sectors for loan disbursement. The major challenges includes lack of skilled and well experienced staffs in each prioritized sectors, lack of clear policy and procedure for agricultural loan at the time of prioritization, absence of insurance for agricultural loan and the legibility of contract for pre-shipment loan are the major challenges.

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Statistical Analysis of Academic Studies on Innovation and Management in the Last Decade in China

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Abstract: Academic research papers related to innovation management which included in “CNKI Chinese Academic Journal” in the last decade are analyzed statistically. Those studies are compared with the main topics of the International Conference on Innovation and Management (ICIM). We have found that ICIM conference themes are closely related to innovation management level and research disciplines. It leads and improves the development of innovation and management science research in China. Finally, some suggestions are presented for accelerating the advancement of the ICIM.

Key words: Innovation; Management; Academic Studies; Statistics; Analysis

1 Introduction

Through centuries' development, management has formed a huge knowledge accumulation. To draw effective innovation management experience and reference from management knowledge, according to the development tendency of the world and combining culture and social background of China, researchers of management science have conducted the ongoing studies on innovation and management. Especially over the past decade, those researchers have published papers extensively on the themes of innovation and management research, and have held many domestic and international academic conferences with above themes. What is the role of the conference on innovation and management playing in the development of management studies? To identify the relationship of above mentioned problem, we have fulfilled step by step. Firstly, the innovation and management research paper of China in the last decade are analyzed statistically. Secondly, the comparison between those papers and the main topics of ICIM are investigated thoroughly. Finally, the intrinsic links are revealed consequently.

2 The Analysis of the Age Distribution Distributions of Research Papers

China Academic Journal Full-text Database--china National Knowledge Infrastructure (CNKI) which is known as the largest and most complete collection, the most widely used database has been adopted as the studied data source. In CNKI, “Innovation management” is chosen as the search keywords. To fairly assess the affect of ICIM conference on innovation and management of academic in China, it limits the scope journal 8685 articles cited by CNKI from 2003 to 2012 and does not include conference papers and graduate thesis, etc. The age distribution data is shown in Table 1.

Table 1 Distribution Data about Innovation Management from 2003 to 2012

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
381	395	438	569	718	810	1094	1165	1421	1694	8685
4.4%	4.5%	5.0%	6.6%	8.3%	9.3%	12.6%	13.4%	16.4%	19.5%	100.0%

The number of research papers is 381 (4.4%) in 2003 up to 1694 (19.5%) in 2012. The overall number of papers showed an increasing trend, as shown in Figure 1.

ICIM is the international conference on innovation and management which organized in 2004 for the first time and consecutively held the ninth in 2012. ICIM always adheres to the “innovation” and “management” as the theme. The scholars put forward insights on innovation for business, industry and government and hold academic communication related to the field of management science and engineering, technical and economic, accounting, business administration, marketing, logistics and supply chain managerial, E-commerce, knowledge management, human resource management, etc. As shown in Figure 1, from 2003 to 2005 the number of papers grows moderately, but there was a sharp increase in 2006. It shows that after two sessions the influence of ICIM reflected gradually. With further analysis, it can be found that the main topics of Third ICIM added the Synthetic content which gives greater communication space to researchers on innovation and management. This is also one of the

factors that the number of papers increases evidently. And every other session have retained the “Synthetic” issues, reserved the expansion space of the field of innovation and management and played a positive role in promoting the number of papers. There is also a large growth in 2009. It has been searched twice with the theme of “Technical innovation”, “System innovation”, “financial management” and “finance”, obtain the data as shown in Table 2. Compared with the data in 2008 and 2009, it can be found that the similar research papers grow exponentially. Particularly, the number of papers on financial innovation is 6 in 2008 to 59 in 2009; the growth rate reached 883%.

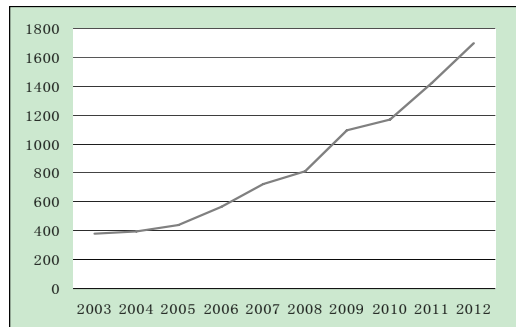


Figure 1 Distribution Data about Innovation Management from 2003 to 2012

With depth analysis of the financial situation at that time, the global financial crisis in 2008, huge losses of financial institutions, government funding scales expansion. For many countries, the government has faced huge pressure. The countries which are not powerful in Eastern Europe and Asia faced national bankruptcy crisis. At the same time the voice of reforming the international monetary system and international financial systems are rising. In this context, “financial innovation” and other topics in ICIM is corresponding to the current major domestic and international economic situation. Then it can be inferred that the topic in ICIM is closely to the hot issues of international affairs. There is also a large growth in 2011. Compare with the conference theme in ICIM in 2011, 2010 and 2009, it can be found that the conference theme has changed significantly. Although two topics have been decreased, but “Industry-study-research”, “Open innovation”, “Technical innovation” and other new conference theme have been added. It has been searched twice with the theme of “Open innovation”, “Technical and economic” and “Industry-study-research”, the obtained data is listed in Table 2. It shows that in the newly added three research areas the number of papers has a more substantial increase in 2011 than that in 2010. It fully shows that, the adjustment of ICIM conference theme has been a positive response from the community, and also confirms that the ICIM conference plays the key role in this study domain.

Table 2 Main Topic Papers in from 2008 to 2011

	2008	2009	Growth Rate		2010	2011	Growth Rate
Technical Innovation	81	166	105%	Open Innovation	32	50	56%
System Innovation	12	63	425%	Technical and Economic	18	32	78%
Financial management	10	23	130%	Industry-study-research cooperation	2	7	250%
Finance Innovation	6	59	883%				

3 Statistical Analyses about Support Fund

To encourage scholars to engage in various high-level basic research work, the government departments at all levels in China have established a variety of research funds, in which the National Natural Science Foundation and the National Social Science Fund is the representation of highest level. Thus, the paper which received a special fund to support is considered to be a high quality research. We have research the association between the quality or the quantity of the innovation management papers and the ICIM conference. Therefore, we analysis the themes of the consecutive ninth ICIM in order to find whether it in accordance with the frequency statistics or not (due to the first conference has no subject classification, so it is not included in the statistics), as shown in Table 3. In our analysis, each topic indicates with the code “NO.n; n =1, 2…16”. Within the chart, the top five are “Product

innovation ,technical innovation and industrial innovation”, “Regional innovation”, “Organizational innovation, system innovation and management innovation”, “The technical economy and the policy of science and technology innovation" and "Intellectual property and knowledge management” and each conference is basically used as those themes. It has been searched twice with the themes and the obtained data is shown in Table 3.

Table 3 Frequency of ICIM Topic, Statistical for Five Kinds of Papers were Supported by the Fund

Topic	Code	Rate of Recurrence	Fund		Natural Science Fund		Social Science Fund	
			Fund	Proportion	Fund	Proportion	Fund	Proportion
Technical innovation, product innovation and industrial Innovation	NO.1	9	247	46.25%	95	48.47%	33	37.50%
Regional innovation	NO.2	9	6	1.12%	1	0.51%	2	2.27%
Organizational innovation, system innovation and management innovation	NO.3	9	116	21.72%	38	19.39%	18	20.45%
The technical economy and the policy of science and technology innovation	NO.4	8	2	0.37%	1	0.51%		0.00%
Intellectual property and knowledge management	NO.5	8	48	8.99%	14	7.14%	12	13.64%
financial management and finance innovation	NO.6	5						
Marketing Innovation	NO.7	5						
Production, logistics and supply chain managerial	NO.8	5						
E-commerce, e-government and information managerial	NO.9	5						
Human resource management and its innovation	NO.10	5						
Industry-study-research cooperation and strategic alliance	NO.11	4						
Open innovation and distribution innovation	NO.12	4						
Production and operation innovation and application of IT Technology	NO.13	4						
Competitive Advantage and Corporate Competitiveness	NO.14	1						
Independent College (Private University) innovation and management	NO.15	1						
Risk Analysis and Risk Management	NO.16	1						
Total				78.46%		76.02%		73.86%



Figure 2 Frequency of ICIM Topic, Five Kinds of Papers were All Kinds of Fund Support Ratio

The data shows that support fund based on the conference themes have reached to 78.46%, as shown in Figure 2. And the support of National Natural Science Foundation of China has reached to 76.02%, the National Social Science Fund support is 73.86%, as shown in Figure 3. Thus, the previous ICIM conferences with the purpose to organize high-level international conference stick with the forefront of innovation management themes. As can be seen from another angle, the ICIM has made unremitting efforts to improve the quality of innovation management papers.

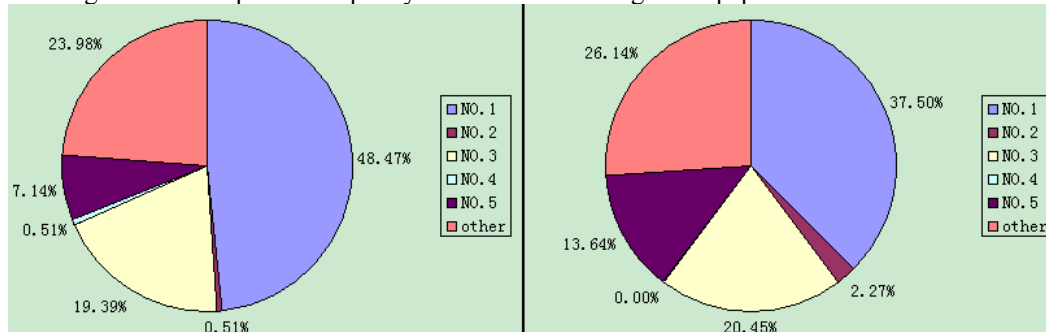


Figure 3 Five Kinds of Papers were Natural Science Fund and Social Science Fund Support Ratio

4 Statistical Analyses about Research Level and Discipline Distribution of Papers

We sorted the discipline distribution of the innovation management theses, as shown in Table 4. While it has been associated with the ICIM conference themes and the top five of research levels, is shown in Figure 4. The second one is the industry guidance. “Financial management and finance innovation”, “Marketing Innovation”, “Production, logistics and supply chain managerial”, “E-commerce” and “Human resource” etc. have always been the themes of ICIM. The third one is the policy research, in addition to no elaborate classification in the first conference, the “Science and Technology Policy” is the reserved topic theme from the second ICIM, and this can prove that the ICIM conference attach importance to research. Each conference has “Technical innovation” in addition to the seventh one. “Independent College (Private University) innovation and management” is one of the main themes in the seventh conference and this is the first time to discuss vocational guidance. It should be noted that, the top of the ranking is basic research; it is not the keyword in the conference. In addition to the seventh conference which emphasizes research results into productive, others are part of basic research. With foregoing analysis, the Conclusion is that the ICIM conference is closely related to the scholars on the domain of innovation management.

Table 4 Research Level and Discipline Distribution

Rank	Research Level	Number of Papers	Proportion (%)	Discipline Distribution	Number of Papers	Proportion (%)
1	Basic Research	2304	26.53	Enterprise economy	1880	21.65
2	Industry guidance	2091	24.08	Industrial economy	1375	15.83
3	Policy Research	736	8.47	Higher Education	772	8.89
4	Engineering and Technology	492	5.66	Macroeconomic Management and Sustainable Development	555	6.39
5	Vocational guidance	211	2.43	Information and Library Digital Library	391	4.50
6	Industry technical guidance	209	2.41	Agricultural Economics	383	4.41
7	Higher Education	111	1.28	Power Industry	233	2.68
8	Basic and applied basic research	107	1.23	Research on Medicine and health policies and laws and regulations	227	2.61
9	Policy Research	48	0.55	Architecture and Engineering	199	2.29
10	Economic Information	44	0.51	Mining Engineering	198	2.28
11	Basic education and secondary occupation education	16	0.18	Finance	194	2.23
12	Standard and quality control	11	0.13	vocational education	189	2.18

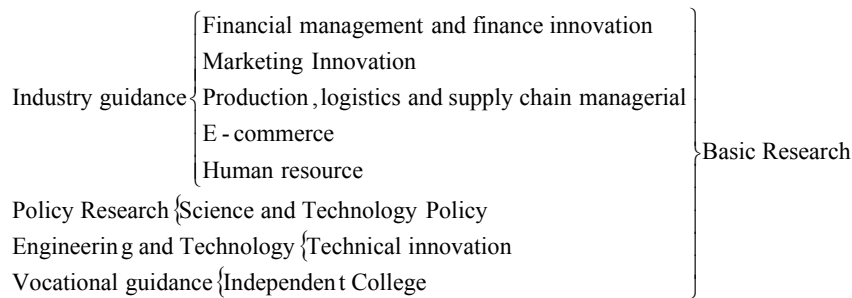


Figure 4 ICIM Conference Topic and Research Level Association Graph

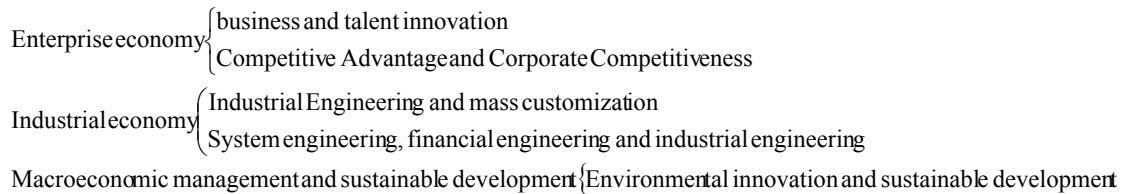


Figure 5 ICIM Conference Topic and Research Discipline Association Graph

The disciplines about innovation management are also sorted, as shown in Table 4. At the same time, the theme also process appropriately, as shown in Figure 5. Enterprise economy: At the first conference “business and talent innovation” is conduct as the topic theme. What is more, “Industry-study-research cooperation and strategic alliance” is also a theme that relates research institutions to enterprise products. Industrial economy: “Environmental innovation and sustainable development” appeared at the second, ninth, tenth conference as a main theme. Macroeconomic Management and Sustainable Development: After the seventh conference “Environmental innovation and sustainable development” appeared as a main theme. But the conference does not include the third one “Higher Education”, the fifth one “Information and Library Digital Library”.

It can be concluded that in the coming ICIM, it is sane to focus on above themes appropriately.

5 Statistical Analyses about Research Institutions of Papers

The research institutions which have published more than 20 papers about innovation management can be seen in Table 5.

Table 5 Research Institutions Which Have Published More Than 20 Papers about Innovation Management

Ranking	Organization	The number of thesis	Proportion (%)
1	Zhejiang University	102	0.62
2	Tsinghua University	38	0.23
3	Wuhan University Of Technology	36	0.22
4	Sichuan University	33	0.20
5	Wuhan University	32	0.20
6	Tianjin University	29	0.18
7	Central South University	29	0.18
8	Renmin University of China	28	0.17
9	Shanghai Jiao Tong University	26	0.16
10	Nanjing University	26	0.16
11	South China University of Technology	26	0.16
12	Harbin Engineering University	24	0.15
13	Nanjing University of Aeronautics and Astronautics	22	0.13
14	Harbin Institute of Technology	22	0.13
15	Dalian University of Technology	20	0.12
Total		493	5.68

Within the 8685 papers, the number of papers which the top 15 research institutions have published is only 5.68% in the total number of papers. It shows that the institutions are rather decentralized. From another perspective, the ICIM has powerful influence on the research institutions of China. Zhejiang University, Tsinghua University, Wuhan University of Technology and other 15 universities is the main research institutions on innovation management. Compared with other research institutions, they have showed strong academic ability and play a important role. Especially Wuhan University of Technology which ranked third beats many top universities in China. It is related with the WHUT all year round as the ICIM of the host of the conference. In turn, it can be observed that by organizing the ICIM the management subject of the university has enhance the visibility and academic status further. In addition to the traditional academic institutions such as the universities, research institute, many companies and institutions are beginning to join in the team. It shows that the discussion on innovation and management is not only limited in academia. It has aroused repercussions, and has been used depth into practical activities about innovation management. Seen from the other side, the social has given a positive response to various activities (including conferences) about innovation management.

6 Conclusions

Through the statistically analysis of thesis about innovation management which included in “CNKI Chinese Academic Journal” during 2003 and 2012, and compared with the main issues of the ICIM, We found that ICIM conference plays a very important role in innovation and the development of management science research in China, and ICIM always adhere to use the forefront conference theme, and improve the quality of papers about innovation management. In the coming ICIM, the organizers can take the subject relating to “Higher Education” and “Information and Library Digital Library” into the main theme for further discussion.

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Operation Performance Analysis of Enterprise Complex System from the View of Synergy

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Abstract: Enterprise performance has always been a major concern of the people engaged in management, the passage Performancism Ruined Sony caused academic reflection on enterprise performance. Based on the complex scientific management analyze the characteristics of the enterprise complex systems, combined with synergetic theory studies show that enterprise self-organization model is the main order parameter, is the slow variables which decide the enterprise performance; the integration mode of enterprise systems to resource, advantage resources are the parameters second to the main parameters, also the key factors influenced the enterprise performance; the way to improve enterprise performance according to the main and second order parameter analysis.

Key words: Enterprise performance; Complex scientific management; Synergetic; Slow variables

1 Introduction

Faced with the same market, why do some enterprises achieve success and make high profits, while some remain bad even bankruptcy. The enterprise is a complex system, which operation performance is decided by both the system's internal factors and its function with the external environment. Faced with complex, changeable and intensely competitive external environment, managers are keen to improve enterprise performance, put forward related management concepts, such as the core competitiveness, the learning organization, business process reorganization, disruptive innovation, blue ocean strategy and so on, which provides direction for organization changing, most of these management concepts reflect the characteristics of simple, operational, appeared novelty, committed results, halo effect, and easy to segment, which summarized by Miller & Hartwick institute, become a management fashion admired by managers for a time. But many studies have shown that the management style in the enterprise application has many failed cases, its reason mainly lies in the management style is based on reductionism^[1], but in a way explains the enterprise in need of improvement, or just provides a solution to better enterprise performance than the status quo. The enterprise management is a complex systematic operation process, including enterprise resources, management mode and enterprise external environment, enterprise performance tend to have many solutions. For enterprises complex systems, the view of complex scientific management was needed during thinking and solving.

2 The Enterprise Complex System Characteristics from the Perspective of Complex Scientific Management

The Santa Fe institute in new Mexico (SFI) led the complex scientific research founded in 1984, which specialized in the research of complex scientific research, changed the views of people towards social and economic system, the first director George Cowan pointed out, when people look for solutions to the problems which were idealized in different levels, they have deviated from the real world more or less, and confined to the point of searching a solution, while the real world requires people to adopt integrated methods to deal with the reality problems^[2], Applied complex science to management field, which created a new management thought, i.e. complex scientific management. The complex scientific management based on system thinking mode to analyze the complex systems socially, including enterprise organization management system.

The complex scientific management believe that the socially complex system is a complex system interfered by people with the ability to think^[3], its theoretical point is the concept of system, based on systematic thinking model to analyze management issues, dealing with management issues with the integrated theory, emphasizing the system dynamic changes from disorder to order through the integration of resources and elements within the system and system interaction between the internal and external environment. Based on this theory, reconsider the complex system of enterprises whose main characteristics are as follows:

2.1 Enterprise complex system with nonlinear

The research object of the Complex scientific management is the social complex system, which was featured with nonlinear. When analyze the cause of success or failure of enterprise management, nonlinear determines that we cannot revert the results simply to the reasons, because the results and reasons are not a linear relationship. Nonlinear complex system has become a successful way to solve the problem. Nonlinear doesn't just mean circular causality. Because the circular causality seems to be linear, this kind of observation is repeated. Complex systems have a certain macroscopic phenomena by nonlinear interaction of micro-elements of the system, from the macro-elements characteristics, which is difficult to find the reunification, to the height of the complex nonlinear systems, overall behavior of the system is not simply linked to some of the behavior, but through the consolidation of the results reflect the overall system behavior. Current management based on reductionism which provides direction for companies to increase enterprise performance and implement revolution, thus it cannot really solving the problems within the enterprises.

2.2 Enterprise complex systems have the ability to predict

The complex systems are featured with self-organization, adaptive and dynamic nature^[3]. In nonlinear complex systems, the complexity doesn't just mean nonlinear, but a lot of elements with freedom in different levels, which are the enterprise resources. The act of individual elements in a complex system with different degrees of freedom cannot only be foreseen, but also be traced, while these separate elements can spontaneously form stable structure under the interaction among them, this is the complex self-organization, self-adaptive system constituted by intelligence. The most essential characteristic of the complex system is its part has some intelligence, namely knowledge about its environment, according to the target to take action, and this system has the ability to predict. Enterprise organization system is dynamic, it is in constant development, and the system itself can predict the future development. The enterprise, in the process of development, in the face of changing circumstances whether can keep on learning by prediction, restructure and improve its operation models to some extent determines the enterprise's performance.

2.3 The enterprise systems are a complicated nonlinear feedback network

Nonlinear system and linear system are completely different, and all the people involved in the systems are nonlinear feedback network, enterprise system is not exceptional. Meanwhile the complex systems with positive feedback and negative feedback, this makes the results finally produced by the system unpredictability. but there is one thing for sure, the negative feedback loop in the system will make the system stable, while the positive feedback loop by magnifying the interactions between independent intelligences make the system development unpredictable. During the enterprise operation process, the positive and negative feedback loops work on the organization system, the two forces result in the enterprise's business performance.

1.4 The enterprise complex system with initial value and path dependence

The enterprise system's initial state is different, which decided the enterprise to improve business performance by employing different strategies; the enterprise resource's interaction pattern is different, which decided the enterprise system evolution process is different, resulting in different enterprise performance.

Based on the perspective of complex scientific management, the analysis of the characteristics of the complex system shows that the enterprise performance, the initial status of the system, and the evolution process of enterprise resource system, related components, has the path dependence.

3 The Models of Enterprise Complex Systems' Evolution

The evolution of enterprise systems in the face of environmental change decided the enterprise performance. For complex system, the system as a whole is greater than the sum of the parts, when some components constitute a system, the system will appear the natures that its individual components without. Thus complex scientific believe that system is a function of its components^[4], which form the basis of the evolution model of complex scientific management analysis system.

The enterprise system evolution is along with the process of self-organization and enterprise resource integration. Resources integration is the reverse thinking, that is, starting from the target, what resources are needed, which resources, integrating them to create new resources^[3]; while self-organization model is positive, according to the complex system's unique predict ability to achieve the system's self-drive and self-organization.

The evolution model of enterprise system can be expressed

$$D_t(R) = O_t(S_t, R_1, R_2, \dots, R_n) + I_t(S_t, R_1, R_2, \dots, R_n)$$

$$I(R) = I_t(S_t, R_1, R_2, \dots, R_n)$$

which means resource integration mode; the resources are integrated by enterprise operation mode, thus It means the operation pattern at the time of t , which is relevant to S_t and R_n .

$O(R) = O_t(S_t, R_1, R_2, \dots, R_n)$ said the enterprise's self-organizing mode at the moment t ; which is related to both the system state S_t and system component R_n of the moment.

$S_t, R_1, R_2, \dots, R_n$ mean the various resources within the new resource outlook of complex scientific management.

Status variable S_t , which indicates the state before system integration, determined by $D_{t-1}(R)$;

The evolution of enterprise $D_t(R)$ was determined by integration mode It and self-organizing mode O_t , this both interactions urge the enterprise evolve from S_{t-1} to S_t , the evolution result reflect the enterprise performance.

4 Operation Performance Factors Analysis of Enterprise Complex System on Synergetic

The evolution process of enterprise in the face of environmental change decided the enterprise performance; what decided the evolution process of the enterprise? Complex economic systems rely on supply and demand laws of market economy, the laws of the market economy are the main parameters of economic system running. As for enterprise complicated systems, and what is the corresponding parameter to the market economy rule in economic system? What determines the evolution process of the enterprise, thus then determines the corporate operating performance.

4.1 The main parameter and second parameter which were decided the enterprise operation performance

The synergetic which was founded by Hawking in the late 1970s is a sub-branch of modern self-organizing theory, it mainly research system from disorder to orderly mechanism between their systems. The synergetic provides a heuristic framework for constructing natural sciences and humanities of nonlinear complicated system model^[5]. Enterprise is a complex nonlinear system, in the edge of chaos and order, the essence of enterprise management is the enterprise through the organization between various elements and the effect between the elements and the environment, realize transformation from disorderly to orderly, finally realize the management goal.

Analyzing the determinants of enterprise evolution by using synergetic, the system is expressed by a number of state variables, and the evolution of the system i.e., the change of state is expressed by a set of differential equations:

$$D_t(R) = O_t(S_t, R_1, R_2, \dots, R_n) + I_t(S_t, R_1, R_2, \dots, R_n)$$

$$dD/dt = dI/dt + dO/dt = (\partial I / \partial S) (dS/dt) + (\partial I / \partial R_i) (dR_i/dt) + (\partial O / \partial S) (dS/dt) + (\partial O / \partial R_i) (dR_i/dt)$$

Among them, $dy/dx, \partial y / \partial x$ represent variable rate of variant y to X .

dD/dt system evolution agenda represents the evolution of enterprise systems is determined by the variable rates on the right side of the equation.

The system variables were divided into two major categories of slow and fast variables by synergetic principle. The quick variables change fast over time, the number of them is huge, but plays a minor role in the system evolution; Slow variables, also called order parameter, which changes over time slowly, the number is less, but it controls the system's evolution; The nature of the complex system will be determined by the order parameter or slow variables.

For enterprise systems, various resource elements R_i , the initial status of the enterprise S , enterprise operation mode It , recover mode O_t and so on, decide the enterprise's operation performance, but the change is slow to other influential factors of slow variable is the enterprise resources integration pattern IT and the self-organizing mode of the enterprise system O_t . In the system deepening agenda, the dD/dt is mainly determined by the four slow variants $\partial I / \partial S, \partial I / \partial R_i, \partial O / \partial S, \partial O / \partial R_i$, in the four variants, the rate of the self-organizing pattern to the resources $\partial O / \partial R_i$ change slowly over time, is the main

enterprise system parameters; Enterprise to resources integration mode $\partial I / \partial R_i$ slowly change over time, is the second system parameters. Multiple parameters have order, among the other changes faster parameters, the variant dR_i/dt change is relatively slow, enterprises need a certain amount of time to tap resources, therefore the system resources is an important parameter, which need longer time to foster or acquire enterprise advantage resources, change is slow, is give priority to order; Other resources are relatively inferior, the order parameter around main parameters to look for its to its way to realize enterprise performance.

4.2 The implementation of the main parameter and second parameter in the enterprise complex system

From the above analysis, the self-organization of enterprise system to the function mode of the resources is the main parameter, is the main determining factor of the enterprises performance; Enterprise system of resource integration model is the second order parameters, the advantage of system resource is the order of the order parameter, is the key to affect enterprise performance factors in enterprise management, through the design of certain mechanism to formulate some rules (consolidation pattern) oriented enterprise main body behavior, enterprise main body through the mutual influence and mutual relationship between the employee (self-organizing mode) to perform the rules. These smart bodies compose a complex self-organizing, adaptive system, through the external environment prediction and adaptation, showing more complex than a single member of the intelligence, language, behavior and other characteristics. Based on the characteristics of complex systems managers should design integration mode and self- organization mode to allows them naturally produce creativity and high efficiency, rather than to impose their own solution on them.

The design of Mechanism and rules are provided for the enterprise resources integration model, and under this guidance, enterprise systems produced self-organization, thus the primary order parameter and order parameter of enterprise systems are basically determined. In this enterprise system, employees will release enormous energy and enthusiasm, and the company's operating performance will be increased.

In addition to the innovation of resources integration mode, design healthy self - organizing mode of enterprise mechanism for enterprise, businesses cannot afford to ignore the order parameters of resources, actively explore and cultivate superior resources, improve enterprise performance constantly.

5 Conclusion

When people look for solutions to the problems which were idealized in different levels, they have deviated from the real world more or less, and confined to the point of searching a solution, while the real world requires people to adopt integrated methods to deal with the reality problems. complex scientific management from the whole to think the enterprise complex system, combined with synergetic theory analyzes the slow and fast variables, gain the key variants: enterprise self-organizing mode, resource integration mode and superior resources, which determined the performance of the enterprises, through the design of enterprise operating mechanism oriented enterprise integration patterns and the self-organizing mode, and actively expand the superior resources, make other enterprise system parameters around the three main parameters to find the ways of the realization of the enterprise performance, provides the direction for improving organizational performance and implementation of organizational change for the enterprise.

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Expert Counseling Model Based on Life Cycle Theory

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Abstract: Currently, as the dominant force in national investment in science and technology, the national science and technology plan is important in building an innovation-oriented country. Expert advice and opinions in our technology programs play an important role in decision-making and management. This paper proposes life-cycle expert counseling model by grafting life science theory after defining connotation and denotation features of expert counseling. Based on this model, it has carried on expert consulting system organizational structure and operation process innovation, and the theoretical support is also provided for government technological program and decision-making.

Key Words: Expert counseling; Life-cycle expert counseling model; Expert counseling management innovation; Decision-making.

1 Introduction

Expert counseling has displayed an important role in the formulation and management process of China's scientific and technological plans, including initiating a project appraisal, project approval, appraisal reward and other aspects of the project. Each link is with the participation of experts. Expert recommendations and advice in these planning decisions and management has become one of the most critical factors. Presently, the number of experts to support national 973 project has reached more than 6,000 people, the scale of 863 plan database is close to 20,000 people, and the expert database in Office of the National Science and Technology Awards has more than 30,000 people (Xu Guanhua, 2007). After years of development and practice, expert counseling has been employed in China's three major scientific and technological plans, namely, National High-tech Research and Development Program (863 Program), National Key Basic Research Development Program (973 Program), and National Science and Technology Support Program, which has helped to accumulate practical experience, achieve good results and display scientific style and democratization in the government decision-making. It is worth mentioning that National 973 Program always adheres to the combination of expert advice and policy management mechanism, establishes expert consultant team and domain expert advisory group, thus give full play to experts in strategic research, in formulation of guidelines, in project evaluation and in assessment process management.

2 Research Status at Home and Abroad

As an important part of counseling system in modern decision making system, the expert consulting system is an important measure "to implement a verification system and decision-making responsibility to prevent arbitrary decision-making." The function of government policy decision expert counseling mainly manifests in: (1) providing ministrant, independent and diverse service for government policy decision-making. (2) providing the dual function of investigation and study, information analysis and project design as well as expression of public opinion for the government policy decision-making (Fu Xiaosui, 1995). (3) supporting role in decision-making, democratic political advocacy role, role in promoting economic and social development and promotion role in scientific and technical knowledge.

According to UNESCO, Science and technology policy is an important system and implementation of policy initiatives for the Government to foster effective development of science and technology and enhance overall national strength. This definition is only related to the field of science and technology, equivalent to what Brooks said, "not the policy for Science, namely" management and support of national science and technology policies, as well as for selection and evaluation of specific science program" (Brooks H. The scientific adviser[A]. Robert Gilpin, Christopher Wright. Scientists and National Policy—Making[c]. New York: Columbia University Press, 1964. 73—96), and (OECD, 1963 Classification, Xing Huaibin, Su Jun. Theoretical Progress of Analysis for Public Scientific and Technological Progress: Comments and Comparisons[J]. Public Management Journal, 2005. 2(4): 42—51). In the actual government policy decision process, policy-maker's demand to the science and technology expertise is not only limited to "for the policy of science" scope, but more widespread,

especially for policies related to environment, food and medical care. Therefore, Brooks describes this phenomenon of science and technology of massive intervention in political affairs as "Science in Policy, including " politics, policy, international relations in nature but have to rely on Science and technology" (Chen Guang, Wen Ke, Mou Zhiping. Role Transition of Experts in Sci-tech Counseling[J].Studies in Science of Science,2008.26(2):385-386).

Therefore, formulation of science and technology programs requires both an experienced expert counseling for their professional knowledge, practical experience and innovation in science and technology forecasting and strategic decision-making advice; it also needs to solicit opinions from the public, businesses and government agencies in order to meet their technology development needs. In addition, it requires the participation of technology managers at different levels in order to develop the country's science and technology development strategy, plans and programs in accordance with science and technology management system and research funding (Qiao Dongmei, Yang Jian, Li Zhengfeng. Knowledge acquisition, analysis and assessment of Expert Counseling System for Internet Scientific and Technological Planning[J]. Scientific Progress and Countermeasures,2007. 24(7)). To sum up, although sci-tech programs promoted by government mainly involve experts in sci-tech fields, their scope tends to be much wider.

3 Definition and Features of Expert Counseling

Expert counseling means that experts engage into the management of specific organizations and help the organizations to improve science, democracy and effectiveness of management with their professional knowledge or special skills. As for the government expert counseling, it means government seeks knowledge and technological help through certain procedures to improve scientific, democratic and legal levels of management in their public management, especially in decision making. Compared with the enterprise expert counseling, the government expert counseling is different in many aspects, such as behavioral intentions, personnel requirements, consultative approach, consulting and supervisory body .

Firstly, government expert counseling involves three bodies, namely, government, experts and the public, while the enterprise expert counseling only involves activities between companies and experts. Consultation of governmental experts aims at prevention and correction of Government and citizens' interests and "ignorance", and maintain balance between public interest and private interest with specialized knowledge and skills and a high degree of rationality. Beneficiary parties between government's expert counseling and companies' expert counseling are different. The former benefits society and individuals that make up the society, but the latter benefits companies as the market body. From this perspective, the success or failure of government expert counseling relates to the interests of the whole society.

Secondly, different types of experts are needed due to different purposes between government expert counseling and enterprise expert counseling. Companies which focus on profits demand more economists, business management experts and technological experts, while aiming at improvement of decision making levels and realizations of a scientific, democratic and legal decision making, government needs to consult not only economic and technical experts, management consulting experts, legal experts, planning experts, psychologists but also multidisciplinary experts in the field of sociology, and this is determined by the complexity and variability of social affairs. Thirdly, government expert counseling is realized mostly by entrust, which means experts provide their counseling advice for professional mission and social responsibility, and the Government will pay experts only in the case of major project tender or a few paid commission, This is totally different from the contract between the enterprise and expert. Enterprise expert counseling is a civil act, governed by private law while government expert counseling is subject to private law and public law. Therefore, procedures for government expert counseling have strict limits and subject to supervision from the society.

4 Life Cycle Expert Counseling Model

Life cycle counseling model means dividing life cycle of sci-tech plans or programs into several processes, and involving expert counseling management into each controlling points and key decisive points separately, thus realizing objectives of the whole program and acquiring corresponding social and economic returns. A complete expert counseling system must include five stages of life cycle, namely, issuance of program guidelines, program approval, implementation, completion and evaluation, and outcome transfer.

Life cycle expert counseling model not only requires a complete and scientific counseling to the content of each stage of the program, but demands the management between stages of “interface”, enabling a successful transfer of result from the last stage to the next stage and a proper time to start counseling work within the last stage.

5 Management Innovation Based on Life Cycle Expert Counseling

5.1 Flat type Expert Counseling Organization Structure Based on Internet

Flat type expert counseling organization structure based on network information technology combines the development of existing internet information technologies, and introduces network technology into the organization structure of expert counseling system, breaking the current binary system of hierarchical structure and flat structure and combining these two structures together, thus enabling these two structures to develop its own strengths and complement each other as well. At the same time, introduction of internet information technologies could break the geographical limitation of expert counseling, expand the professional range and import decision making and suggestions from the foreign experts, thus improving the counseling quality and efficiency and decrease the counseling cost a lot.

International counseling experts and experts from various institutes in the WAN organization structure make up the WAN experts. Top counseling experts and counseling experts from the professional fields make up LAN experts through LAN channel. At last, via the connection of internet, WAN experts and LAN experts form a complete organization structure of flat expert counseling system network based on internet.(Seen from Chart 1

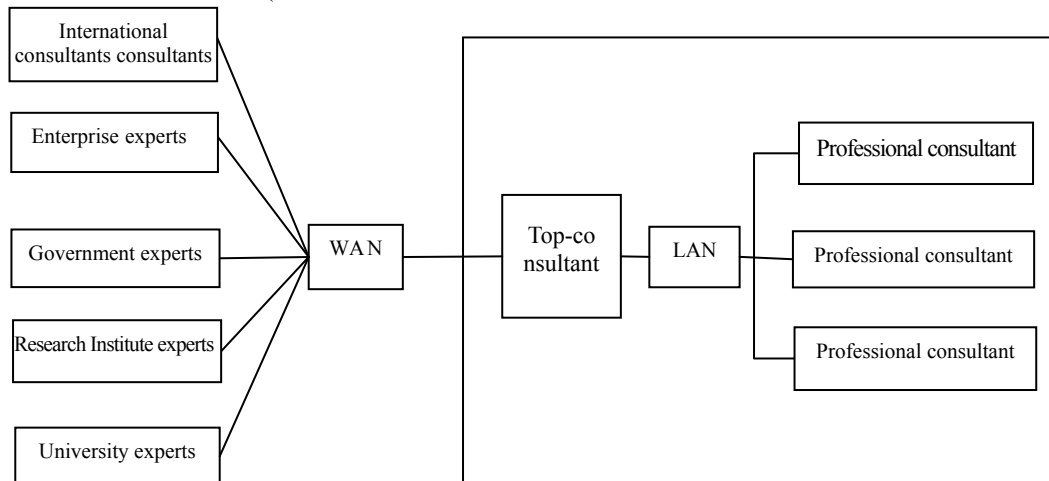


Figure 1 Organization Structure of Flat Expert Counseling Based on Internet

Advantages of organization structure of flat expert counseling system network based on internet are as follows. Firstly, a wide range of experts means abundant knowledge to pool mind together. An integration of existing expert database through internet technologies can break the geographical boundaries and collect good ideas and suggestions from experts coming from different institutes. What’s more, counseling work information of sci-tech programs proposed by overseas advanced experts can be introduced, which brings new ideas. Secondly, high counseling efficiency and low counseling cost. Secondly, counseling experts communicating through network information technologies helps them express their opinions equally. Thanks to the information platform, suggestions and ideas of counseling experts can be reflected, which avoids frequent conferences, discussions and experts’ taking turns speaking, thus reducing the difficulty of coordinating advisory experts, saving a lot of time and improving counseling efficiency. At the same time, network technologies also avoid the excessive use of paper documents, expert travel expenses, thus reducing research cost and consulting costs .Thirdly, organization shortcomings can be weakened. An increasingly mature network technology weaken the flat-like organization structure as it helps to shoulder management responsibilities of top counseling experts, so that they can devote energy to guiding and managing work. Meanwhile, it enables top-level consulting experts to understand the progress of the consultation work from a global perspective,

understanding each advisory expert performance and evaluating consultant work impartially. Fourthly, it harbors higher degree of confidentiality and security. WAN experts enjoy larger openness, but they are less-privileged. Although experts submit their counseling suggestions through the internet, they don't have access to other experts' files. While entering the stage of approval and evaluation of scientific research program, WAN will be narrowed to LAN, therefore, a higher degree of confidentiality and security is established. Fifthly, expert database are managed in a dynamic manner. Network technologies help to build a complete, scientific and dynamic expert database system. Based on up-to-date information, expert database can update the application and recommendation information of experts and add new information of evaluation experts accordingly without delay; At the same time, information of experts, including transfer, retirement and death, can be updated as well. Sixthly, unfair assessment influenced by factors such as social connections, and celebrity can be avoided. Network technologies requires the expert's participation of evaluation work in their individual names, and shields the applicant names and their working institutes, enabling a full display of anonymous system and ensuring the fairness, objectivity and accuracy of evaluation work by experts. Seventhly, counseling experts are engaged into full process of counseling and management of scientific research programs. Owing to the convenience and cross-regional nature of network, counseling experts can provide timely counseling to the program at whatever stages as counseling experts can play their respective roles at different stages and for different purposes. In this way, a life cycle expert counseling function is realized.

A flat-like expert counseling system network based on internet combines network information technologies and experts counseling system, which fully develop their respective roles. It provides a new idea for the development of China's sci-tech plan management, and a new model for the counseling and management work of scientific research program.

5.2 Operational Process of Expert Counseling Model Based on Life Cycle

Life cycle expert counseling model are useful in every stage of scientific research program, for example, when the requirements for technological support of a scientific research program are produced, just as a seed takes root in the soil, experts will provide intelligence support to help it transfer into a plan in the program guidelines. After program selection by counseling experts, the program will receive guidance from experts including intermediate stage inspection and annual review to help it develop healthily. While entering the middle stage of the program, counseling experts working for professional fields will deliver a final evaluation to the program led by top counseling experts. Similar to the evaluation of material quality of good wood that has already taken shape, they determine whether it has realized the transformation of scientific and technological achievements eventually. After evaluation, counseling experts from different areas will be selected from the database to provide a complete set of advisory service to the sci-tech transfer. With life-cycle expert advisory model in conjunction with project life-cycle, it forms a "tree" shape operation pattern, shown in chart 2.

5.2.1 A Tree Shape Operational System Structure Based on Life Cycle Expert Counseling Model

"Root": Operation pattern "root" refers to the pan-expert links network. The pan-expert is not necessarily consultancy expert, but certainly is in the expert of profession. They disperse in the world in various trades and occupations. Similar to a giant library, they are the soil for all scientific research item breeding. Network information connects these experts together, providing intellectual "nutrients" for scientific research project life-cycle and life cycle expert counseling system, and ceaseless driving force and solid foundation for scientific cause. "Trunk": Trunk of the operational model is the specific organization of the life cycle experts counseling model. The bottom part of the stem is representative of pan-expert groups selected in various ways. Experts in the database have more definite goals and responsibilities. They are candidates of counseling experts, providing daily consultations to expert counseling system. Other parts of the stem are WAN experts connected by WAN and LAN experts connected by LAN, as well as the affiliated hardware facilities. WAN experts will provide professional counseling work at the initial and late stage of the scientific research program, while LAN experts evaluating on the scientific research program within the LAN at the key evaluation stage. "Stem": Stem in the operational model represents five stages of the life cycle in the scientific research program. Different experts play different counseling roles at different stages. "Branch": Branch of the operational model means specific counseling work assigned to counseling experts in each stage.

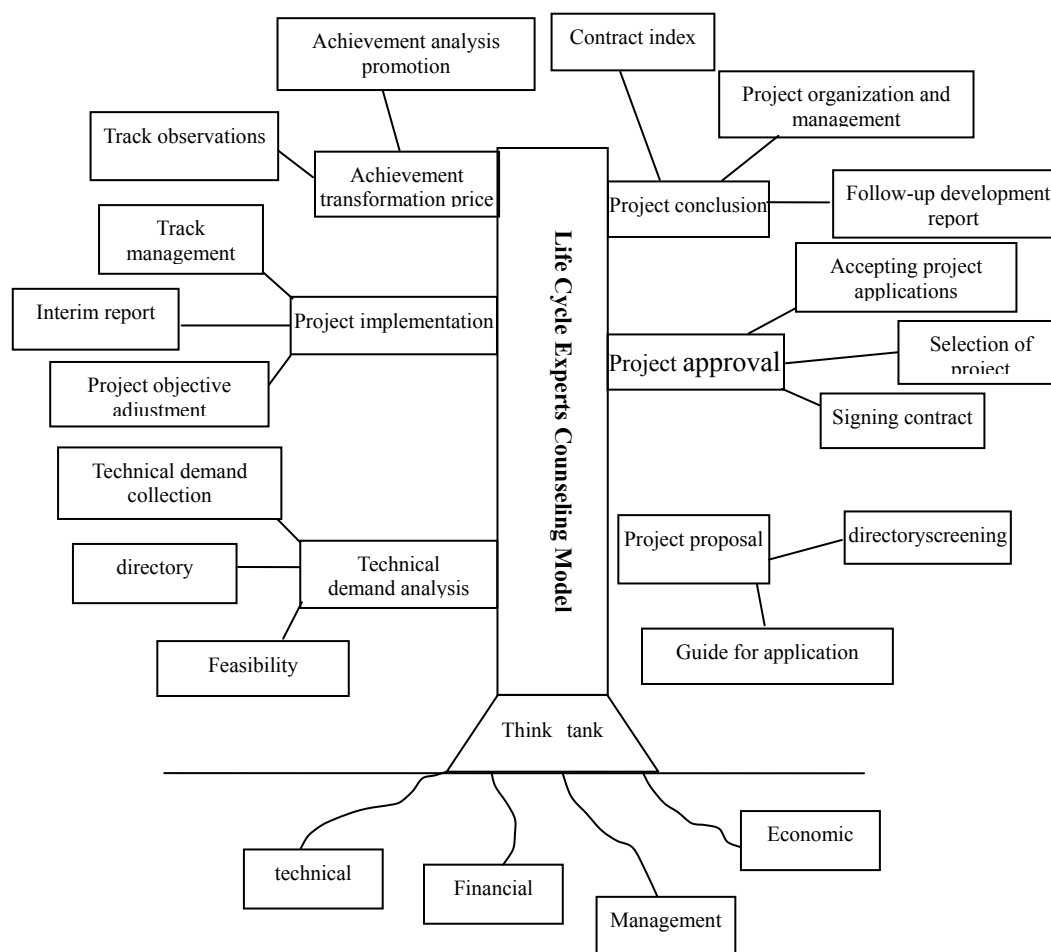


Figure 2 Tree Shape Operational Chart of Life Cycle Experts Counseling Model

5.2.2 Tree Shape Operational Route Based on the Life Cycle Experts Counseling Model

During the tree shape operational process of the life cycle experts counseling model, different stages of the life cycle have different operational routes. “Series” type: “Series” type refers to a type in which all consultancy experts in the same consultation link in a work flow use similar network condition to carry on consultancy work. “Parallel” type: “parallel” type is defined in a different part of the same consultation workflow counseling Experts use different network conditions to carry out consultancy work in parallel mode. “Hybrid”: “hybrid” refers to a participatory work model with different advisory links in different processes in which experts use different network conditions with several links doing consultancy work alternately across.

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Mode of the State-Subsidized Student Loan System in China

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Abstract: For three decades of reform and opening up, the educational aid system in China has presented great changes with social revolution. To decrease the economic burden of students in Chinese higher education, the system of State-subsidized student loan (SSSL) was constructed in 1999. For some misunderstanding exist in the SSSL system which is predominantly provided by government by a subsidized policy, this article focuses on the purpose, coverage and characteristics of the SSSL (2004) in China. It is concluded that the SSSL (2004) system is basically on commercial mode by comparison with the policy loan. Therefore, methods induced by the commercial mode are more suitable in solving the problems in the process of SSSL.

Key words: Higher education; State-Subsidized Student Loan system; Commercial mode

1 Introduction

Since the establishment of P.R. China, the higher education was free of charge for students, in which the expense was completely supported by government. Until 1988, the government starts to charge a small fee (200 RMB) for higher education for the tuition of 200 RMB is only symbolic. However, it is a beneficial attempt that the higher education is not the free-lunch any more for students passed examination in some extent. After eight years since then, the tuition of the reformed higher education was gradually increased by 2,000 RMB. But it was just beginning; the tuition of higher education entered into channels of the moderate ascending for some reasons, such as the principle of apportionment expenses of higher education, the economic inflation. Recently, the average tuition in China rose to 5000 RMB, and the dormitory expense cost 1,000 to 1,200 RMB besides subsistence expenses. Therefore, the financial support of one student has to get at least 10,000 RMB from their families by each year. It has become a heavy burden for student families because per caput gross of China was 2000 RMB, and it is the huge challenge for pursuit of freedom and democracy^[1].

At the same time, the popularizing rate and enrollment rate in higher education was also enlarged with the increases of the absolute quantity of student passed examination. More and more children, who are coming from poor families, try to receive advanced education and deeply believe in the conviction that knowledge can change their fate^[2]. Of course, the value of social fairness has spread and embodied in education, including two basic fields in the equality of educational right and opportunity. According to the statistical data of the Education Ministry the total amount of full-time undergraduates in 2008 is 21.03 million. Within it, the students in the financial difficulty are about 473.96 million accounting for 22.53% of the total. Especially students in the extreme financial difficulty are about 158.32 million, accounting for 7.53% of the total. It is not easy for the poverty families to charge this tuition, especially for the multi-child-families, the low-income family struggling for surviving, and the rural families after the natural disaster. So the contradiction between the tuition of higher education and the low income becomes a potential threatening to the equality of educational opportunity and social fairness.

Chinese government provides five kinds of subsidy strategies: scholarships, maintenance grant, apart-time jobs while studying, deductions or exemptions of tuition, and State-Subsidized Student Loan (SSSL). Among these, SSSL is most available to almost students in poverty. The major reason is that eligible students can apply for the loan without monetary limitation. Another reason is that the tuition and dormitory fee are the main component of higher educational expenditure, which is mainly supported by SSSL. Therefore, SSSL might probably eliminate the contradiction between the tuition of higher education and low income.

As we all know, SSSL is multi-win mode: 1)for the poverty recipients of higher education, SSSL help students to avoid the burden of increased tuition; 2)for the higher colleges, SSSL can solve the problem of poor students tuition barriers; 3) for the state, SSSL are able to relieve pressures on national budgets by facilitating greater cost of enrolment expansion; 4) for the society, harmony aim can be achieved in the equality of educational opportunity and social fairness.

2 Enforcement and Reform on SSSL

After the regulations on SSSL management were suspended by a joint mandate of the Central Bank, Ministry of Education and Ministry of Finance of China, the mainland attempt on SSSL was carried out in eight cities in 1999. This is the beginning of popularization on SSSL mode. At that time, SSSL was carried out by the Industrial and Commercial Bank of China, the interest burden of loan during SSSL borrowers' schooldays was undertaken by government and the repayment period cannot exceed four years after graduation.

In 2000, the supplementary suggestions of the regulations on SSSL management were announced by a joint mandate of the Central Bank, Ministry of Education and Ministry of Finance in China. After one year, it was decided that the only one bank performed SSSL business extended to four banks -- the Bank of China, The Agricultural Bank of China, China Construction Bank and Industrial and Commercial Bank of China; the SSSL applicants expanded to undergraduates and postgraduates; the college served as introducer and one teacher at Student Affairs Office regarded as witness. At the same time, the regulation was definite that SSSL applicants could not tender Property guarantee. That is to say, SSSL is certificated as unsecured and consumer credit loan, which is supported by government policy.

In 2004, the further improvement of the regulations on SSSL management (for short "SSSL (2004)") was declaimed by the Central Bank, Ministry of Education and Finance of China. The banks with permitting qualification on SSSL business are endowed with the winner in a public bidding, and the actual successful bidder is the bank of China. That means the bank of China obtains the only qualification on SSSL business. A system of SSSL compensation by government is built on for volunteers working at the outlying poverty-stricken regions. And then a risk compensation system is developed. The risk compensation fund is offered by government and colleges that the student borrowers belong to and the distribution of the risk ratio is equal. To some extent in SSSL (2004), the government takes count about the balance mechanism among various interests: the repayment burden of borrowers, the compensation of debt, and risk of commercial bank.

3 The State-Subsidized Student Loan (2004)

The present SSSL system is consequence of the latest reform in 2004. Therefore, the further study SSSL (2004) is necessary.

3.1 Purpose

SSSL keeps invariant in some extent, and the purpose of SSSL (2004) is to help the poor students pay the tuition and dormitory expenses. The financial instruments are analyses to support the development of higher education and safeguards equity on education right.

3.2 Coverage

Considering SSSL performed as a kind of methods in supporting the poor students in higher education, the eligible SSSL applicants are students in general colleges who have difficulties on paying the tuition and dormitory expenses. The coverage of applicants in SSSL (2004) has enlarged to students in higher vocational colleges, postgraduate students and some second degree students. The coverage of SSSL applicants becomes more extensive.

3.3 Operations of SSSL system in China

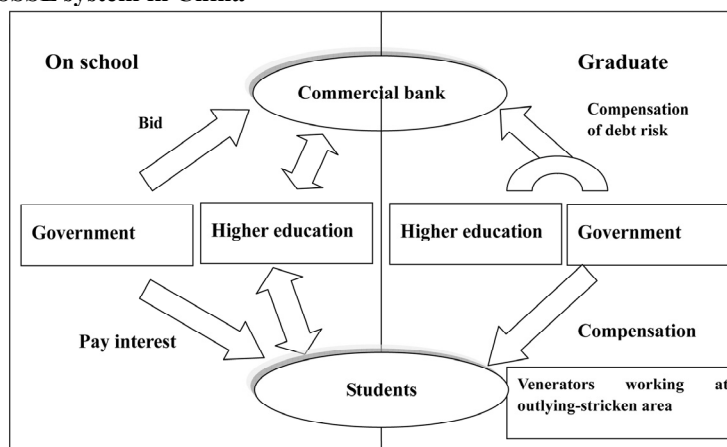


Figure 1 The Process of State-Subsidized Student Loan (2004)

3.3.1 On school (see the Figure1)

Commercial bank: lending money to poor students. The legal status of commercial bank is regarded as a lender, which provides money to students. The limitation of loans is determined by the tuition and dormitory expenses of applicant and the total of loan cannot exceed 6,000 RMB per year.

Students: the eligible applicants are students in higher education who passed the entrance exams but cannot afford the tuition and dormitory expenses. In China, applicants must provide a certification which is signed by the civil administration department above county, to insure the poverty degree of students. Besides certification, application materials also conclude the copies of students card (or enrollment note), students and their parents' Identification Cards. The application from senior class has to provide score sheet with latest one year for the qualified applicants must have no failed courses.

Higher schools: SSSL application can not submit directly from students to commercial bank, but is submitted from higher education. The higher education set up a specialized department in subsidization, named as the center of higher school students' financial aid (CSFA). After collected all application materials in time, CSFA submits these to commercial bank altogether. Compared with large scale of applicants, SSSL is credit of small amount loan. Because the amount of applications is larger, CSFA collect and check up at first before putting together to commercial bank. Although the debtor-creditor relationship is between the commercial bank and the students, the contract both parties are connected indirectly with the higher education that it is a distinctive difference from the commercial loans. The SSSL (2004) has manifested that the higher education serves as introducer between debtor and creditor, such as application submitter, the contract first reviewer, the loan usage supervisor and so on.

Government: The bank with permitting qualification on SSSL business is chosen by government through a public bidding; the interest of SSSL on the borrower in school is paid by finance ministry.

The first step: the government endows a commercial bank with the qualification on SSSL business by public bidding.

The second step: The eligible applicants submit their applications to commercial bank through the higher school of the applicants. Before the application profile sent to the commercial bank, the higher schools have to gather and sort out of materials according to the demands of commercial bank.

The third step: After received the applicable materials, commercial bank approval the contracts. By those approval contracts, the commercial bank carries out obligations on lending. And this course of lending is also through the colleges which applicants belong to for supervising the usage on this loan.

3.3.2 Graduation (see the right side of Figure 1)

Students: after graduation, higher education has no longer performed as medium between the debtor and creditor. Students repay the principal and interest by themselves and the repayment has followed the regulations as follows: students have repaid the interest after graduate immediately and have right to choose any date in two years after graduation as the beginning of repayment. The repayment has four years limitation from the starting day of repayment that students have chosen.

Commercial bank: bank has right to take back the loan principal and interests, and the interest rate is floating according commercial bank rate.

Higher schools: before graduation, higher schools have obligation in collection the student borrower information, which contain the employment intention, working site, kinds of communicative way and other information related to repayment. After graduation, higher schools assist the commercial bank to connect the borrowers who was delay of performance or non-performance on repayment. These tasks could be classified into information collection. Besides these, higher schools have to undertake the half of risk fund.

Government: government undertakes the other half of risk fund and compensates the volunteers working at outlying poverty-stricken regions. The former is in favor of commercial bank's benefit, because that SSSL is put into credit loans without property guarantee and the risk of taking back the loan principal and interests is high. The later is to courage students to devote into the development of outlying poverty-stricken regions. Compensation have two mainly reasons. Firstly, the jobs in the outlying poverty-stricken regions have lower salary whereas SSSL repayments maybe become financial burden on volunteers. Secondly, working in the outlying poverty-stricken area is also responded the call of nation to devoting to the development and improvement of people's lives in the outlying poverty-stricken regions.

4 Discussions of the SSSL mode: Commercial loan or Policy Loan?

In China, besides the Central Bank, People's Bank of China, there are two kinds of banks: commercial bank and policy bank. These two kinds have their own business. In the aspect of credit

business, the commercial bank mainly develops commercial loan and the policy bank mainly operates policy loan. These two kinds of loan have their own characters as follows (Table 1):

Regarding to these two kinds of loans, there are mainly three kinds of opinions on SSSL in China. The first opinion thought SSSL belonged to policy loan, for the aim of the SSSL is to relieve the financial difficulties on children in poverty families. That aim can be regarded as administrative remedy or governmental functions^[3]. The second one believes that the SSSL is commercial loan, for the lender is commercial bank and the operation was according to commercial loan mode^[4]. The third one insists on an alternative opinion that is the SSSL has characters of both policy loan and commercial loan^[5].

Table 1 Comparison the Commercial Loan with Policy Loan

Comparison	Policy loan	Commercial loan
Lender	policy banks	commercial banks
The role of state	subside; administrative interference; take on the bad debt risk	encourage competition
The service object	weak industry and vulnerable groups which are Out of sight of commercial bank	the well or stable-income ;the large and medium-size enterprises
Capital source	financial budget; government policy support.	market distribution
Interest rate policy	preferential interest rate	market interest rate
Risk control	administrative management.; ignore the risk	credit rating; financial reports; mortgage lending
Characters	government's involvement; financial method	pursuit the maximum return on the minimum risk
Problems	lack of the risk consciousness; rent-seeking; obvious against the market	transaction cost are high; information asymmetry; take no consideration of weak industry and vulnerable group

The third opinion does not fully reveal the nature of the SSSL because SSSL is only intermediate form and the essence is obscure. However, the nature of SSSL should be direct and certain.

Between the former two opinions, the author holds that the essence of SSSL is commercial loan. Firstly, the lender is commercial bank, which have the final right of interpretation on the SSSL applications and has veto power independently. Secondly, the interest rate of SSSL keeps consistent with commercial interest rate without any favorable policy. Although the interest on loan is paid by government, interest rate level has no discrimination with commercial interest rate. Thirdly, the risk of SSSL is undertaken by commercial bank mainly. The risk fund sets up just for this function. Fourthly, the operation of payment and delay of performance or non-performance are also the same as the commercial loan. The last, the commercial bank and student borrower are the volunteer for SSSL, in which they all have complete autonomy, and the relationship between them is civilized subjective on debtor-creditor. All these characteristics are not compatible with the policy loan.

5 Conclusions

SSSL is a kind of loans by commercial bank. That is saying that commercial banks lend money to students and the students on debt repay the money to commercial bank with repayment period. On the other hand, SSSL is subsidization from government. The government suggests that the commercial bank lend money to poor students without security. SSSL is the credit and unsecured loans for poor students by commercial bank. In a word, the State-Subsidized Student Loan system in China is in commercial mode.

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The Reform of US Financial Supervision after Sub-Prime Crisis and Its Implications to Chinese Financial Supervision

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Abstract: The financial crisis led by the sub-prime crisis has heavily hits the global economy and makes many countries carefully examine their own financial supervisory systems. Strengthen financial supervision becomes a necessary issue. This paper first talks about the profound reasons of the financial crisis. After that, this paper discusses the reform of US financial regulators after the financial crisis; regard it as a example, trying to figure out what we can learn from it to improve Chinese current financial supervision under the circumstance of current Chinese financial field. Finally, this paper draws this conclusion that it is essential and urgent to clearly define the rights authorized by laws.

Key words: Sub-prime crisis; Financial regulation; Institution reform; Risk management

1 Introduction

There is no denying that it is a globalized economy ear today. The sub-prime crisis starts in US led to a sweeping horrible financial crisis all over the world. As a matter of fact, US may has the most advanced and efficient financial regulation in the world. Therefore, why it fall to prevent the crisis from happening become a question that often asked. One of the main reason of this terrifying financial crisis is the lack of government financial regulation. Enhance the regulation of government on financial and give more power to the government is becoming a regular method for governments in this post-crisis period.

2 A Brief Analysis of Sub-prime Crisis

First of all, what is the sub-prime crisis is crucial. In US mortgage market, sub-prime and prime are two different standards that represent the credit rating of the borrower. Therefore, loans that are offered to borrowers with bad credit record and no stable income by the banks are called sub-prime mortgages. Those loans are usually with great default risk due to the low credit rating and poor ability to pay off the debts of borrowers. But, the interest rate of sub-prime mortgage is usually 2-3% higher compared with normal loans. Thus, the sub-prime mortgage is very attractive business section for banks. Also, its high revenue comes with accordingly high default risk.

It needs to be emphasized that this sub-prime crisis is not caused by one single reason. So many elements combined together then triggered the crisis. In another word, these crises occur due to several different reasons integrated. Several main reasons will be discussed in this paper.

The first main reason should be the burst of the real estate. By reviewing what happened before, we are able to be aware that the real estate bubble burst of the seeds has been planted as early as 10 years ago. At the beginning of 2001, the Internet bubble in United States burst, stock prices fell sharply, plus the 9.11 terrorist attacks, United States economy was in the edge of recession's. In order to stimulate economic development, then-Federal Reserve Chairman Alan Greenspan, taking cuts in a row. From January 3, 2001, to June 25, 2003, the Fed cut rates 13 times in a row, the federal funds rate had declined from 6.5% to 1%. While greatly stimulated the real estate industry, and drove the United States economic development. But it also caused the 'false prosperity' in United States domestic real estate field, which forming the foam. Burst of this bubble started in 2004, from June 2004 to June 2006, the federal funds rate from 1% rose to six, almost back to levels seen the interest rates cut 13 times before. Gradually increasing interest rates to mortgage holders increased the bubble of the repayment burden. Therefore, real estate boom began its recession, the dramatic decline of investment housing demand occurred. In 2006, the new building real estate area fell to 40%. In 2007 the overall home prices in the second quarter its largest decline since 1987. In February 2008, 8.8 million households in the United States were facing unaffordable mortgage. The total amount of mortgage loans in negative equity was up to \$ 2.6 trillion.

The second reason is that banks and other financial institutions are becoming too utilitarian, ignoring the risk of default and operating against basic mortgage loan regulation and rules. Major banks in United States becomes too greedy in getting more revenue. They are stimulated by high profits in sub-prime mortgages. Loan credit approval procedure has been simplified, and credit information lenders don't have strict audit. A large number of unqualified borrowers received sub-prime loans.

Statistics show that the share of sub-prime US home loans rising from less than 5% in 2001 to 23.6% in 2007. At the same time, the absolute amount up to \$ 1.89 trillion in sub-prime loans.

The third reason is a serious dereliction of financial regulators and credit rating agencies. First turning point, is the excessive free of securitization led to a widespread proliferation of financial risks. During the booming period in the real estate industry, financial institutions are holding a large amount of housing loans. In order to increase the rate of capital operation, boost their profits, investment banking industry developed a kind of financial derivative called Collateralized Debt Obligation also known as CDO. Before the bonds put to the market, it requires credit rating agencies to evaluate its quality. Major international credit-rating agencies like Moody's, S&P's and Fitch give the highest credit rating AAA to many actually junk bonds that packed into premium bonds after they received a lot of commissions from investment banks. In this way, investors in every work fields from all over the world have purchased a large number of these junk bonds, resulting in the rapid global spread of the crisis in the future. In this case, once borrowers are unable to repay their mortgages, all institutions and persons involved in this very CDO funds chain will receive one after another severe shock, causing very serious consequences. One example of it is that thousands of people in US got their house taken by the bank due to their lack of money to pay off the mortgage.

Led by the Federal Reserve, the financial regulators of the United States became serious misconduct. United States Government is serve lack of regulation on expansion of sub-prime loans, derivative spread that led investment banking almost totally separate from financial regulation. Those investment banks are able to conduct massive promotion of financial derivatives, and concealing its hidden risk. Moreover, credit-rating agencies do not have any responsibility for their ratings due to the lack of law regulation. Then-Federal Reserve Chairman Alan Greenspan said at a Congress hearing on October 28, 2005: "Fed till 2005 years don not know the exactly scale of the sub-prime lending market in the US." But he also acknowledged that themselves against the practices of derivatives regulation errors. When Alan Greenspan as Chairman of Federal Reserve, he is committed to building a minimum level of government regulation in the second market and even in the whole financial system.

3 The Defect of United States Financial Regulatory System and Its Reform

In November 1999, the United States passed the "Financial Services Modernization Act" put the implementation of the 66-year-old "Glass-Steagall Act" to an end. Restrictions that banking, securities, insurance companies are regulated to separate their business was completed abolished. US financial regulation Institutions finished its functional change from single supervision to "multitasking supervision". United States Federal Reserve is designated as the primary supervisor, the executive regulation of entire financial holding companies, as well as by business line provides the specific person. In the United States under the federal system, laws not only give the Federal Government regulatory functions also authorized the State Government to exercise regulatory duties. The graph below indicates a brief structure of the early US financial regulation.

3.1 Before reform United States financial regulatory system deficiencies:

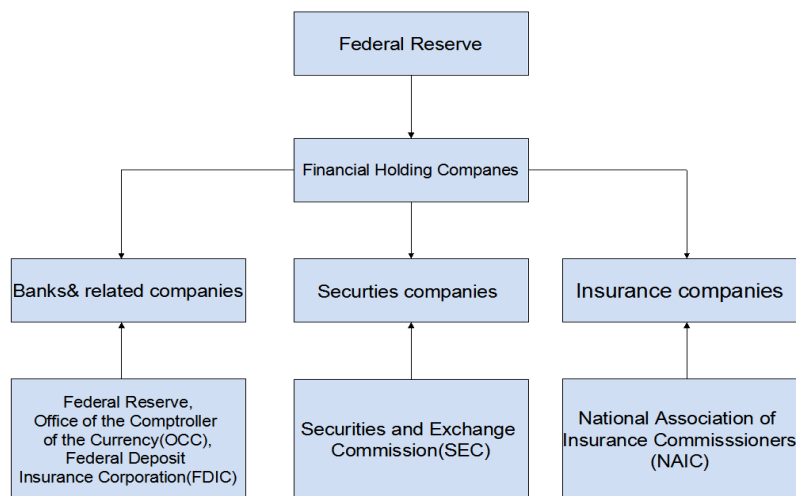


Figure 1 Early US Financial Regulation Structure

(1) Overlapping Regulation

Taking supervision by a number of regulatory regulators is common to United States financial institutions. Multi-head control refers to United States financial regulatory system operate the business separate supervision. In practice, however, the whole financial industry has entered the stage of mixed business field operation; there is an inextricable link between financial products. In this case, there is a clear overlap between different supervisions.

Taking the Citibank as an example, it has to be supervised by a numbers of regulators: The Office of the Comptroller of the Currency(OCC), the Federal Deposit Insurance Corporation(FDIC), Federal Reserve Bank, savings institutions supervision Department, the Securities and Exchange Commission(SEC), and other local regulators by the 50 States. There is a crossover between these institutions and the phenomenon of regulatory overlap. There is no single financial regulator with the necessary authority and information to monitor systemic risk in the market. Between existing financial regulators, they are lack of the necessary coordination mechanisms when dealing with major issues threatened the stability of the financial markets. Due to the different regulatory goals and purposes, regulators of financial institutions to the new standard, submission of information formats and procedures, internal risk control, capital adequacy standards, qualifying for senior managers, financial institutions mergers and acquisitions and so on, there are always different provisions. Large financial groups on the preparation and submission of the annual report per year will have to spend at least 2 months time. Financial institutions are also often the same thing, in the same sector or subsidiaries continuously taking on-site inspections of different regulators.

(2) Regulation omission

In 1998 the Long Term Capital Management (LTCM) suddenly on the brink of insolvency. On such a large scale, such company that deeply participated in Forex market, futures markets, monetary market, securities markets and financial institutions. Surprisingly, there is not one agency claimed that it had implemented regulations. In this LTCM event, many banks operated with the LTCM company. They invest without understanding the details of the case, giving large amounts of loans to it in high risk investments business. Eventually it was revealed the seriousness of the problem until the Federal Reserve investigated. It reflected that financial regulators facing varieties of challenges when fulfilling their supervisory duties, financial regulators need to be constantly innovative and vigilant to identify and respond to potential threats to the financial system risk. As a matter of fact, LTCM was one of the thousands of unregulated hedge funds. Also, we know that in the early 1990 of the 20th century, the United States major commercial banks and securities companies have established derivative products, and vigorously expand structured products business. These structured products is not the traditional options, futures or swaps, but a sort of complex amalgam of derivative products with varieties of basic products. More than 10 years passed, while structured products has become an important source of income for financial institutions, since none of the regulators claim that they have supervisory responsibility for these products, risks revealing and investor protection. Disperse will easily lead to regulatory gaps in the regulatory powers.

3.2 The reform of United States financial regulatory system after the crisis

In March 2008, the United States Treasury Secretary Paulson referred to the Congress the 'Blueprint for Modern Financial Regulatory Reform', which formally starts the new round of financial supervision system reform of United States. The blueprint is divided into three parts: the short, medium, and long-term. The ultimate goal is to establish development status to be goal-oriented and adapted to the financial regulatory system.

Its short-term aim is to strengthen regulatory cooperation and to address the current United States regulation of housing mortgage market lack. Achieved target of main way including three points: (1) Enhanced President financial working group on financial regulatory institutions of coordination role, to strengthening regulatory sector cooperation and information communication. (2) Strengthening Fed in ensuring market liquidity aspects of responsibility, and gradually strengthening Fed in integrated regulatory aspects of functions. (3) Established a Federal mortgage Committee appointed by President, which is responsible for assessment, evaluation and report mortgage financial business progress and license issued situation of each State.

Medium-term objective is to address the reform of United States regulatory duplication in financial regulation, increasing the effectiveness of supervision. Achieved targets include five points: (1) Plans to put original State Bank regulatory functions into federal regulatory system. (2) Recommends the Fed to building a efficient of modern paid settlement system, and established paid settlement system regulatory framework. (3) Recommends the Treasury constructs a national insurance office that provides effective,

unified regulatory rules and framework to all insurance companies. (4) Proposes to merge the Securities and Exchange Commission (SEC) and the Commodity futures trading Commission (CFTC) in order to provide a unified regulation of futures and securities industries.

Long-term goal of the reform is to establish optimal regulatory system to increase United States competitiveness of the financial industry. Means to achieve goals including four main points: (1) Build the optimal regulatory framework. This framework has three pillars: financial market stability regulation, prudential financial regulation and business conduct regulation. (2) To the fed as the Center, building a super regulatory agency responsible for financial stability as a whole. This new institution has the right to implementing the necessary regulatory to all financial Agencies. It is responsible for monitoring systemic risk in the entire financial markets. (3) The blueprint recommends building a prudential financial regulator, responsible for the regulation of access to Government-guaranteed financial institutions, and is responsible for the supervision of financial holding companies. (4) Building a business conduct regulator of financial institutions. To implement appropriate regulatory on financial institutions such as access into the financial sector, selling their products and so on. In order to reach balance between controlling financial risks and encourage innovation.

On this basis, on June 17, 2009, president Obama announced the reform programme as “Financial Regulatory Reform: A New Foundation:Rebuilding Financial Supervision and Regulation” at the White House. This 88-page programme indicated the largest reform of financial regulation in United States since the great depression.

4 Enlightenment on the Reform of Financial Supervision in China

4.1 Laws and rules are the priority to regulators

As can be learned from the reform of US financial regulation system, in order to reduce the moral hazard in financial institutions, we must build a sound market discipline mechanisms, strengthen market supervision.

On June 28, 2004, China Banking Regulatory Commission(CBRC), China Securities Regulatory Commission(CSRC) and China Insurance Regulatory Commission(CIRC) officially announced the three financial regulators financial regulation Division memorandum (will be called ‘Memorandum’ in further parts). In the form of system gave the joint meeting of the regulatory system: positive coordination, avoid duplication of regulatory vacuum and regulatory mandates. Thus, the joint meeting of the regulatory system was finalized in the form of the ‘Memorandum’, it is not a law, does not have the constraints of three capabilities. Selective persistence of law enforcement in the area of financial regulation in China, for ineffective the ‘Memorandum’, its just as likely to be selective implementation of even a virtual reset scheduled convening of a joint meeting of the monitoring on a quarterly, but had missed 18 months. Therefore, administrative regulations are necessary for the clearly effectiveness of the ‘Memorandum’.

4.2 Joint regulatory Conference and the perfection of the memorandum

Joint regulatory conference system under the ‘Memorandum’ was flawed: (1) From the view of participating, the third level sector differences was not established to address the meeting mechanism, differences only reported to the State Council to make the final decision while the joint meeting does not have the decision-making functions of the dispute. (2) On the supervision of financial groups by, the provisions of the memorandum on the financial holding company of the group based on the nature of their principal business, vested in the appropriate regulatory bodies, the relevant body, the business regulation of the financial holding company, implemented according to the nature of the business-industry regulation. But this Division is not reasonable, financial holding company may itself only to the subsidiaries of the group administration do not carry on specific business, while there was no clear division of primary and secondary business in accordance with the criteria, divided by which body of primary and secondary business and major business change and how to deal with such details. (3) The joint meeting of the People's Bank of China to participate as an observer only, neither the rights nor the right to vote and the right of veto. As “maintaining financial stability” was excluded from the joint meeting of the Central Bank, which amounts to a fragmented financial regulation and financial supervision of contact. (4) Joint Conference by the three party set up "joint secretariat" was not a unified standing body. Creation of a unified standing body point is assigned to the permanent establishment is situated in the most important regulator ‘primary facilitator’ status, a clear ‘primary facilitator’ in favor of links related to regulatory forum and the consensus further implementation.

Hence, it is needed to establish a clear legal permission, the entity organization coordinating bodies.

Most suitable for this by the people's Bank of China. primarily for the following reasons: (1) From the historical point of view, the people's Bank of China used to be the only Chinese financial regulators, the three regulatory powers are stripped from people's Bank of China for global financial regulation to seize a significant advantage. (2) From the perspective of supervision fee on sources, the rules of the independent system of financial budget, does not charge a supervision fee, from the impact of sectoral interests. (3) From the efficiency point of view, the People's Bank of China is responsible for setting monetary policy. Monetary policy can not run without good financial information that is complete, timely collection. Therefore for information gathering the most effects agency will be the People's Bank of China. For practical considerations, branches of People's Bank of China are all over the country. Therefore, the People's Bank of China the most appropriate for the information platform. (4) From the level of law, 'maintaining financial stability' is the statutory duty of the Act provides the rules of the People's Bank of China. In 2008, for the functions of the People's Bank of China under the State Council, People's Bank of China 'charge in conjunction with the financial regulators to make regulation of financial holding companies, cross-financing business standards, norms.

5 Conclusions

First of all, the US sub-prime crisis and the following world wild financial crisis has profound influence to every country. Due to the globalized world today, there is no single country that is able to be absolutely isolated from other countries. Once another crisis occurred, we will suffer the damage and lost together. Therefore, the regulatory system in every country should be vigilant from now on in order to detect and prevent the next financial crisis in the future.

Second ,taking the reform of US financial regulation system as a example, we are able to learn that the clear and proper legislation in financial regulation is the priority and very foundation of a efficient, powerful, economic financial supervision system. Also the branches and their layout of the supervision system are equally important. To prevent inefficient supervision, resources wasted, corruption and bureaucrats from happening. In order to reach these goals, the responsible link system should be done. By doing so, when accidents or crisis occur, those who should be responsible will not be away from the punishment of laws. The justice should and will be done in the field of finance.

Third, there is no denying that no body knows what the future is. So what we should do is to build a proper system to prevent the disaster from happening. In the worst case scenario, once the crisis happens, we are able to find out as soon as possible. Thenwe should try to minimize the damage and lost relay on this supervision we built. The world is changing every day, so we should update the system everyday to adapt the changing circumstance in the world.

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Marketing Mix and Adaptation Strategy of Commercial Banks in a Fragile Economy: A Case Study on the Congo D.R.

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Abstract: This paper intends to analyze marketing strategies of commercial banks operating in a sub-Saharan economy such as the Democratic Republic of the Congo. Therefore, by focusing especially on the manner they develop their marketing mix, it will find out if adaptation as a strategy in international marketing has been utilized within the Congolese market. It is assumed that accordingly to the last 32 years of a disastrous political and economic management of this country, the ongoing efforts to restore a good business climate and to minimize the risks on any investment such as banks, the Congo seems to be a perfect case study for a discussion about the adaptation strategy. To apprehend and understand the motives and the canals through which the strategic marketing adaptation has been operated, the environmental analysis using the PEST, the SWOT models and the 4Ps analysis have been used and are sustained by a survey and data collected on 21 banks which were running normally their businesses within the period going from 2001 to 2010.

Key words: Congolese banking system; Marketing mix, Stability; Adaptation

1 Introduction

After several years of economic recession and degradation of the social and political environment, the Democratic Republic of the Congo from the year 2000 began to renew with positive growth trend in the macroeconomic sector whilst some efforts were also made to improve the political environment.

Meanwhile, a critical lecture of the evolution of the global situation of the country shows that the renewal with positive macroeconomic indicators cycle like a positive GDP growth trend or the management of political contradictions doesn't effectively mean becoming stable.

Indeed, stability is a vague concept that lacks a clear understanding as stated by Leon Hurwitz (1972), Emily Paddon and Guillaume Lacaille (2011). Stephen Guest (2008) citing John Rawls noted that in general, stability implies solidity- as in difficult to be swayed- and a dependable continuity. It may also imply relative lack of conflict and harmony. Whence, about Congo's stability, several reports of international organizations such as Refugee Studies Center (2011) stated that the country was coping with a positive propensity of falling under a peaceless state because of the effectiveness of the threats coming mainly from the political situation.

Nevertheless, this renewal with positive economic and political trends, reinforced by the government's desire of improving the business climate, has strengthened investors' wills to direct and locate new investments within the Congo. Banks number grew quickly in the last ten years in this extroverted economic system strongly dollarized, with a national budget supported almost at 50% by international partners, a population counting small incomes almost dollars 180 as minimum wage and low purchasing power.

By assuming that in an unstable or fragile economic and political environment, investors' first move will be to reduce the risk taking, it can be pretended that their actions should be to use prudential measures and to develop product that match with the market.

Through these kinds of flexible strategies, banks may then be prospectors, defenders, analyzers or reactors accordingly to Miles and Snow's classification. (Miles and Snow, 1978) and then, they may be using any other strategy such as differentiation, cost-leadership, segmentation or diversification. How and why strategies have been developed through marketing mix is the focal issue to which the paper is going to answer.

2 Theoretical Views on Adaptation Strategy by the Marketing Mix Canals

As stated by Ai Jun Hou (2001) by citing Bradley (1995), adaptation is related completely, when concerning a marketing mix, to a "localized" marketing strategy. This strategy often used when an enterprise decides to go international stands on the how to adjust marketing mix and marketing strategies to fit the characteristics of targeted market.

The adaptation approach of entering a market can be applied not only on marketing, but also on other

domain of business management such as logistics, operations, organizational behavior, accounting, finances, human resources and etc. This will specifically depend on the market structure, the economic landscape, the political influence, the cultural values, the customers' needs, the human capital and abilities, the religious beliefs, factor endowment, laws and regulations.

However, throughout the marketing mix canal, adaptation strategy will be related to the product, the pricing, the distribution channel and the communication depending on the firms both internal and external environment. So, adapting his business is merely referring to the choice of flexibility rather than rigidity in accordance to the environmental forces.

The environmental view remains extremely important because of the risk that firms have to cope with. In this case of the Congolese banking industry, these risks are financial, economic/systematic (Santomero, 1996) and market risk. Conforming to the Congolese reality, the political risks affect more directly than the other risks. Financial risks that Congolese banks avoid are the credit/loan portfolio risk (customers' insolvency), interest rate risk, liquidity risk (related to provision), and transactional/operational risk.

The systematic/economic risks concern at the first level the monetary risks which are related to inflation, depreciation, foreign exchange rate. At the second step, it concerns more the general productive activities. A decline (depression or recession) in the economic activities will directly affect the banking position and may also be linked to profitability risk and liquidity risk. The market risks may be more relative to customers' perception and competitors' behaviors (anticipation/flexibility).

As stated by Santamero, there are risks that can be absorbed totally or partially, as there are other risks which cannot be avoided. Market risks and financial risks may at some level being avoided or partially absorbed, depends on how the banks set their compliance system and specifically use their R&D department. While the economic risks are so external that they impose themselves to the firms and their effects can be diminished but there is no way to avoid them.

These risks (economic, financial, and marketing) can be amortized or avoided through the marketing mix whenever banks decide to be customer-oriented in setting the product, pricing, places and the promotion. Each canal of the 4P's is referring to specific aggregated values that have to be counted in the analysis as standards of evaluation.

3 Methodology

According to the strategic relationship between strategies, marketing mix and the environment the PEST, SWOT and 4P's analysis are required for a good comprehension of the context in which banks developed their businesses. A ground research focused more on direct observation, interview and collection of document. To have a better view on the field reality a benchmarking on twenty-one banks and a statistical treatment of data collected is used to present the strategic landscape.

3.1 Environmental approaches: PEST and SWOT analysis

3.1.1 PEST analysis : understanding the general environment

At the first glance, it is important to note that the Congo is a sub-Saharan African country located in the central African region and neighbored by nine countries. This country bigger as the Western Europe region passed through terrible events that marked negatively the evolution of the economy.

Looking at a political-legal-security environment, it seems that this country went through difficult period. From its independence day to date, the political history of this state has been strewn with several terrible events which moved the country to the queue of the rank of safe African country. Some events such as nationalization of private enterprises in the earlier 1970s, putsches (1965 and 1997), political legitimacy contestations, riots and pillaging in 1991 and 1993, provinces secessions around the year 1960s (Katanga and Kasai secessions), multiple and continuous wars (1998-2004), a permanent rebellion in the eastern of the country and a politicized institutions.

However, it is necessary to remark that in a global vision of the situation, the country is relatively politically stable, even if this stability is threatened by some selfish politicians 'desire of getting in power.

A report released by Alfie Ulloa, Felipe Katz and Nicole Kekeh (2009) noticed by cons that the political instability as a security issue was not the first constrain for the country development.

From the recent decade, considerable efforts to build trust and new values on national institutions are still on process; also a lot of law measures and counter measures have been taken to provide the country with a solid legal framework for a sustainable development.

Even though major consideration may be generally given to the political and legal aspects, the stability of a country cannot be evaluated on this unique criterion. The economic and social aspects must

necessarily be added to the analysis. The debate does not stand indeed on the preponderance of one factor on the others, but on the global understanding of what is showing up as a global evidence of a national reality.

In the economic framework, a lot of decisions have been made to reinforce the stability of the macroeconomic framework by mastering the general price inflation through a permanent control of the price of the national currency, an improvement of the investment code as a stimulus to the private investments, the fiscal policy, a supervision of the financial intermediaries, a control of the government channel of expenditures and the creation of new partnership with international financial institutions and other financial partners such as the People Republic of China for the funding of development's projects.

In general, macroeconomic indicators show from the year 2000 even a bit earlier from year 1998 a positive trend. From 329% in 2001 to 22% in 2010 the inflation, consumer price index has considerably been mastered. The Gross domestic product trend moved from -6.9% in 2000 to 7.2% in 2010. A positive interest of foreign investors may be underlined because of the continuous growth of FDI such as from USD 80 million in 2001 the total foreign direct investment index reaches the level of USD 2,939.3 million in 2010. The export and import sector presents a contrasted situation strewn with fluctuation in such manner that for instance exports of goods and services varied from 60% in 2007 to 38% in 2010 with an average of 27%; while import of goods and services was about 77% in 2007 and 40% in 2010 with a trend averaged out at 29%.

The big deal with the economic environment is in the microeconomic side. This country is still counted as a poor and under developed country in term of GNI per capita which is US\$ 190, poverty head count ratio at the poverty line almost 73%, household consumption growth level remains very low, human development index equals 0.286 (the lowest level), existence of basic facilities and infrastructures and an unemployment rate over 75% (OECD, 2012) which means that 2,981,250 over 3,975,000 active inhabitants are jobless.

The strong dollarization of the economy due to the use of free circulation of foreign currency within this economy has seriously deteriorated the preference for and the value of the national currency, the Congolese Franc (CDF). Bad money drives out good one, say economists. In other words, monetary issues remain important for the development and the stability of this economy.

Another serious problem of is the existence of underground economy due to higher tax rate, relative hard condition of opening a formal enterprise according to the doing business report and a lack of sufficient funding for start-up business. The financial stability since the last decade depends on the policy of the central bank to control the overflow of dollars and to stimulate the banking of the economic system for higher flow of transaction. Another specific argument that goes against an easy implantation of banks is the saddest history of bankruptcy of several banks and the earlier existence of financial scams.

The social and technological environment of this country is at some level directly affected by the political and economic realities. A country with almost 70 million of inhabitants, the Congo presents itself as one of the giant country in Africa. This population, great potential for sustainable development, is most composed by youth in such as proportion: 53% are aged between 15 and 64, while 44% represents young people less than 14 years old and only 2.6% are above 65 years old.

Two other problems may be highlighted from the demographic approach; these are the psychological stress due to economic and political phenomenon, and the lack of added value on the human capital and knowledge on technology. The access to technology is still be improving with the growth of new foreign investment in all sectors.

3.1.2 SWOT analysis of the Congolese banking industry

The Congolese banking industry is an important part of the financial sector which composed with 21 operating banks belonging each of them to international management strategic channel of different financial corporation.

The history of the Congolese banking industry began in 1909 with the authorization of creating indigenous cooperatives and colonial banks with the prior purpose of doing an intermediation of the mining products and rubber's trade. From that period to date, those institutions are from multiple nationalities Belgian, American, Indian, Spanish, Pakistan, Russian, French, German, South African, Nigerian and others. Almost, 86 % of the banks funds origins are foreign direct investments.

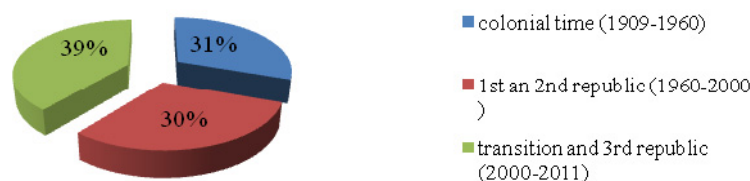


Figure 1 Repartition of Band Creation by Period

Table 1 SWOT Analysis Summary

Strengths	Weaknesses
Existing demand relative economic stability Willing of the government to reinforce the system Existence of investment sector with high of return on investment.	Low diversification High costs (Slight legal system Low coverage Concentration of activities Lack of rigorous supervision and coordinated actions with other structure of the financial sector: insurance, installment purchase. Low quality of information Lack of an efficient risk central
Opportunities	Threats
Development of a particular system innovative diversification Segmentation and specialization of institutions	Political instability None clear delimitation of laws about activities of bank and microfinance NGO and informal structure

3.2 The 4P’s analysis method

It is merely about to utilize the 4P’s marketing mix strategic analysis in a scope that it may become a technical approach for studying and understanding behaviors, objectives, motives and decisions that organizations are developing within the market.

4 Banks Adaptation Strategy: Data Analysis and Results

As said above the survey stands on the manner that marketing mix of Congolese banks is settled according to this country’s environment and the feasible risks to minimize. Each canal of the marketing mix will be globally analyzed according to visible attributes which may probably affect the positioning of banks. The use of 4P’s canal is by then more preferable for this study about adaptation (internationalization) than the 7P’s channel that may be certainly affected by standardization for certain canal such as People, Physical evidence and process.

4.1 Product adapted strategy

As identified during the investigation, the Congolese banking industry propose a product mix of 4 product lines (accounts, credit, cards and services), 13 product lines length (4 kinds of accounts, 4 models of credit, 2 types of cards, 3 sorts of services), 18 product depth representing the 18 active banks operating until year 2010. In total almost 104 products have been recorded within the product width. The four accounts product lengths are current account, saving account, time deposit account and special accounts.



Figure 2 Rate of Product Usage

4.1.1 Special accounts

Special accounts are the symbolism of a strong need of adaptation presented by banks. Only 50% of active banks were developing specific account until year 2010. These accounts are considered as specific firstly because of their target market (religious group as Muslim, student, adolescent, traders such as woman performing the sale shoplifting, employees of enterprises contracting a bank) and the brand which is generally in local language. E.g. account elikya from the lingala language which simply means account hope.

4.1.2 Saving accounts

About the saving account, the adaptation dwells in the fact that bankers set these account in both Congolese currency (CDF), Euro and in US dollar for them to avoid the monetary risk of the money inflation.

Banks promote dollar and Euro as a stable currency. They also propose for certain banks the opportunity of withdrawing money from the saving account to permit by then customers to face undesired situation. The proportion for saving account is like 67% of banks develop this product. Competition within the market affected the interest rate on saving account by increasing it from almost 1% per year in average during the year 2002 to an average of 2 or 3 % per year in 2010 for saving in foreign currency. Savings in CDF are averaging an interest rate of 10% per year as demanded by the central bank for the stimulation of saving and the stabilization in the national currency.

4.1.3 Credit line

Concerning the credit product line, this banking industry proposes four types of credit offer that are consumer loans, investment loans and real estate credit. The important part of this sixteen credit product line depth is presented as cash facilities or banks overdrafts strongly guaranteed at a minimum of 100% by customers. Employer guarantee, mortgage or term deposit are the most desired guarantee required by bankers.

Obviously, banks are strictly protecting their engagement to avoid risk portfolio and the risk of liquidity. According to the economic risks credit are evaluated in dollar and project funding are not too much used. Most repayment period are delimited on two years. Credits are short-termed because of the economic uncertainty on the future. Technically, Start-ups, small enterprises and microenterprises are not well positioned to get loans because of the strong prudential regulation established by banks. Furthermore, banks are fixing a high debtor interest rate on credit at least the double of what they propose for a term deposit accounts. They are obviously low risk-takers.

Statistics on bank card offers shows that for both international and local card of almost 38% banks in average propose cards. This is because of the level of the technology interest and the level of the population income. Congolese consumers are adverse to additional charges, but also the culture and infrastructures (condition) for using banks cards are not developed. Furthermore, only 44% of banks offer ATM, even though not all of them are functional because of the weakness of the energy supply.

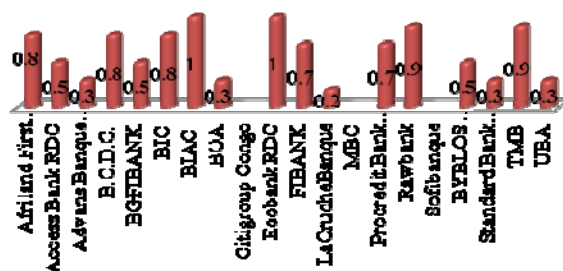


Figure 3 Product Width

4.2 Place / Distribution channel

The investigation counted out almost 216 banks agencies disseminated through the national territory with a critical concentration in certain towns.

There are cities or regions of the country which are containing the largest number of banks represented in the Congolese banking market. The deployment of agencies is following two very simple logics those are profit and dynamics. In banks vision of profitability, agencies are installed at the hot spot of Congolese economic activity. Focal points which can be summarized in two areas of activity which are the Eastern Zone and Western Zone.

The eastern region is dominated by the productive activity such as mining (copper, gold, cobalt, coltan and etc) while the western region is more depending on the administrative, services and trade

(traders, oil and port).

Despite of this reality, there are not too many banks which are represented everywhere, two of the reason being the cost in terms of implementing agencies and the existence of infrastructures. Such cost may be installation fees, taxes, equipment and so on. Almost, 79% of the banks visibility is concentrated in 3 provinces which are Kinshasa, Katanga, Bs-Congo. Provinces like North and South Kivus, Maniema in spite of their mining endowment have not a lot of branches because of problems related to security and lack of infrastructures.

4.3 Pricing adapted strategy

The prices analysis of product is certainly not exhaustive, but it will certainly present an overview of the banking industry. In pricing, it is taken the minimum deposit, fees required to account, the cost of withdrawal, the closure costs, the repayment rate of credits, the price of cards, the transfer fees and other charges for both individuals than for corporations.

The pricing strategy was really differentiated in function of product in such way that is a quiet difficult to identify one strategy for the entire industry. However, it has been really noticed a weave of cutting price down especially for accounts in term of reducing charges on the deposit of customers. Other products such as cards have almost the same standard in pricing; they are depending on the contract banks signed with international suppliers like MasterCard and Visa. So, two strategies may be highlighted in this case. When they are market-oriented strategy, they often do penetration strategy at the first stage and discrimination pricing at the diversification. But, they do also cost-based for such product as card, transfer and credit.

4.4 Promotion strategy

As communication channel, banks in Congo often use three types of features which are direct marketing, public relationship and advertising. Targeting primarily enterprises, banks focus principally on direct marketing through their sales forces. This practices permit to propose concrete offers, to have firm agreement and by then gaining individual customers.

By doing corporate, they ensure to their business a good retail option with low risk-taking. Public relationship is also used to accompany their customer through their social project; it is certainly a way for them to build a good image and so to minimize the market risk related to the customer perception.

4.5 Model summary

This may be seen as simple model presenting the relationship between environmental problems, the risks implied from them and the strategic adaptation approach organized by those commercial banks through their marketing mix

Thus, by differentiating themselves through their product, cost, price, distribution and communicational channels to achieve the goals of good customer satisfaction, good market penetration and the improvement of their business activities.

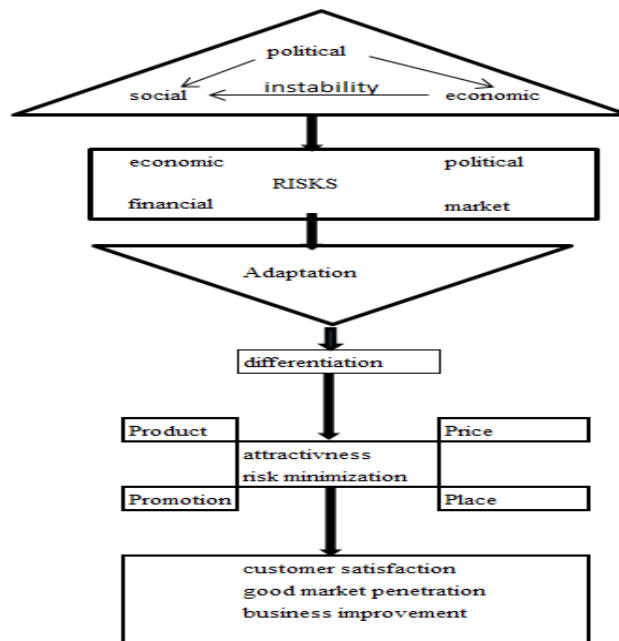


Figure 4 Relationship Environmental Risks-Adaptation-Marketing Mix Strategies**5 Conclusion**

Strategy issues for the development of the banking industry are truthfully essential for the Congo which wants to have a strong financial system. Strengthening the financial system does not only involve the increase in the number of financial institutions which operate within the country; but at a larger scale, the development of products and services that meet the diverse needs of consumers. It is also about servicing this system by strengthening auxiliary structures and building a confident interaction between stakeholders by shaping well the organization of financial intermediaries.

Effectively, the adaptation strategy through the marketing mix has been executed by those international financial firms installed within the Congolese market. The design of their product explains a lot about the nature of the strategic view they developed. In a point of view, about innovating through the 4P's channel, the R&D development became a critical element. It had certainly cost less to banks to minimize the risks by activating efficiently their R&D department.

Daniel Hoewer, Tobias Schmidt and Wolfgang Sofka (2011) stated that the major input in this innovation process is unique knowledge generated by investments in research and development (R&D). They strengthened their argumentation by citing Grant (1996) and Schumpeter (1942) whose summarized ideas are the continuous generation of innovative products, processes and services is widely considered to be the primary key to the competitiveness and growth of firms and of entire economies.

Some innovative ideas such as constructing internal financial market within banks in such a way that banks may just intermediate their customers to enable them to buy stocks or options. In accordance to the need of customers, such credit line based on tangible goods may also be developed to limit amount of cash that banks provide to clients. This will surely increase a B2B or a B2C relationship through banking institutions.

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Selection and Evaluation of the Tenant Enterprises for Industrial Base on FAHP

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Abstract: From the enterprise industrial base perspective, this paper analyzes an evaluation index system model of the tenant enterprises, to evaluate and analyze two selected enterprises by using expert scoring method. Considering the complexity for constructing the industrial base, it uses Fuzzy Analytic Hierarchy Process (FAHP) to determine appropriate weights and analyze them according to these various indicators. Finally it picks out the excellent enterprise which is the most suitable to construct the industrial base.

Key words: Industrial base; Tenant enterprises; FAHP; Index model

1 Introduction

At present, the academic world has paid close attention to the study on industrial base. In fact, a number of industrial bases have been established, while some are being built. Industry base is to focus on specific industry, to make enterprises and institutions together according to the industrial chain or product category, in order to form the enterprise cluster zone with relative concentration layout, matched environment, and the important status in the international or domestic. Aiming at enterprise D1 and enterprise D2, this paper is to analyze how to evaluate and choose tenant enterprises of industrial base which based on FAHP.

2 Constructing and Analyzing the Index System of the Tenant Enterprises

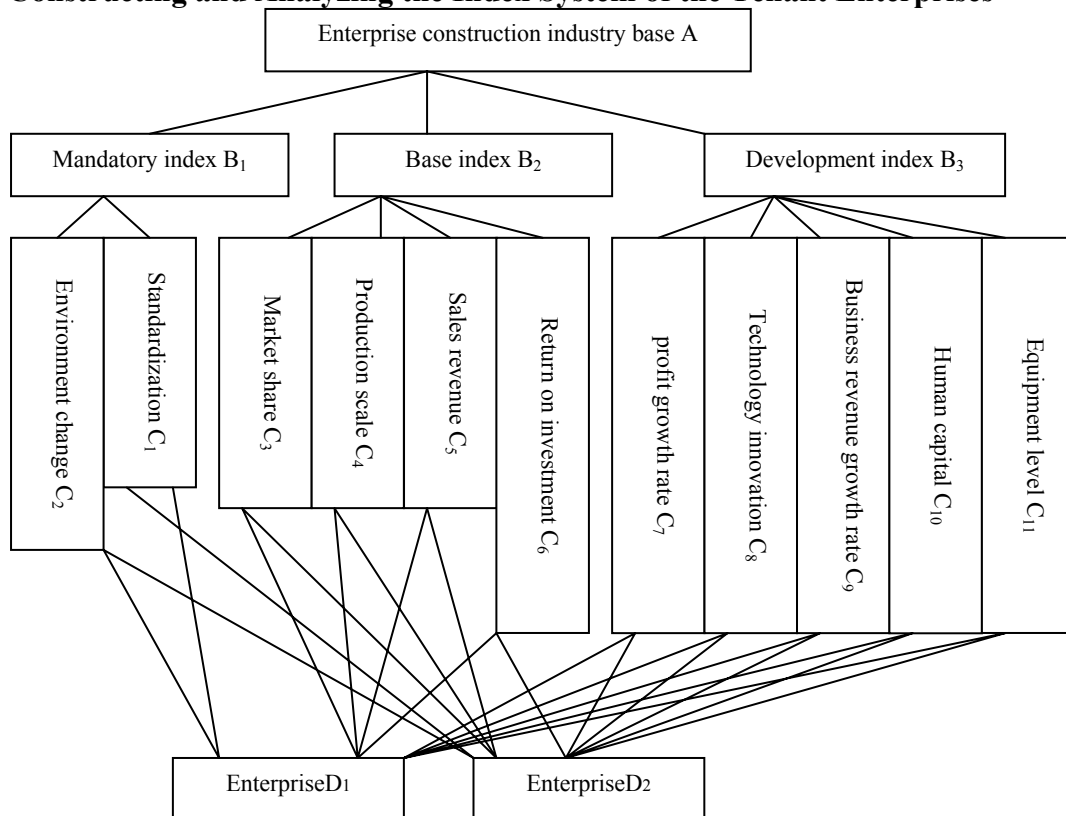


Figure 1 The Tenant Enterprises' Evaluation Index System Model

In order to construct a better industry base, and make full use of the comprehensive benefits of

industry base, it needs qualitative and quantitative research. The conditions of forming industrial base include a long value chain of the industry, the resources and marketing conditions that meet industrial development, technological innovation, and cultural environment and so on. This study is to construct a set of quantitative analysis index system, including mandatory index, basic index, and development index^[1].

The first indicator is the mandatory indicator. As an existing prerequisite, the industrial base construction has a ticket veto position. It mainly meets various environmental indicators and the standardization indicators. Standardized index is mainly based on ISO9000 and ISO14000 certification for evaluation. Environmental indexes like pollutants of exhaust quantity, resource utilization rate and secondary utilization rate, can refer to the industrial standard files.

The second is the basic indicator, such as the marketing share, production scale, sales revenue, returns on investment rate, etc. Basic indicator reflects the enterprise's initial condition. These indicators need to meet the funds of enterprise industrial base construction, and ensure the normally operation of the tenant enterprise at the same time.

The third is the development index. Human capital (engineering and technical personnel proportion, per capita salary, training expenses proportion), technology innovation (research and development funds rate, research personnel rate, new product sales rate, own the patents), equipment level (equipment new degree coefficient), the main business revenue growth rate, net profit growth and so on. These indicators are used to evaluate whether the industry base have a promising future^[2].

According to the above indicators, this study is to build the tenant enterprise' evaluation index system for the industry base, which is shown in Figure 1.

This paper uses FAHP to establish the level of decision-making problem. The related model can generally be divided into three levels, target layer, criterion layer and scheme layer. The first floor is the target layer, enterprise construction industrial base (A), which is objective or ideal result of the decision maker. The second floor is criterion layer, including mandatory index, basic index, development index, which sets out the main evaluation indicator systems of the tenant enterprises. The third floor is sub-criterion layer, including all the indicators involved in the intermediate links to achieve the goal, such as environment change (C₂), standardization (C₁), market share (C₃), sales revenue (C₅), return on investment (C₆), profit growth rate (C₇), technology innovation (C₈), business revenue growth rate (C₉), human capital (C₁₀), equipment level (C₁₁). The fourth floor is scheme layer, including enterprise D₁ and enterprise D₂, all the elements of the layer can contribute to achieve the target selection of various measures, decision or plan. According to the relationship among the target layer, criterion layer and scheme layer, it can get the tenant enterprise' hierarchical system as shown in Figure 1^[3].

3 Using Fuzzy Analytic Hierarchy Process to Evaluate the Tenant Enterprises

Fuzzy analysis method was set up by introducing the idea of fuzzy mathematics to Analytic Hierarchy Process (AHP). On the condition of difficulty to assess a situation, a big system is decomposed into smaller systems, and smaller system is decomposed into the smallest factor, then the minimum factor weight is determined, finally the importance of the whole system is deduced. The study will use FAHP to analyze the tenant enterprises of the industrial base quantificationally. Firstly, it selected 10 experts, used expert scoring with a 10-point scale, and then constructed judgment matrix, calculated the corresponding weights. Finally, it made a reasonable assessment for the two enterprises D^[4].

In order to determine the comprehensive weight of the tenant enterprises' index system, the group will adopt brainstorming method (Delphi) collecting expert opinions, and nominate the relative importance of the tenant enterprises' each index. In order to guarantee real objectivity of evaluation results, experts at home and abroad should thoroughly research the chosen field to deal with various enterprises. Various specific indicators of the tenant enterprises include environment change (C₂), standardization (C₁), market share (C₃), sales revenue (C₅), return on investment (C₆) and so on. The study will respectively determine its weight, and weight the sum to 1. Experts will make the index divide into 10 levels, compared with the each two elements to determine the relative importance and give quantitative values for each grade, then use the 0.1~0.9 to score, each level corresponds to a score. Finally each index weight should multiply with the corresponding level, and then to find out the index score.

The study will make expert members use the 0.1~0.9 scale method to quantify the relative importance of the tenant enterprise' each index, according to the established evaluation index system,

which is shown in Table 1. Then it will use AHP to determine the weight of each index. Finally it will construct the judgment matrix, and use MATLAB software to calculate the judgment matrix^[5].

Table 1 0.1~0.9 Scale

Scale	Definition	Explanation
0.5	Equally important	Compared the two elements, equally important
0.6	Slightly important	Compared the two elements, one element is slightly more important the other one
0.7	Obviously important	Compared the two elements, one element is obviously more important than the other one
0.8	More important	Compared the two elements, one element is much more important than the other one
0.9	Extremely important	Compared the two elements, one element is extremely more important than the other one
0.1,0.2,0.3,0.4	Converse comparison	If two elements compared, get r_{ij} , by compared to get judgment get $r_{ji}=1-r_{ij}$.

$$R = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1n} \\ r_{21} & r_{22} & \dots & r_{2n} \\ \dots & \dots & \dots & \dots \\ r_{n1} & r_{n2} & \dots & r_{nn} \end{bmatrix}$$

When R meet the properties:

- (1) $r_{ii} = 0.5, i=1,2,3,\dots,n;$
- (2) $r_{ij} = 1-r_{ji}, i, j=1,2,\dots,n;$
- (3) $r_{ij} = r_{ik} - r_{kj}, i, j, k=1,2,3,\dots,n$

Namely, R is fuzzy consistent matrix. Therefore, if the tenant enterprises' indicators meet the conditions of fuzzy consistent matrix, it can use AHP to determine the index weight.

4 Using FAHP to Choose the Tenant Enterprise of the Industrial Base Construction

The tenant enterprises' evaluation and selection is a complex problem of multicriteria decision. According to the relevant data of the enterprise, the study uses the data from expert scoring method to construct the corresponding fuzzy judgment matrix, and then establishes the evaluation index weight, finally selects a suitable enterprise for industrial base construction by using FAHP.

Based on FAHP evaluation theory, at first, the study establishes a fuzzy judgment matrix from the target layer to the criterion layer, then calculate the weight as follows.

$$A = \begin{bmatrix} 1 & 5 & 3 \\ 1/5 & 1 & 1/3 \\ 1/3 & 3 & 1 \end{bmatrix} \quad B_1 = \begin{bmatrix} 1 & 2 \\ 1/2 & 1 \end{bmatrix} \quad B_2 = \begin{bmatrix} 1 & 3 & 2 & 9 \\ 1/3 & 1 & 5 & 4 \\ 1/2 & 1/5 & 1 & 3 \\ 1/9 & 1/4 & 1/3 & 1 \end{bmatrix} \quad B_3 = \begin{bmatrix} 1 & 1/3 & 1/7 & 1/5 & 1/6 \\ 3 & 1 & 1/4 & 1/2 & 1/2 \\ 7 & 4 & 1 & 7 & 5 \\ 5 & 2 & 1/7 & 1 & 1/5 \\ 6 & 2 & 1/5 & 5 & 1 \end{bmatrix}$$

$$W_A = (0.637, 0.105, 0.258); \quad W_{B_1} = (0.667, 0.333); \quad W_{B_2} = (0.505, 0.299, 0.138, 0.058);$$

$$W_{B_3} = (0.037, 0.097, 0.537, 0.105, 0.223)$$

It is to use MATLAB software to weight B-C's weight, such as Table 2.

Table 2 B – C's Combination Weight

	B ₁	B ₂	B ₃	Combination weight
	0.637	0.105	0.258	
C ₁	0.667	0	0	0.425
C ₂	0.333	0	0	0.212
C ₃	0	0.505	0	0.053

C ₄	0	0.299	0	0.031
C ₅	0	0.138	0	0.014
C ₆	0	0.058	0	0.006
C ₇	0	0	0.037	0.010
C ₈	0.097	0	0	0.025
C ₉	0	0	0.537	0.139
C ₁₀	0	0	0.105	0.027
C ₁₁	0	0	0.223	0.058

$$U_j = (0.425, 0.212, 0.053, 0.031, 0.014, 0.006, 0.010, 0.025, 0.139, 0.027, 0.058)$$

Then, to establish fuzzy judgment matrix from criterion layer to layer scheme, and to calculate weight;

$$C_1 = \begin{bmatrix} 1 & 2 \\ 1/2 & 1 \end{bmatrix} \quad C_2 = \begin{bmatrix} 1 & 3 \\ 1/3 & 1 \end{bmatrix} \quad C_3 = \begin{bmatrix} 1 & 5 \\ 1/5 & 1 \end{bmatrix} \quad C_4 = \begin{bmatrix} 1 & 1/7 \\ 7 & 1 \end{bmatrix} \quad C_5 = \begin{bmatrix} 1 & 1/9 \\ 9 & 1 \end{bmatrix}$$

$$C_6 = \begin{bmatrix} 1 & 1/7 \\ 7 & 1 \end{bmatrix} \quad C_7 = \begin{bmatrix} 1 & 1/5 \\ 5 & 1 \end{bmatrix} \quad C_8 = \begin{bmatrix} 1 & 3 \\ 1/3 & 1 \end{bmatrix} \quad C_9 = \begin{bmatrix} 1 & 1/5 \\ 5 & 1 \end{bmatrix} \quad C_{10} = \begin{bmatrix} 1 & 1/4 \\ 4 & 1 \end{bmatrix} \quad C_{11} = \begin{bmatrix} 1 & 7 \\ 1/7 & 1 \end{bmatrix}$$

$$w_{C_1} = (0.667, 0.333); \quad w_{C_2} = (0.75, 0.25); \quad w_{C_3} = (0.833, 0.167); \quad w_{C_4} = (0.125, 0.875);$$

$$w_{C_5} = (0.1, 0.9); \quad w_{C_6} = (0.125, 0.875); \quad w_{C_7} = (0.167, 0.833); \quad w_{C_8} = (0.75, 0.25);$$

$$w_{C_9} = (0.333, 0.667); \quad w_{C_{10}} = (0.2, 0.8); \quad w_{C_{11}} = (0.875, 0.125)$$

It uses the MATLAB software to get decision weighted weight, which is shown in Table 3.

Table 3 Target Decision Weight

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	C ₁₀	C ₁₁	Combination weight
	0.425	0.212	0.053	0.031	0.014	0.006	0.010	0.025	0.139	0.03	0.058	
D ₁	0.667	0.75	0.833	0.125	0.1	0.125	0.167	0.75	0.333	0.2	0.875	0.616
D ₂	0.333	0.25	0.167	0.875	0.9	0.875	0.833	0.25	0.667	0.8	0.125	0.384

C-D's combination weight $U_2 = (0.616, 0.384)$

5 Results

From comprehensive evaluation of the target decision, this paper compares the overall weight of enterprise D₁ and enterprise D₂, then the result is $W_{D_1} = 0.616 > W_{D_2} = 0.384$. Meanwhile, according to the mandatory index, basic index, development index of the tenant enterprise, and all the subordinate indicators, including environment change (C₂), standardization(C₁), market share(C₃), sales revenue (C₅), return on investment (C₆), profit growth rate (C₇), technology innovation (C₈), business revenue growth rate(C₉), human capital(C₁₀), equipment level (C₁₁), the results show that enterprise D₁ is more suitable for construction industrial base and it is also good choice .

6 Conclusions

This paper used FAHP to make the corresponding evaluation of the two enterprises by the expert scoring method and finally determined the corresponding comprehensive index weights of the tenant enterprises. Thus it chose the suitable enterprise to build the industrial base. What need to be pointed out is that FAHP still exists a degree of subjective assumption. The evaluation index system constructed in this study is not very comprehensive and remains to be further researched by other experts.

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Research on Undergraduate Technology Innovation Base Construction

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Abstract: It's a practical and feasible method to develop undergraduate's technology innovation awareness that constructing undergraduate technology innovation base, which can help undergraduate overcome disadvantages such low technology innovation maturity or insufficient internal driving force, provide a platform for students exchanging and discussing originality. Combined with the experience of Mechanical and Electronic Innovation Base in Wuhan University of Technology, the paper analyses the characteristics of undergraduate technology innovation and the significance of undergraduate technology innovation base construction, take undergraduate autonomous management as the starting point to explore the new method of undergraduate technology innovation base construction, in order to offer beneficial reference to undergraduate technology innovation system construction.

Key words: Undergraduate; Technology innovation; Innovation base; Construction

1 Introduction

The eighteenth National Congress of the CPC pointed out that technological innovation is the strategic support to improve social productivity and comprehensive national strength, which must be in the core position of national development. Training and bringing up innovative talents, especially innovative engineering talents, is the key of building innovative country, carrying out the strategy of revitalizing the nation through technology and education, and the strategy of strengthening the Country through Talents. At the same time, it puts forward new and higher request for university building undergraduate technology innovation system (Cheng Guangxu, 2011). Construction of university technology innovation base, providing a innovation communication and exercise platform for undergraduate, is one of the most important steps in constructing undergraduate technology innovation system.

Combined with the experience of Mechanical and Electronic Innovation Base (MEIB) in Wuhan University of Technology (WHUT), the paper analyses the characteristics of undergraduate technology innovation and the significance of undergraduate technology innovation base construction, take undergraduate autonomous management as the starting point to explore the new method of undergraduate technology innovation base construction, in order to offer beneficial reference to undergraduate technology innovation system construction.

2 The Characteristics of Undergraduate Technology Innovation

Because undergraduate have scanty experience of life, professional knowledge and personal mental has not yet mature, undergraduate technology innovation has significant characteristics relative to the social technology professionals.

2.1 Coming from the actual life

Undergraduate technology innovation often focus on university grade two and grade three, when they have learned the basic knowledge of the subject system, had considerable understanding about technology innovation, but for the forefront grasp ability is poor, the breadth and depth of social practice await to accumulate, so undergraduate usually use their professional knowledge for technology innovation from the reality of life. The theme of the 6th National Undergraduate Mechanical Innovation Design Competition is “phantom· dream classroom”, which require the content of innovation is “design and manufacture of classroom using equipment and materials”, in order to lead undergraduate carrying out technology innovation activities from the reality of life.

2.2 Active thinking

Undergraduate have mastered extensive basis knowledge and systematic professional knowledge through the systematic professional learning at the university, which is the basis of the open thinking and broad mind (Zheng Yongting, Gao Guoxi, etc, 2010). Compared with adults, undergraduate,

because of age small, wet behind the ears, show curiosity and novelty to surrounding things, and thinking is more active, technology innovation topic tend to design novel, the logic is clever.

2.3 Low Maturity

Undergraduate have active thinking in technology innovation, at the same time means that undergraduate technology innovation is often ridiculous thoughts, couldn't consider the reality of technical conditions. Undergraduate's professional level is at the fledgling stage, and technology innovation belongs to the extracurricular activities, so even if a good idea, many key techniques are difficult to overcome in a short period of time. Then the cycle of innovation projects generally within a year or so, therefore, a lot of technology innovation projects tend to ignore many objective conditions for finishing the project, far less than the level of utility, having low maturity. Taking undergraduate highest technology innovation competition "Challenge Cup" for example, the proportion of the projects which can reach the level of maturity and signed a contract with the enterprises is less than 10% in total number (Ding Sanqing, Wang Xipeng, 2009). If considering the area out of project, "challenge cup" competition project technical conversion rate is far lower than 1%, even less than 1 %.

2.4 Insufficient internal driving force

The rapid development of undergraduate technology innovation benefit from all kinds of technology innovation competition, and technology innovation competition provides project support funds and works display platform for undergraduate technology innovation. However, there will be others points, part of a high standard competition even become the symbol of the strength and the level of university education. Many colleges and universities reward the award-winning students "excused from examination to higher school" or bonuses to encourage students to get good grades in technology innovation competition. Therefore, technology innovation competition has more and more serious utilitarian color. More and more undergraduate involved in the scientific and technological innovation, and tend to incentives as the ultimate goal, but ignore the meaning of scientific and technological innovation itself, leading to the enthusiasm of innovation is just in order to the extrinsic incentives, the internal driving force is insufficient.

3 The Function and Meaning of Undergraduate Technology Innovation Base

Undergraduate technology innovation base is a communicating and developing platform for undergraduate technology innovation, as well as a platform of undergraduate' self management and exercise. With MEIB as an example, the undergraduate technology innovation base is generally responsible for the following work: undergraduate technology innovation promotion and training; organization and declaration of technology innovation competition; cultivation of undergraduate technology innovation talents and management cadres.

3.1 Construction of undergraduate technology innovation base is in favor of strengthening undergraduate's innovation consciousness

The basic starting point of undergraduate technology innovation activity is to enhance students' innovative consciousness, so that the students can grasp problem analysis and solving ability. The priority of undergraduate technology innovation base construction is to promote undergraduate extracurricular innovation, enhance their innovation consciousness. Undergraduate technology innovation base can provide students creative exchange and discussion platform, to guide students in learning life always have good ideas and put into practice. The process of creative communication and discussion means the more prone to gather effect and produce more creative and more scientific ideas, so as to promote undergraduate extracurricular innovation atmosphere, overcoming creative low maturity and insufficient internal driving force.

3.2 Construction of undergraduate technology innovation base is in favor of improving the students' comprehensive quality

Undergraduate technology innovation activities can not only strengthen them the consciousness of innovation, but also access to scientific research methods, exercise manipulative ability, enhance the unity cooperation spirit, and improve personal comprehensive quality. Universities' all work are around "education", students in the classroom is the easiest way to improve intelligence and knowledge, in the technology innovation activities is personal comprehensive quality and ability of knowledge, and these two is students into the society must have the ability in the future. Construction of undergraduate technology innovation base will also be able to provide display personal ability platform for the students with technology management ability, they can continue to exercise and improve themselves and enhance individual core competencies through organizing technology innovation activities and participating in

technological innovation projects.

3.3 Construction of undergraduate technology innovation base is in favor of construction of study style

Undergraduate technology innovation activity in the final analysis is a process that the students convert their mastery of the knowledge to practical problem solving skills or tools based on real life observation. Students who want to a breakthrough in technology innovation activities, should study hard in the classroom, master more knowledge, and improve their learning ability and breadth of knowledge. When more and more students devote their energy to technology innovation, under the interweavement, the time they spend on the Internet, shopping and leisure will be reduced. Gradually, major learning and technology innovation will form a virtuous cycle, and then school style of study will be constructed well.

4 The Method of Technology Innovation Base Construction

MEIB in WHUT founded in 2011, is responsible for various innovation competition preparation, declaration and the instruction work, which is the innovation platform of students' self management and improvement. Since MEIB inception, it constantly explores new ways and method to construct innovation base, accumulates a wealth of experience.

4.1 Perfecting base management team

Perfecting the management team in undergraduate technology innovation base, is to abandon the past management pattern of teacher guidance, students follow, form the management methods that students autonomous management, teacher providing guarantees. The managers in undergraduate technology innovation base are also innovation talents. They belong to different innovation teams, and are divided into affair group, propaganda group and technology group according to the ability, these groups work around the function of MEIB.

Affair group is mainly responsible for base daily transaction processing, such as activity site management, funds management, project management, members of the base management, and other matters; Propaganda group is mainly responsible for base activities publicity and display, such as activity early announcement and publicity, prometaphase of announcement and publicity, game late results publicity and display, base website construction and maintenance management, etc.; Technology group is mainly responsible for the team project technical problems, focusing on studying and learning new knowledge, difficult disambiguation, keep communication with teachers in time, promote good projects.

4.2 Building technology innovation team

Technology innovation activities in general are divided into project driving type, member driving type and team driving type. Project driving type as the name suggests is project dominated, almighty on sucker, which can improve students' competitive consciousness and enthusiasm. But, the type requires much to undergraduate psychological quality so as to be quite unfavorable to the cultivation of for all students. And when after the completion of the project, the staff is dissolved, which is not conducive to innovation. Member driving type is a small team formed by main innovation members, but because students strong liquidity and low technical level, the type is difficult to effective application in undergraduate technology innovation activities.

Team driving type is an undergraduate self-management innovation team which makes major competitions or projects as the carrier, improving learning practice ability as the core. Technology innovation team consists of one or more professional guidance teacher, including a dozen or dozens of students of different grades. Knowledge, information, technology can be shared in technology innovation team, and the member can flow between different teams. The type can overcome the shortage of the above two types, and can ensure the team dynamic and the enthusiasm of students.

4.3 Promoting technology innovation activities

In order to popularize technology innovation knowledge in undergraduates and enhance their innovation consciousness, undergraduate technology innovation base could not confined technology innovation activities to inside, on the contrary, the base should organize a series of technology innovation activities: to attract more students to join the technology innovation team, MEIB carries out the innovation team recruitment at regular intervals, which are innovation team self management. To increase the members' professional technical ability and innovation consciousness, MEIB carries out innovation lectures to members and school students at regular intervals. The lectures invite the teachers with rich experience, the students performed very well in the national competition, technical talents in

social to carry out different themes. In order to improve the innovation level of the project, check the progress of innovation projects, MEIB regularly invited experienced renowned teachers and graduate students as juries to carry out simulation reply, and the reply open to all students, encouraging students view the scene.

5 MEIB Construction Results

So far, MEIB has invited the well-known professor as the core teachers to set up four innovation team; has carried out 11 innovation team recruitments, 7 innovation lectures, and more than 20 innovation simulation replies, attracted more than 2000 students to attend. Taking innovation as a unit, MEIB has collected 194 university independent innovation fund declarations, 19 school innovation cup declarations, 43 national college students' innovative entrepreneurial training program declarations, 108 national college students' mechanical products digital competition declarations, 108 energy conservation and emission reduction competition declarations, and 42 mechanical innovation design contest declarations. MEIB has got 54 university projects and 8 national projects, won 8 provincial awards and 6 national awards, and 602 students attended in total. MEIB has become an influential students' technology society in WHUT, accumulated rich experience in undergraduate technology innovation base, enhanced undergraduates' innovation consciousness within the scope of the whole university, and promoted undergraduate technology innovation atmosphere of the university.

6 Conclusions

Innovation is the soul of a nation, is the driving force for the prosperity of a country. Colleges and universities bear the task of training innovative talents for the great rejuvenation of the Chinese, need to establish and improve undergraduate technology innovation system. Construction of undergraduate technology innovation base is the practical and feasible method to train undergraduate technology innovation awareness, which can provide a creative platform for exchange and discussion. Taking undergraduates autonomous management as the starting point, constructing and managing undergraduate technology innovation base, is favor of improving the comprehensive quality of students and producing more innovation talents for the country, and provide a steady stream of the great cause of rejuvenation of the Chinese nation.

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Mental Health Service System Innovation in University: Application of Case Management

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Abstract: The article mainly made research on mental health service system innovation in university in China. It claimed that improving university mental health education service overall efficacy in China was urgent. An innovation was needed in order to bring better care to the clients, and to improve cost-effectiveness as well. The article suggested applying case management to renew the standard procedures, to make a clear classification to practitioner, and to provide characteristic support to the university students in China. The conclusion of this article was the application of case management in university mental health service system in China would be a worthy and good try.

Key words: Case management; Mental health; Service system; university

1 Introduction

Mental health service in university in China started in the 1980s, developing in the last 3 decades, which met the demands of the fast developing society. Researchers in China made a lot of researches from different aspects, including service content, organizing structure, practitioner, running model, etc. XU Dazhen & XU Guangxin (2007)¹ claimed that university mental health service system must be multiple subjects fundamental, using all possible resources. System context, practitioner cultivation, organization management, curriculum developing, organization reform and staff training were the most important columns. The innovation to the system was aimed to adapt to Chinese local condition on multiple levels. SHI Wenshan & CHEN Jialin (2004)² made research from modern management point of view. They believed university mental health service system should be made up with 3 levels, which were university, grade and class. LIU Keshan (2006)³ observed many universities, and he suggested that the service organization should be established on each 3 levels. ZHANG Dajun (2004)⁴ claimed the purpose of mental health service in university should be cultivate students. It should abide by two principles, which were positively adaptation and actively development. He asserted using simple education approaches to help students, such as invisible influencing, selected training and counseling, meanwhile fully using the power from individual, university, family and community. ZHANG Dajun (2008)⁵ also suggested to establish observation network and responsive system in 3 levels.

The mental health service system was founded earlier in the USA than in China. The system combined resources and power from university, family and the whole society, in which, facilities established by university and community were the core part, and professional service and association were good assistants. Haight, Black, & Sheridan (2010)⁶ illustrated the aim of university service was to meet the help-seeking intention of college students. The service was made of 2 parts, which were psychological counseling and mental health service. The main function of psychological counseling included counseling, coordinating, consulting, appraising and referral. And the functions of mental health service were assessment, consultation, intervention and prevention. Its main clients were students. Sometimes if needed, parents and teachers were involved too.

2 Current Problems in Mental Health Service

2.1 Mental Problems & Mental Illnesses

According to a survey made by Beijing health bureau in 16 universities in Beijing, the ratio of suspended and termination due to mental problems were 37.9% and 64.4%. Mental illnesses had become a main reason for leaving school⁷. A great number of students returned to university from mental hospital needed a long recovery period. They would meet more difficulties and pressure than normal students on environment adaption and interpersonal relationship. Nowadays, in many universities, counseling, crisis prevention and intervention were used to reduce self-injury and suicide. Students in recovery phase seldom received help and support from community. Reports also showed some suicide cases in university occurred during the recovery period, which suggested it might be a weak point in the whole service system.

2.2 Participator's Identification

Counseling was one of the main functions of mental health service, which required professional study and training for a long time. During the session, counselor must abide by ethical requirement, maintaining confidentiality and avoiding dual positioning. In the USA, it usually had 2 teams in mental health service facilities, which were professional team and support team⁸. The professional team was in charge of counseling, made up with people who passed the qualification examination, or had doctoral degree in counseling psychology, clinical psychology or psychiatry. The support team was in charge of reception and background service, made up with people who had been trained on psychological counseling basics. The 2 teams guaranteed service outcome, and made sure that ethical principles could be implemented.

In china, the professional level of the practitioner were raising up. New blood continuously took part in this meaningful career. They usually worked in mental health education center in universities, not only provided psychological counseling, but also gave lessons to students and helped to organized activities, intervened crisis, and dealt with administrative work and etc. The blurry identification often trapped them into dual positioning, made them hard to keep privacy, and finally took damage to the effect of counseling.

2.3 Unsystematically Intervention

University students were still growing physically and mentally. Their mental problems and illnesses were often triggered by various factors. When dealt with them, both individual strength and social environment should be highly considered. Counselors should assess the individual problem in university and social networking atmosphere. Some of the participators in China only evaluated problems individually, which might weak the counseling effect when students faced the actual difficulties.

2.4 Inaccurate Positioning

The basic obligations of mental health service in China were education and administration, with a strong color of compulsory, which was far away from the mental health service's motto of equal and love. Meanwhile, students' self-awareness grew stronger and stronger day by day, moralistic preach and administrative supervision could no longer meet the requirement of college students. The efficacy and constancy of the old service mode was not satisfied neither.

3 Applicability of Case Management in Mental Health Service

3.1 What is case management?

The case management method was a technique and social work approach, which was first introduced in social welfare aiding. It met the multiply welfare needs of the public, and help to promote the service cost-effectiveness, which had been used wildly in hospital, recovery center, and community in abroad.

According to the definition made by American Case Management Association, case management was a collaborative program, which including assessment, planning, implement, collaborating, administration and evaluation to the selected treatment and service. By organizing and using all related resources, the treatment and service aimed in meeting the requirement of individual health needs, improving service quality and creating a cost-effecting healthy caring outcome⁹.

Case management emphasized community caring. It encouraged long-term nursing based on community, asked for a systematically solution with multiple approaches and continuously service. The purpose of case management was to reorganized social resource, to ensure providing professional, continuously and individualized caring to high risk clients, promoting their self-independence and controlling cost¹⁰.

All case management activities were carried out by case managers. They provided long-term and direct help to the clients. Generally speaking, there were 3 patterns of case management, which were comprehensive mode, agent mode and mixed mode. The comprehensive mode meant to provide clients all clinical and support service. The agent mode meant to help clients to seek the service they needed, but with less direct help. And, the mixed mode meant to provide both direct and indirect help to the clients. Patterns selection mainly depended on the level of illness and the size of service facility¹¹.

3.2 Applicability of case management in university mental health service

Broadly speaking, a university could be regarded as a community. Students suffering from mental illnesses or mental problems finished their treatment in hospital and would finally come back to the community. Applying case management to students suffered from severe mental illnesses could be a better way of caring, which asked for a nursing during the whole phases from treatment to recovery. It putted all medical and educational resources in and out the campus, to help students to finish their study

and help to restore their social ability. It might also avoid suicide and self-injurious behavior, and reduce suspended ratio due to mental illness.

There were 2 benefits of applying case management. First, it could clearly identify the counselor's role in university. The counselors were only a team member but not the leader. They just needed to focus on counseling and left administrative work behind to the case managers. This might also avoid dual positioning, and help to build mutual trust between the counselor and client more quickly and easier. Secondly, case management was a systematic solution. It was not only used to gather resource, meet students' requirement, but also helped the students fully developed in the future.

4 Application of Case Management in Mental Health Service

4.1 Service object

The main purpose of applying case management in university was to promote the quality of psychological counseling and therapy, maintain healthy mental status of the students. Fully applying is suggested, but, considering the actual condition in China, the major recipients should be the students with severe mental illness or complex mental problem. With the experience growing and fund increasing, the service objects could be larger in the future.

4.2 Positioning of case manager

In the process of case management, the case manager was in charge of analyzing client's physical and psychological status, assessing client's problems and needs, recognizing and coordinating resources, and deciding the service program and nursing level. The positioning of case manager asked for he/she should have a wide range of knowledge and skill. A good case manager should be acquainted with evaluating problems, running sequence of the related facilities in the community, mastering communication skills with people, to serve the clients well. The best choice of case manager in mental health service organization in university in China should be the full-time staff in mental health education center or the students' tutor who had received basic training on psychology.

4.3 Working pattern

According to the situation in China, the agent mode is recommended to put in use in mental health service facility in university. Case managers were in charge of coordinating resources, helping the students to seek for professional support, observing and evaluating the whole process.

4.4 Working process

The case management of mental health service in university included 7 stages: 1) cases classification and selection; 2) case manager-client relationship establishment; 3) preliminary assessment; 4) service plan-making; 5) resources coordinating & program implementation; 6) process observation & quality evaluation; 7) case closed¹². The whole working process was shown in Figure 1.

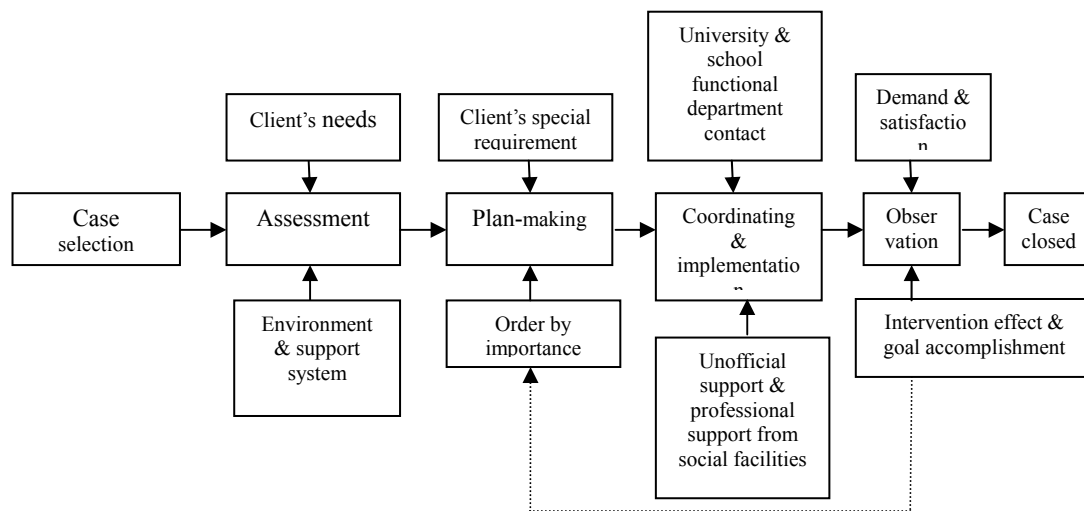


Figure 1 Working Process

4.5 Issues & recommendations

In each process of case management, the issues hereafter should be noticed.

- 1) The cases classification and selection phase. Case manager should filtrate out server cases and

deal with them first. All students suffered from mental illness should apply case management immediately. Some students with complex problems or needed to help with multiply service should apply case management if possible.

2) The relationship establishment phase. The case manager should fully understand the student first. Sometimes, the client's classmates, roommates, tutors, teachers, and family should be involved too. This phase was a key process that establishing a strong connection and deep trust between the case manager and the client. Case manager should understand the importance sufficiently.

3) The preliminary assessment phase. There were 3 questions to be confirmed:

a. What's the problem?

b. What do they need to self-help in their own opinion?

c. What's the obstacle to getting help?

Case manager should confirm the questions before making plan. The possibility of self-help, the resource already had and still needed should be considered. The assessment should be all-around and individually, from inner strength to exterior support.

4) Service plan-making phase. A good case management service plan should include treatment plan, recovery plan and long-term caring plan. A student's participated plan-making was highly recommended, which would help to amplify the power of self-determination, self-selection, self-help and self-actualization.

5) Program implementation phase. This was not only the process of carrying out but also the process of coordinating, intervening and preventing. Case manager played multiply roles, such as coordinator, organizer, promoter, and provide service and resource from in and out the campus.

6) Observation & evaluation phase. Case manager should make sure that the student, the case management team, the help and support provider communicated with each other well. Case managers also had the responsibility to track on program running. Evaluation was a real-time work, which included the set out goal evaluating and the system function monitoring. In university, the result and effectiveness evaluation was the most important part. Generally, it would include student's requirement, satisfaction, goal achievement, service quality, and cost-effectiveness.

7) Case closed phase. When the result of evaluation showed all set out goal had achieved, case manager could discuss with the students whether to close the case or not. After a case closed, case manager should still track on the case for a period time for assurance. Some of the students suffered from server mental disease should never stop tracking on, until left the university.

5 Conclusion

In the late 20th century and the early 21st century, service mode reform spirit raised up in the USA, which asked for changing mental health education into a wild and integrated case management service, by using all social resource to serve the suffering students¹³. Nowadays, university in China asked for a method to guarantee that the most ill students could finish their study, while saving work spend on mental health service as well. In the actual situation, short on man and work fund were quite common in many mental health education center. To apply case management in mental health service in university would be a nice try and solution. It could enlarge the practitioner from only the counselor to all related stuff, and also provide long-term nursing to the service receivers and emergency clients. It would benefit both the university and the students, worthy to be applied and amplified.

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Institutional Innovation: Path Selection for Increasing Soft Power of Culture of Clean Governance*

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Abstract: Today in China, culture of clean governance and the health of Chinese political system are closely linked to each other. As culture of clean governance and political system complement each other, the innovation of the political system can be the key to develop the soft power of culture of clean governance. This paper begins with the obstacles in developing culture of clean governance, followed by discussion of the lack of culture of clean governance in the period of China's social transformation. Then, four paths to strengthen soft power of culture of clean governance are introduced: 1) Innovation in the field of ideology can lead the improvement of culture of clean governance. 2) Eliminate the influence of past institutional change, get rid of path dependence. 3) Establish effective system incentives to positively encourage culture of clean governance. 4) Citizens' participate in institutional innovation is the foundation for improving soft power of culture of clean governance.

Key Words: Culture of clean governance; Soft power; Innovation of political system

1 Introduction

Culture of clean governance consists of culture tradition and culture patterns. In other words, culture of clean governance relies on political impartiality and integrity which is encouraged in Chinese culture and enforced by the legal system. Corruption is a global problem and all countries are facing anti-corruption issues. Promote culture of clean governance is the basis of anti-corruption campaign. In 2010, the Commission for Discipline Inspection of the Central Committee of the CPC along with other six ministries and commissions released Views of Strengthen Promotion of Culture of Clean Governance. It pointed out that promote culture of clean governance is a fundamental and strategic step and of the anti-corruption campaign. The document states that "Promotion of culture of clean governance is a very important part of our advanced socialist culture. It takes advocate honesty and disdain corruption as values and integrates our vision, action and social trends. It reflects people's awareness of clean politics and clean society, basic concepts and spiritual pursuit."

The concept of soft power was developed by Joseph Nye of Harvard University a 1990 book, *Bound to Lead: The Changing Nature of American Power*. He defined soft power as the ability to attract and co-opt rather than coerce, use force or give money as a means of persuasion^[1]. This theory has been widespread since its birth, and attracted attention and great interest from various governments and academia. In recent years, as an important part of soft power, the cultural soft power has gradually been accepted by Chinese academia and government, and influenced national decision-making. Culture of clean governance is an important part of cultural soft power, "If we cannot give life to the culture of clean governance value system, we will get nothing."^[2] Therefore, culture of clean governance and the health of Chinese political system are closely linked to each other; the innovation of the political system can be the key to develop the soft power of culture of clean governance.

2 Obstacles in Improving Soft Power of Culture of Clean Governance

2.1 Old political culture has strong impact on improving soft power of culture of clean governance

Culture of clean governance is part of political culture, feudal political culture still exists in today's Chinese society. For example, rule by man not law, privilege, official-oriented, hierarchy, nepotism and so on. Such feudal political culture still has a big influence on some officials. The outworn feudal soil for corruption, to improve soft power of culture of clean governance the feudal concepts must be eradicated.

Clan is the basic social structure of Chinese feudal society. The so-called patriarchal system takes hereditary as a legal way of power succession, thus the ruling of the country becomes similar to a clan chief rules his clan. Deng Xiaoping indicates in his *Selected works of Deng Xiaoping (Volume II)*, "Even

* Fund Project: Empirical Study on Enhancing Soft Power of Clean governance Culture in Chongqing, Sponsored by Chongqing Social Science Fund(Project No.2009ZD05)

now, the abominable practice of appointing people through favoritism and factionalism continues unchecked in some regions, departments and units.” This shows some cadres have deep-rooted concept of rule of man.

Lasts for thousands years, the Chinese political culture, “subject personality” has deeply influenced people in their characters. This requires people to fulfill their obligations but not encourage them to claim rights, rights and obligations are very unequal. If people claim their right, such action can be considered as “rebel” and is very immoral in Chinese culture. This distorted sense of entitlement hinders the progress of democracy in China, thus makes it hard to foster culture of clean governance in Chinese feudal society. Long-time feudal rule almost makes people lose their sense of entitlement. In such profound feudal culture, it is almost impossible to find value and theoretical support for culture of clean governance. To improve soft power of clean governance, we must eradicate feudalism culture and cannot allow unrestricted power exceed democratic political system. Power should be put into the cage of democratic political system.

2.2 The Openness and Operability of current system need to be further improved

Establish and improve the culture of clean governance system can accelerate culture of clean government promotion. For example, develop implementation plans, performance evaluation system and long-term planning can lay the foundation for a routinized and long term culture of clean governance campaign. However, the overall condition of current system is very imperfect. First, the main reason is the lack of a national level strategy. Although local institutions can develop targeted culture of clean governance promotion plan according to local conditions, from the perspective of guiding ideology and unified objective we need a national level strategy. Second, since there is lag in the result of culture of clean government campaign, it is hard to evaluate in a short time. We should not judge whether culture of clean government campaign is effective just from the superficialities, but should continuously test it in long-term practice. Thus it is very necessary to formulate a scientific and objective evaluation mechanism for culture of clean governance^[3]. Additionally, culture of clean governance campaign needs innovation and improvement during the implementation. This will require development of appropriate incentives for innovation and optimization mechanisms thus to ensure good result for improving soft power of culture of clean governance.

2.3 Other Non-institutional Factors

First factor which affects culture of clean governance is the lack of innovation concept and understanding of soft power. These factors are the cause of formalism in culture of clean governance campaign. Some people do not believe and do not support the campaign, take negative attitude and acquiesce corruption, some even involved in corruption. “Money first”, “Personal interest first”, it seems such kind of values have become the beliefs of some people. Corruption is not condemned but be treated as a sign of “capable”. Some people envy the outcome of corruption and follow this unhealthy tendency. In contrast, people abide by the principles and honest are often seen as “non-mainstream” who is against the trend. This creates public opinion which is not good for fighting corruption. It can be said that the society and public are not all firmly against corruption.

Second, culture and value recognition need to be improved. Because China is a multi-ethnic country, every ethnic group has strong and unique culture tradition. Also different ethnic group has different lifestyle, ideology and cultural traditions, which make their interests, needs and capability different, thus inevitably create different values among different ethnic groups. It is normal that every ethnic group may have different views on culture of clean governance. To promote culture of clean governance, we must consider the influence of culture diversity. Despite there are different voices, some common values like honesty and integrity can play important roles in improving soft power of culture of clean governance. Additionally, in this information age, the promotion of culture of clean governance hasn't found a way to fully take advantage of information technologies. The fast-developing internet provides a new platform to improve the soft power of culture of clean governance, especially the emerging social network which can greatly expand the space of promotion. Currently, the online culture of clean governance campaign is not professional enough; there is still much space for development.

3 The Institutional Innovation Paths for Improving Soft Power of Culture of Clean Governance

3.1 Foster innovative ideas, lead the institutional innovation for improving soft power of culture of clean governance

Innovation in the field of ideology can lead the improvement of culture of clean governance.

First of all, socialist core value system should be used to guide culture of clean governance value recognition and the modern transformation of culture of clean governance transformation. Value recognition is the core value of soft power and the most direct manifestation of culture of clean governance. It influences national public management, mode of production, system establishment, the public's value judgments and behavior.

Under the condition of market economy, the traditional values, spiritual concepts of the public receives selection of the modern society and should be keeping pace with the times. Socialist core value system is not only public's spiritual sustenance and relegation of culture of clean governance, but also the backbone in the process of China's social modernization. From the "National Integrity System" developed by Transparency International, we can clearly see that social value and public awareness are the foundation of National Integrity System. If a country has a strong awareness of integrity, it can strongly support the country's development, that's how soft power of culture of clean governance works; if a country has a complete system of national integrity system, the system can conversely promote the development of culture of clean governance. China's Sixth Plenary Session of the 17th CPC Congress report indicates: "Adhere to the socialist advanced culture, vigorously promote the culture of clean government, take efforts to cultivate integrity values, actively build a positive social environment."

3.2 Eliminate the influence of past institutional change, get rid of path dependence

American economist Douglass Cecil North developed a very important concept from economic perspective: path dependence. He stressed that a country's process of institutional change is susceptible to traditional culture and historical factors.^[4] Although he analyzed a country's attitude towards traditional culture, but also pointed out historical factors' constraint and impact on modern system reform. Path dependence theory explains once the system develops along a certain path and inertia is formed, it will be difficult to replace it with other system or even more preferable system, even get into a vicious circle. Old regime and historical factor have relatively great impact on China's culture of clean governance. Since the Reform and Opening up, economic development is always the first priority of China, the lag in cultural development is restricting the development of economy. The fact of non-balanced development has illustrated that compulsory institutional change have led to the "lock-in" (Douglass North) of culture of clean governance campaign, and this status cannot be neglected.

The promotion of culture of clean governance has been restricted by historical conditions for a long time. In the condition that there is not much institutional demand, the system has long been locked, thus formed dependency and inertia on institutional change. This status, reflected to culture of clean governance, is also very clear. To improve the soft power of culture of clean governance, we cannot only rely on policy guidance and institutional changes to unlock "lock-in" system. We need to introduce external variables, for example new systems new technologies, new models to eliminate the inertia in institutional change and carry forward internal force to develop culture of clean governance. There have been examples of culture of clean governance squares, culture of clean governance comics, culture of clean governance advertisements, culture of clean governance calendars, culture of clean governance mobile news, etc. In 2010, Supervision of the Central Commission for Discipline Inspection named 50 national anti-corruption education bases which expanded the space for culture of clean governance campaign. These various culture of clean governance carriers played importance roles in spreading culture of clean governance value and improving soft power of culture of clean governance, and there is more potential to be discovered.

3.3 Establish effective system incentives to positively encourage culture of clean governance

Any action of human beings must have a motivation, and then the motivation decides action. Incentives is a complete set of rules and regulations, it uses basic ways such like promote, encourage, inhibit, oppose, reward and punishment to realize organizational goals. North believes whether formal and informal institutions can play roles depends on the establishment of effective institutional mechanisms for implementation. And whether effective institutional mechanisms for implementation can realize the organizational goals depends on the satisfaction of people's interests. Establishment of effective institutional mechanisms is the power source of improving soft power of culture of clean governance. Incentive theory indicates that incentives should have dual function of constraints and incentives. On one hand, there should be reverse incentive like limitations, restrictions, oppose and penalties, eliminate hindering factors in improving soft power of culture of clean governance, establish a mandatory or normative incentives. This is an important task to enhance institutional innovation of culture of clean governance; it can transform the passive demand of culture of clean governance development into active demand. For instance, there should be effective reverse incentive to hold back patriarchal ideology like old customs, personal dictatorship, official-oriented thought, subject personality,

appointing people through favoritism and factionalism and so on. On the other hand, we should satisfy people's interests to add positive energy to enhance soft power of culture of clean governance. Power restriction, better social and moral status, harmonious and healthy relationships, cultural and environmental improvement are all examples of positive energy, all of these can encourage the society to sustainably take initiative in improvement of soft power of culture of clean governance. For example, Jiangxi Province uses its rich "Red Resource" to launch culture of clean governance education project. Lots of cultures of clean governance campaigns are organized, public service ads are widely displayed and public opinion guidance mechanism is completed. More than a thousand printed ads, television ads and comic ads for culture of clean governance are created; outstanding works are selected to broadcast in main news media in the province. Among them, *Jinggang Bamboo* and *Taomu Tuiyu* are acclaimed; meanwhile contribute to the "Red Tourism" and local economy. Therefore, to realize the dual function of incentives, we need the combined effect of law, policy, rules and regulations and code of conduct.

3.4 Citizens' participate in institutional innovation is the foundation for improving soft power of culture of clean governance

This is to use legal means to protect the rights of citizen participation, clearly define citizen participation in the content, manner in fostering culture of clean governance, so that the process of citizen participation can have procedures, and fix legal form of the procedures, make the citizen participation legal basis routinized and institutionalized. Deng Xiaoping always attached importance to the system of citizen participation construction, he pointed out: "System is the deciding factor." "Good system cannot make bad people run amok, but bad system can make good people unable to do good, or even go to the opposite."^[5] Therefore, a sound system is an important guarantee of citizen participation. Also, we should broaden the channels for citizen participation to achieve diversity in both participants and participation ways. Further fulfill the role of non-governmental organizations, non-profit organizations, the third sector, community in fostering culture of clean governance. These groups and civic organizations are closely related to citizens, they should play the role of coordinating, integrating citizen interests and demands in the expression processes of public policies. NGOs can effectively prevent political corruption. First, it enables citizens' individual survival and development less dependent on government, thereby reducing opportunity for the government to get excuses to increase the power and escape supervision. The higher level of public self-management and self-service are, the less reason and opportunity for government to go corruption. Countries with higher corruption index, such as Canada and the United States, all have mature non-governmental organizations which are independent well functioning. Secondly, non-governmental organizations have organization system which is "non-hierarchical, decentralized network-style"^[6], reflect the free will of individuals in work, also train its members of the spirit of liberty. Non-governmental organizations are large schools of free education for citizens in practice. Again, non-profit, non-governmental organizations set role models for the whole society to be indifferent to fame and fortune; its members' dedication not only provides the country with a large number of honest people, but also helps to prevent excessive pursuit of money.

4 Conclusion

The culture of clean governance is belong to a part of political culture, its progress facing the resistance come from old system and the opportunity in the future. We want to play the role of anti-corruption and clean-governance in real world, we need to make progress in the culture of clean governance through creating systems. The institutional innovation may provide system power and guarantee for the advanced culture, it also can provide effective pathways to eliminate old systems.

Institutional innovation is a systematic project, the implementation must be gradually and spirally raised. It can not only help to initiate improvement of soft power of culture of clean governance, but more importantly ensure the healthy development of culture of clean governance. To realize the institutional innovation, we should set up creation notion, reduce the inertia of system changing and establish the mechanism of system encouragement. For this reason, we should combine the actual condition of social democratic political development and emerging issues in anti-corruption, carry on in-depth culture of clean governance study, turn the experience into theoretical results through special carrier. Thus, to promote the construction of soft power of clean governance culture, in addition to persist people-oriented and institutional innovation, we should have other innovation carriers or forms, such as encouraging the combination of clean governance culture with history culture, nationality culture, art culture and tourism culture. Our final propose is to realize the ideal goal of using soft power of culture of clean government to continuously promote clean government building.

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A Rustic Opinion on The Quality of Scientific and Technical Periodicals in China

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Abstract: This paper defines several problems on the status quo of China's scientific and technological periodicals by using the principles of management and statistical analysis approach, and objectively analyzes the root cause. These problems include weak influence, low credibility, high page charges, low quality of reviewed papers and long publishing cycle. It proposes an ideal model to improve the quality of China's scientific and technological periodicals in terms of editors' quality, budget, and other aspects, and draws a scientific conclusion that the quality of China's scientific and technological periodicals can be improved only by means of well construction of China Periodicals Phalanx, regular quality examination on scientific and technological periodicals, supervising and urging the implementation of ISO9000 standard series, and intensifying cultivation of editors for scientific and technological periodicals.

Key words: Scientific and technical periodicals; Quality; Opinion

1 Introduction

Through the unremitting struggle by several generations, there has been the rapid growth of scientific and technical journals in China. According to the incomplete statistics, nowadays 8135 sorts of periodicals have been published in the whole country, of which the former make up nearly one third. However, unfortunately, they don't come up to all expectations. In the writer's view, the mathematical model for their quality may be denoted in the formula $Q_k=f(X,U,W)$, in which X stands for the contributions; U the quality of editorial staffs and W the funding for journal publication.

As a scientific worker as well as a long-standing author and reader of scientific and technical journals, here I'd like to express some of my imperfect opinions about the three above factors effective to their quality in hopes of inducing others to come forward with valuable contributions.

2 Present Situations and Problem

Currently scientific and technical journals in China are generally low in level mainly due to the widespread lack of high-standard contributions. Generally speaking, high-standard manuscripts concern not only the degree, the title of the technical post and the subject of research of authors, but the conditions of the units employing those authors. Naturally, those with high degrees and high titles of technical posts normally can win over the important subjects concerning high-tech. Thus, the major undertakers of Natural Science Foundation of China and national level tackle key problems in science and technology own such high degrees and titles. Besides, there is the policy on the encouragement of writing high-standard academic papers in some units. Truly, a scientific and technical journal needs a large relatively stable group of authors with high levels in order to achieve a higher level. But it is just this point that many of our journals are lacking in. Through analysis, the author concludes a few causes for this respect as follows:

(1) The smaller impact of periodicals. Presently the optimum and vicious circles are increasingly severe in the case of absorbing contributions. The high-standard papers are heavily backlogging when they are to be published by such including sources as SCI and EI while they are hardly available for ordinary journals. It is certain that these days the benevolent see benevolence and the wise see wisdom in the right view of SCI and EI. I extremely agree with the opinion of Paper^[1] that they can be neither ignored nor abused since after all, they are the vital basis of indicating how much attention papers can receive. Accordingly, it is somewhat justified that so far numerous units have been adopting them as the important index for measuring the level of science and technology. What's more, a fairly large number of academic papers of China have been issued overseas, which is highly related with their opportunity to be included in SCI and EI. At the moment the greater impact the periodical makes, the more manuscripts it will obtain; and vice versa. For instance, it's evident that some academic journals of colleges and universities are of poor quality which receives far less incoming manuscripts than those needed for issue^{[2]-[4]}.

(2) The bad credibility of periodicals. Some of the periodicals in China are so short of strict regulations and systems such as no reply after receiving manuscripts, no information of including manuscripts for issue or not, unpunctual publication as scheduled and breaking promises to writers that they gradually lose a multitude of writers^[5].

(3) The too high publishing fees. Nowadays the majority of scientific and technical journals in China charge the printed page a definite sum of fees, some of which are even surprisingly high. Take the author with a scientific and technical paper issued once in a famous journal. Unexpectedly, six pages were charged RMB 2400 Yuan as publishing fees. Such high fees don't matter to those writers who can apply for the reimbursement in their own units, whereas they are probably intolerable to those who can't. As a result, the good articles of the latter are likely to be contributed to the periodicals overseas which never charge them this kind of fees.

(4) The poor quality of copy editing. As analyzed in Paper ^[1], many editors in science and technology in China fail to select competent experts for copy editing, so that quite a number of experts' opinions don't accord with facts, which consequently causes many of distinguished papers out of the manuscripts rejected in China to flood overseas for issue. For example, one of the author's colleagues, who had contributed two high-standard papers to a second-class technical journal in China, only to be rejected twice for lack of new ideas, went so angry as to send them both to a well-known international journal in the USA with the result of both of them hitting the target with high estimation.

(5) The pages of journals infested with ads. Supposedly, academic journals, especially those in science and technology, oughtn't to publish any ads for making profits. Nevertheless, a lot of journals in our nation go out of their way to absorb such ads to obtain subsidies for publishing funding. Actually, this objective in mind makes sense but part of the practice concerned is to be deliberated. For instance, thumbing through a relatively renowned academic journal in science and technology at hand, the author found the ads making up almost one third of the pages in the journal, which made it inconvenient to look up the papers inside. In accordance with the preliminary statistics in the reading-room for journals in science and technology in our college, there are X sorts of journals containing X ads, including X sorts with more than X pages of ads making up X %.

(6) The quality of editors. One aspect of improving periodicals in quality is good contributions, while the other important one is the quality of editors of periodicals. Better periodicals in our nation are allocated with a definite quantity of outstanding editors. The relationship between editors and manuscripts is just similar to that between clever women and food material—even best chefs are unable to cook decent delicacies with no good material; nevertheless, good material may hardly make tasty meals with any good chefs. Theoretically speaking, it is hard to become a really qualified editor. Therefore, great editors in science and technology are required to have good writing skills, know or even know well the knowledge of science and technology related with their professions and get familiar with national standards and editing knowledge as well as possess necessary fine personality and virtues. Accordingly, a respectable and admirable editor tends to bring vigor and benefit to a periodical. Regrettably, the current editing staffs in our nation are extremely irregular, concretely shown in a definite quantity of staffs unqualified, some of them with low academic degrees or with no writing skills and others incompetent for their jobs or even with questionable personality and virtues^{[6]-[7]}.

(7) Funding for publishing journals. It is impossible for a journal in science and technology to be published merely based on high-quality manuscripts with no adequate funding because the normal funding is absolutely not small for the editorial staff of this journal. As a result, given the reason of the funding, good editors might quit for the too low treatment or good writers could gradually disappear for the too high publishing fees; on the other hand supposing too many ads were printed in the journal to compensate the inadequate funding, there would be the loss of the large bulk of readers^[8].

3 Suggestions

Just owing to the adequate funding, many foreign periodicals can neither print ads nor charge publishing fees.

Now that China has joined in the WTO, a journal in science and technology will be involved in the competition worldwide just like any other products. In order to swiftly enhance the quality of this kind of journals in China, here the author makes the following suggestions in the light of the problems above:

(1) China's Journals of "Journal Phalanx" must be managed well. 10—20 sorts of international famous-brand journals shall be established as soon as possible to carry out "the Strategy of Quality Products". In the list of China's Journals of "Journal Phalanx" declared by Ministry of Science and

technology of PRC on Sept. 10, 2001 were included 716 kinds of journals in science and technology. Certainly, China must allocate the special funds to provide those journals with the key support. For another, it is indispensable to introduce the competition system and set up the relative index system to make regular inspection with the rigid implementation of the system of the best surviving and the worst dismissed. Moreover, the fair and square and open principle ought to be insisted on in choosing those journals through public appraisal. Currently some of the periodicals included in the Phalanx are greatly out of expectation indeed which have made the unworthy impression of the journal.

(2) The publicity of SCI and EI is to be decreased appropriately. For instance, it is advisable to reduce their weight in establishing the index system of evaluating the level of the scientific and technical research of such research institutions and colleges and universities.

(3) The Editing College of China should be founded or the Editing Department in national key universities with comparatively more mature conditions to inclusively train qualified editors, particularly those of journals in science and technology.

(4) The regular inspection shall be conducted to journals in science and technology. If inspected unqualified, they ought to be given the punishment like warning, imposing fines and even stopping publication in line with the seriousness of their situations.

(5) Journals in science and technology are to be supervised and urged both to carry out and implement ISO9000 and to apply for the ISO9001 Quality System Certification positively so as to firmly improve the quality of those Journals.

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A Critical Analysis of Two Motivation Theories and Their Application

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Abstract: This article describes, compares and contrasts one content theory (Herzberg's two factor theory) and one process theory (equity theory) and believes though the two theories are based on different ideas of motivation, they still have links inside. The article also looks into the application of the two theories in the business world and evaluates their appropriateness for the current business environment through a few representative examples. Based on the study, some useful suggestions are given to help the business to develop a good condition and culture atmosphere for the workers in order to give them a positive attitude, motivate them and makes the company the biggest beneficiary.

Key Words: Motivation; Herzberg's two factor theory; Equity theory; Business environment; Company culture.

1 Introduction

The main purpose of the study is to give a critical analysis of Herzberg's two factor theory and the equity theory and evaluate their appropriateness for current business environment.

Motivation plays a critical role in achieving goals and business objectives and is equally as important for companies that work in a team-based environment or in a workplace comprised of workers who work independently. Trying to understand this complicated and at times contradictory combination of hopes, desires, dreams, past experiences, outside influences, societal pressures, and innate tendencies that we are better to start with motivation theories.

There are many theories of motivation. But there are only two types of motivation theories, content theories and process theories. For content theory, many scholars did their researches on Herzberg's two factor theory. They mainly focus on motivator factors and the relationship between motivation and job satisfaction. For process theory, most scholars examined the equity theory. For recent years, the main focus of researchers moved towards employees and their their motivation factors. Which means most researchers only considered the definition of motivation theory. And only very few people made comparison between the two types of motivation theories and find their links with today's business environment.

In order to attain these goals the plan given here is followed: firstly, a general definition of motivation is given; secondly, definitions on Herzberg's two factor and the equity theories are given, and finally a comparison of the two theories and their application in the current business environment.

2 Motivation

There are lots of definitions of motivation. According to the Oxford English Dictionary, motivation can be defined as "The action or an act of motivating something or someone." Meanwhile, motivation can be considered as "the cognitive decision-making process through which goal-directed behaviour is initiated, energized, directed and maintained" (David and Andrzej, 2010). Robbins (2003) believed that motivation is a process that explains an individual's intensity, direction and persistence of effort towards attending a goal (Robbins, 2003). The lack of motivation or low motivation can lead to counter-productivity behaviours, tardiness for work, absenteeism and many more. Motivation theories are the core theories in organizational behaviour used to deal with the relationships between needs, motivation and behaviour.

There are two types of motivation theories: content theories and process theories. Content theories are "based on drives and needs"(David and Andrzej, 2010). They suggest that people have same needs and explain the factors that motivate them. Process theories, however, mainly focus on figuring out why individuals make different decisions and how their motivations shape when facing changes in offering labour, requirement, payment and reward. So basically, content theories assume that people have the similar set of needs and are to be motivated following the same kind of patterns, whereas process theories concentrate more on the differences between individuals and believe that different measures should be used to motivate various people.

3 Two Factor Theory

A representative example of the content theory is Herzberg's two factor theory. Herzberg, an American psychologist states in his theory that there are certain factors in the work place that may cause job satisfaction (motivator factors) while a separate set of factors can prevent dissatisfaction but cannot increase satisfaction (hygiene factors), which means that "job satisfaction and job dissatisfaction act independently of each other"(Herzberg et al., 1959).

Herzberg analyzed the job attitudes of 200 engineers and accountants, who were asked to tell their feelings about their working conditions and their attitudes towards their jobs. From this test, Herzberg set up the two factors, one is motivator factors, which includes responsibility, advancement, gaining recognition, sense of personal achievement and challenge. These motivators are the primary causes of job satisfaction and positive job attitudes, "because they satisfy the worker's need for self-actualization" (Maslow, 1954). The other is the hygiene factors, which involves salary, security, working conditions, company policy, quality of supervision and more. "It is the motivators that cause satisfaction and have the potential to motivate employees to higher levels of performance because they provide opportunities for satisfaction." (Wilson, 1995)

Though Herzberg's theory has been believed and accepted by most of the managers and researchers around the world, there are still some criticisms to his theory. One is related to his research method saying that Herzberg only used accountants and engineers as his respondents, so there would be a bias in the his research. People in different condition may have different responses to changes. According to a study by Ewan, hygiene factors sometimes can act as satisfiers while motivators sometimes cause both satisfaction and dissatisfaction. For example, poor people may think that a raise in salary (hygiene factor) is more motivating than gaining recognition (motivator factor). So there are limitations to the theory. Secondly, are the people been interviewed telling what they really think? As Vroom and Maier (1961) pointed out that on the one hand, people may be more likely to perceive the causes of satisfaction within themselves and therefore describe experiences invoking their own achievement-that is to say they recognize the advancement in their job. On the other hand, dissatisfaction is not caused by personal inadequacies, but rather by factors in the work environment.

4 Equity Theory

Equity theory is a good example of the process theory. As we all know that inequality is a pervasive fact of our present world and therefore all of us live in unequal societies in this unequal world (John et al., 2009). Based on this fact, process theory of motivation which "argues that perception of unfairness leads to tension, which motivates the individual to resolve that unfairness" (David and Andrzej, 2010) has its sound footing. J Stancy Adams has the most impact on this theory. His most representative two questions are: "What do people think is fair and equitable, and how do they respond when they feel that they are getting far less than they deserve?"(Walster et al., 1978) As we can see, equity theory is more based on individual's own perceptions of what they think is fair or unfair. The core point of equity theory is simple, "the more intense perceived inequity, the higher the tension, and the stronger the motivation to act."(David and Andrej, 2010). There is a famous contribution-reward ratio used to calculate inequity, it is calculated by comparing "my" rewards (pay, recognition) and contributions (time, effort, ideas) to "your" rewards and contributions. When people have perceived inequity, they would act to resolve it until equity is restored.

Why is the equity theory so important in the process theories? The answer is simply: it illustrates that every single person holds different ideas on equity and should have his own perception of motivation, two individuals compared to each other might not feel so equal even their states are similar or even the same in others' eyes, because what fairness is might be different in their eyes. It's also because of this difference, people argue that equity theory has an obvious problem, as David (2010) pointed out that different people think differently when calculating fairness. And also, "There are individual differences in tolerance levels, and not everyone will respond in the same way to a particular level of inequity. The extent to which you believe that there is a valid explanation for inequity will also moderate your response."(David and Andrzej, 2010)

5 The Argument

One might say that these two theories are completely different and have nothing in common, but actually they are linked to each other in some ways. To put them into practice, imagine that you are the manager of a company and you are trying to use these theories in order to improve your working life. To motivate your workers in an effective way, you should make a use of both the content theories and

process theories but not just one. For example, when you get the idea of the two factor theory, you may think that as a manager, to motivate your workers, you should firstly provide them a good job security, a clear job description, a nice working condition and maybe a reasonable salary. And then you consider about their advancement, gaining recognition, sense of personal achievement and give them some challenges. However, some problems might occur when you take the equity theory into consideration, when you put your worker under good hygiene factors, they start to compare with each other, because everyone has his own contribution-reward ratio, they may discover that for example someone who is not working that hard has got a pay rise but they don't, then they sense inequity. So now we can clearly see the difference of these two theories. The two factor theory suggest that all people have the same set of needs and can be motivated in the same way, but equity theory tells us that individuals are different and should be treated using different measures. Another difference is, according to Herzberg, when people move from hygiene factors to motivator factors they are unconscious and everything happens naturally. However, equity theory is not, with the pattern: perception of inequity--experience of tension--motivation to resolve--action to resolve--equity restored. We can clearly see that though this process, it's what we think motivates us, therefore individual's consciousness takes an important part.

6 The Current Business Environment

Many researchers argue that these theories don't fit with the current business environment anymore. I agree that with the development of the society, the enhancement of the level of productive forces and the improvement of technology, the content and structure of physical needs and mental needs are changing constantly, so that hygiene factors and motivator factors may not seem so convincing as before. But I believe there are still something we can absorb from the theory. As we know, even with the most advanced technology and equipment, the most complete material information, without accurate and all-round enforcement of the people, everything would be meaningless. So Firms and enterprises should no longer see "profit maximization" as their only goal, they should consider more about their workers' needs. Considering about the two theories mentioned above, hygiene factors are clear and basic, what firms should be seeking is a way to provide their worker both motivator factors and a new look on equity and inequity. Therefore I believe company culture are more and more becoming the key point of company development.

Company culture is a kind of cultural concept and value which is developed inside the company and is of unique feature. It's the spiritual support of a company. We can take a example from a well-known company-the IBM. IBM designed the new Corporate Trust and Compliance Web site in February 2009, it is a web site that allows the workers to speak out their concerns, such as working conditions, payment or employee misconduct. The idea is to foster a culture of trust and personal responsibility throughout the company. Trust refers to the extent to which we are willing to ascribe good intentions to and have confidence in words and actions of other people(Cook and Wall, 1980). By developing this culture of trust, workers' changed their attitudes towards equity in job and thereby develop personal responsibility, IBM successfully provided the workers a motivator factor which greatly strengthened the workers sense of the masters of the company and therefore enhanced their enthusiasm for the job hugely. Another good case in point comes from Wuhan University of Technology, China. Alongside with a competitive package of salary and bonus for the staff, the university set up a QQ (a popular internet chatting software) group for its staff to exchange their ideas and feelings about their work and life. This measure motivates the staff and offers them a sense of being the master of the university. Through the QQ group, many good ideas and suggestions as well as complaints are put forward which help the administrative sections to take due measures to better the working environment and which in the end benefits the university as a whole. A good company culture should be able to motivate employees as a motivator factor, what's more important, a good company culture can be a factor to shape employees' views on equity and inequity which can give them a positive attitude, motivate them and thereby the company becomes the biggest beneficiary. So the two theories are still helpful with the current business environment, with the idea of company culture motivation being the best example.

7 Conclusion

To the question given, the main differences between Herzberg's two factor theory and equity theory is that Herzberg' theory, as a content theory, assumes that individuals has the same set of needs and can be motivated in the same pattern, whereas equity theory suggests that individuals have their own

perception over fairness and therefore they motivate themselves through different methods. Considering the current business environment, it is the managers' job to develop a good condition and culture atmosphere for the workers, and managers should make good use of both the content theories and process theories but not just one, because "There is, however, no single reliable theory or set of ideas on motivation that can be used as a solution by managers to the problem of motivation." (Wilson, 2010)

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A Discussion on the Dynamic Mechanism of the Management Innovation of Pale-biotic Fossil

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Abstract: This paper discusses the importance of the management innovation of pale-biotic fossils by using the theory and method of the management innovation, thinks that the dynamics of the innovation is the main causes of the occurrence and continuity of the innovation actions, has established the driving source model of the management innovation of pale-biotic fossils, discussed the contents and establishment tactics of the dynamic mechanism of management innovation of pale-biotic fossils, come to conclusion that the real essential driving effect of the management innovation of pale-biotic fossils is the internal dynamic factors, but the external dynamic factors is the external source, resources or opportunities of the management innovation of pale-biotic fossils.

Key words: Management innovation; Dynamic mechanism; Pale-biotic fossil

1 Introduction

The mechanism of the management innovation of pale-biotic fossil is that continuously seek the internal function and operating mode of the innovation under the guiding of the idea of the management innovation of pale-biotic fossil. At present, the capacity of the management innovation of pale-biotic fossil is very weak in our country, the key is owing to the administration departments at all levels don't establish real effective mechanism of the management innovation.

The dynamic mechanism of the management innovation of pale-biotic fossil is dynamic source and effect mode of the management innovation of pale-biotic fossil, is also the mechanism which can drive to achieve the conformity of the resources and high-efficiency operation of the management innovation of pale-biotic fossil and then achieve desired goal. In the activity of the management innovation of pale-biotic fossil, the motive force of the innovation is main cause that the innovation action happens and continues.

2 The Importance of the Management Innovation of Pale-Biotic Fossils

The fossil resources of our country can be said to be the world first-class, the research results of Chinese paleontologists have also enjoyed a high reputation in the world. But it is regretful that the status quo of Chinese fossil protection is still very worrying, main conditions are: the lack of long-term plan, imperfect laws and regulations, the government management is not in place, the protection consciousness of the public is not strong, the relationship between economic development and the protection of the resources is handled improperly etc. In the face of threats from all sides, the most urgent problem Chinese fossils are faced with just is the management innovation.

2.1 The objective request and inevitable trend to promote scientific research and reasonable utilization of pale-biotic fossils

At present, the solution of many important paleontological theories and major geological problems in the world are dependent on the discovery and research of Chinese paleontological data. Only the better protection of the fossil resources and the better management of the fossil resources can provide new, strange, special valuable specimens for scientific research departments to promote scientific research and reasonable utilization.

2.2 To improve the management level of pale-biotic fossils requires the management innovation

By the management innovation of pale-biotic fossils, renew the management concepts, constantly improve the laws and regulations, regulations, improve the organizational structure, innovate the management system, adopt the new management modes and methods, establish the management mechanism beyond the departmental interests, promote the superiority of the natural resource changes into market superiority and economic superiority, constantly improve the level of the management of pale-biotic fossils.

2.3 The best way to promote the comprehensive development of regional economy by taking the

superiority of the resources

The establishment of the protected areas, scientific research bases, museums, geological parks, markets of the pale-biotic fossils can attract many people to visit, appreciate, collect, exchange, make them become the windows of the area, promote the development of the environmental protection, hotel, retail, catering, tourism, transportation, finance and insurance, construction, real estate and other industries.

3 The Content of Dynamic Mechanism of the Management Innovation of Pale-Biotic Fossil

The management innovation of pale-biotic fossil is carried forward by four dynamic mechanisms i.e. the mechanism driven by internal interest, one pulled by the market, one pushed by the science and technology and one encouraged by the policy. But real and substantive driving effect on the management innovation of pale-biotic fossil is the essential factor of internal motive force, external dynamic source is better to say it is external favorable circumstances and conditions than to say it is dynamic factor. Sum up above-mentioned viewpoints, this paper has established the model of driving source of the management innovation of pale-biotic fossil (as Figure.1)

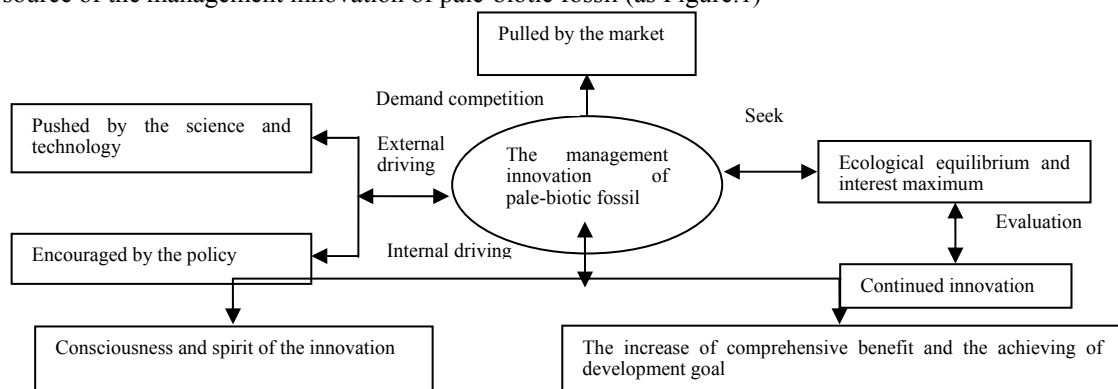


Figure 1 The model of driving source of the management innovation of pale-biotic fossil

The bidirectional arrows are used for connections between all layers or dynamic factors of the same layer, this expresses the motive force of the management innovation of pale-biotic fossil is as an organic whole system, is full of bidirectional mutual effect and close relation between the essential factors, the layers.

3.1 The mechanism driven by internal interest

The driving of the internal interest of the management innovation of pale-biotic fossil stems from seeking the continuous increase and continued development of the comprehensive benefit of the economy, ecology and society, “just because the innovation can give a special increase and temporary monopoly interest requital to successful innovator”^[1], so it encourages the management innovation, generally speaking, the level of the management innovation is higher, the comprehensive benefit is more remarkable. The main body of the management innovation of pale-biotic fossil consists of the government, the comprehensive body of the natural protection area of the pale-biotic fossil (including the state geological park and the state pale-biotic fossil museum) and the public; they have different positions in the course of the pale-biotic fossil management, their corresponding powers, jurisdictions, responsibilities and interests have more difference. The management innovation of pale-biotic fossil is just to break original structure of the power, jurisdiction, responsibility and interest, and then establishes new interest structure according to the requirement of the environmental change. The innovating consciousness and the innovating spirit of the main body of the management innovation of pale-biotic fossil are most important essential factors at the core. The innovating consciousness is a deep understanding of importance and necessity of the management innovation of pale-biotic fossil, is also a strong consciousness to seek and catch new opportunity of the management innovation and to take continuous innovation road under background condition of the times that the mankind seek continued and coordinative development of economy, ecological environment and society. The innovation spirit “which effect on the management innovation, can put it in a nutshell, it is the power of psychology. The innovation is not only a driving of interest, but also a driving of psychology, one of the demands of

higher level of the people. That the main body of the innovation seeks the sense of achievement, the personal value; the sense of responsibility etc. often excites the motive force of the innovation”^[2]. All the administrative department of the government, the comprehensive body of the natural protection area of the pale-biotic fossil and the public hope to make clear the ability and value of the leader or person by successful innovation, so that gain the sense of achievement and the satisfaction of psychology. The management innovation of pale-biotic fossil should also involve that goal of the continuous increase and continued development of the comprehensive benefit is approved by the main body of the innovation. Above-mentioned the driving factors of the internal interest and their mutual effect form a strong and lasting power of the management innovation of pale-biotic fossil.

3.2 The mechanism pulled by the market

The pulling of the market is the innovation caused by the influence of the market demand and the market competition. The market demand is first external force to pull the management innovation. Because the value that the management of pale-biotic fossil exists lies in the satisfying the demands of scientific research, scientific popularization, rational use and market; when the demand of the market changes, the manager will be forced to take the management innovation around the demand of the market for the sake of existence. The market competition is main pressure on the management innovation of pale-biotic fossil, because the market competition is essential characteristics of market economy, objective existence, increasingly presents the trend that the main body has multielement, the means has variety, the level is depth with the developing of the economy, the progress of the science and technology, the changing of the market management mode. On this condition, must continuously take the management innovation of pale-biotic fossil, “adopt the conformity mode and way of the resources that the efficiency is better and the benefit is better than one of the opponent of the competition, can hold the superiority and be not eliminated by the opponent of the competition in the market competition. If it can not create the opponent of the competitive superiority which is different from one of the opponent of the competition, then the final result to wait for it can only be eliminated by the market”^[3].

3.3 The mechanism pushed by the science and technology

The pushing force of the management innovation of pale-biotic fossil stems from rapid development of the science and technology and close relation of the science and technology with the economy day by day, thus it promotes the management of pale-biotic fossil continuously adopts advanced science and technology to make applicable innovation. The science and technology as basic and developing knowledge foundation are another decisive force to pull the management innovation of pale-biotic fossil. On the one hand the technological progress provides necessary material and technological conditions for the management innovation of pale-biotic fossil; for example, variable vacuum scanning electron microscope is applicable to observing the component image of the specimen of the pale-biotic fossil and quantitative analysis of the component part of one; the arranging of the monitoring equipment in an important producing area of the fossils has been forcefully controlling the events of steeling and excavating the fossils. On the other hand the development of the science and technology causes the change of the market demands, for example the state geological park and the pale-biotic fossil museum etc. adopt a great quantity of acoustic, optical, electric, bionic and simulative technologies, these technologies not only strengthen mutual movement sense of the spectators, appeal the spectators, but also produce considerable benefit. This shows, the management innovation of pale-biotic fossil is a result of common effect of the market demand and the science and technology, the market demand decides the direction of the management innovation of pale-biotic fossil and the benefit of the innovation, the science and technology decide successful possibility and cost of the management innovation of pale-biotic fossil. If there is the market demand but is not the guarantee of the science and technology, it is very difficult to achieve the management innovation of pale-biotic fossil.

3.4 The mechanism encouraged by the policy

The encouragement of the management innovation of pale-biotic fossil mainly stems from the policy adopted by the government for encouraging the innovation. The executive meetings of the State Council hosted by Premier of State Council Wen Jiabao had discussed and approved in principle<On Accelerating the Development of Tourist Trade> on November 25, 2009, this document had officially issued on December 1, 2009.

According to investigation, the pale-biotic fossil resources of our country are basically located in poor mountain areas, as a result of restriction of the historical and geographical as well as other conditions, these areas “are not flourishing, are short of development” very seriously. The deciding of this problem i.e. let the poor mountain areas be lifted out of poverty is a long-term and arduous political task in the construction of new socialist rural areas. In new period, the tourist trade becomes a strategic

industry. In this social background, the ecological superiority, the superiority of the national culture, the superiority of the resources are presenting day by day, these superiorities bring new dawn to pass that the poor mountain areas be lifted out of poverty. The developing of the tourist trade has the function to promote the rejuvenating of local culture and the flourishing of national culture, has also special effect to perfect the housing conditions of local people, to stimulate the tourist economy, to provide the employment posts, to increase the income of the residents. If there are only the mechanism driven by internal interest, one pulled by the market, one pushed by the science and technology, but there is not correct and effective encouraging policy of the government, even if the market is very good, the science and technology are very advanced, can not promote initiative innovating of the main body of the innovation. So for the main body of the innovation to take the ecological equilibrium as foundation, above-mentioned four dynamic mechanisms of the management innovation can finally sum up seeking the continuous increase and continued development of the comprehensive benefit.

4 The Establishment of Dynamic Mechanism of the Management Innovation of Pale-Biotic Fossil

According to above-mentioned analysis, think the establishing of the dynamic mechanism of the management innovation of pale-biotic fossil must start from following respects:

4.1 Strengthen the training of the innovating consciousness and spirit of the main body of the management innovation of pale-biotic fossil

The management innovation of pale-biotic fossil is a new question, the innovating consciousness and spirit of the main body of the management innovation of pale-biotic fossil is the key to decide the success or the failure of the management innovation of pale-biotic fossil. The rich and unique pale-biotic fossil resources of our country provides new opportunity for economic development of the area, the seizing the opportunity to advance that the paleontological cause is continuously growing in strength is common aspiration of each main body of the management innovation, for the sake of the achieving of this aspiration, must train strong innovating consciousness and innovating spirit. First must get a clear understanding of the effect and meaning of the development of the paleontological cause; next get a clear understanding of the influence and effect of the main body of the pale-biotic fossil innovation in the course of the management innovation; third must hard study and be brave in practice, so that gain more modern profound professional knowledge, have a strong knowledge foundation and a wide field of vision, train the ability of knowledge conformity, grasp the theory, methods, measures and ways etc. of the management innovation of pale-biotic fossil.

4.2 Continuously improve the quality of the managers

The cultural level and the management level of the managers of the pale-biotic fossils is lower, the management level of the managers is more backward than ones of other industries. This has certain relation with the particularity of the management of the pale-biotic fossils, for the sake of satisfying the requirement of the paleontological cause, must raise the level of the management. Especially strengthen the consciousness of the qualified personnel, put the qualified personnel who have information technology and conformity ability of the management, enforce the law and have a good grasp of the law, implement the policy according to law, strictly act according to the regulations of the law, have very strong professional knowledge quality in the important positions. And let them more participate in the policy decision of the management, stimulate their work zeal, and increase the satisfaction of the qualified personnel doing everything possible. Establish the management ranks to take the personnel in a specific field as the core, to take professional personnel to enforce the law as main body.

4.3 Create the cultural atmosphere to encourage the management innovation

The culture, it is invisible, is also true, the people run into it in the practical life in all matters and all respects. Many useful things in historical culture are needed to be carried energetically forward. When we investigate the birthplace of Hushi Guizhou dragon of Luyin Village of Dingxiao Town of Xingyi County of Guizhou Province, we had seen that since Xianfeng five years of Qing Dynasty (that was 155years ago), the for the sake of protecting the geomancy, protecting dragon mountain and dragon vein, villagers of The Bouyei nationality had established the stele with the regulations of the village and convention of the public, the blasting up mountain and the mining stones is forbidden, so the innovation of cultural atmosphere is the soul^[4]. Be sure to make the significance of the management innovation of pale-biotic fossil clear to people as many as possible, train the consciousness that the whole citizens consciously protect the pale-biotic fossils, bring the enthusiasm of each person of the main body of the management innovation into full condensation to become prolonged tremendous force, form a

atmosphere to dare to challenge all outmoded convention and bad customs (those living on a mountain live off the mountain etc.) in the whole society, initiate to take good care of environment, bring up the life on the earth with loving care, cherish the pale-biotic fossils which are irreplaceable resources, let more people accept the result of the management innovation, form powerful driving force of the management innovation, so that successfully attain the goal of the management innovation of pale-biotic fossil.

4.4 Perfect the laws and systems step by step

The market demand and the market competition are basic external source, driving factor or opportunity of the management innovation of pale-biotic fossil. The science and technology are both basic resource factor and opportunity of the management innovation of pale-biotic fossil and driving force of the management innovation of pale-biotic fossil. The perfecting of relevant laws and systems step by step produces powerful driving to the management innovation of pale-biotic fossil. With the developing of the economy and culture of our country and the improving of legislative technology, great advances have been made in the legislation field of the pale-biotic fossil resources; have basically formed the system of laws and regulations to take <The fossil protection ordinance> as the foundation and the mutual coordination of all management ways (including local ones). But must conscientiously examine uncoordinated factors of all components of the system of laws and regulations in combination with the practice, continuously perfect of the system of laws and regulations; examine mutual coordination of relevant laws and regulations as well as the factors in conflict with that our country had joined the international convention organization, revise in time; must also draw up the management ways for the plan and construction of the museum and the natural protection area, the laws and regulations for the protection of ecological environment and other fields as quickly as possible, including unofficial systems for the ideology and sense.

5 Conclusion

Thus it can be seen that the real essential driving effect of the management innovation of pale-biotic fossils is the internal dynamic factors, in the same way as the driving essential factors of internal interest, there are also inseparable mutual effect and relation between the external dynamic essential factors of the management innovation of pale-biotic fossil, these are also external source, resources or opportunity of the management innovation of pale-biotic fossil.

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Innovations in Public Transportation Privatization in China and Its Reflection

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Abstract: In this paper, case study methods are applied to discuss the Chinese bus service system innovation and privatization reforms. The frustrations in privatization reform are due to Chinese public transportation system which should be partly privatized, rather than fully privatized including government functions, because government plays an important role in undertaking reforms. The failure in Privatization of public transport services does not mean the failure of market mechanism. It is not worth returning to state-owned economies in order to avoid privatization. Lessons should be drawn from failures to try new things, to find a suitable partial market-oriented way to reforms.

Key words: Bus service systems; Privatization; Innovation; Reflection

1 Introduction

In the 1990s, influenced by the rising Western market-oriented reform in public services, Chinese bus services have begun to try privatization reforms. With the continuous development and deepening of reforms, some problems which seriously endanger the public interest gradually exposed. With the privatization of bus services failed in several places, such as, in Lanxi, reforms in privatization of public transport services have fallen like domino. Doubts and denial of market-oriented reforms have increasingly become the mainstream of public opinion. Cheap bus in Beijing and welfare reform in Shanghai have shown that city bus service reform has returned to emphasize more on public welfare. It is necessary to reflect and learn lessons from the failures in privatization reforms of bus services. With the backgrounds that market mechanism is unfavorable and state-owned system returned back to people's sight, this paper will discuss the bus service reform.

2 Status Quo

Privatization can be defined as civil institutions to rely on more, less reliance on government to meet the demand of the public.(Savas,1987)The Chinese scholars primarily discuss whether privatization reform should be introduced in the public transport service. For example, Hong Sheng and Yushi Mao believe that the market mechanism should be introduced in the public transport even though it has natural monopoly nature. The privatized service has efficiency advantage. The market reform can enhance the entire service level. This is the mainstream idea. In the mainstream of supporting privatization, Scholars discuss bus privatization reform mainly from the legal, regulatory and other perspectives. According to Xu Jun, government regulation can guarantee the public benefits and welfare provided by bus services. It can ensure the effective supply of public transport, and also promote the public transport enterprises to compete actively and fairly, thus, to improve operational efficiency. Some scholars also analyzed the reform risk and difficulties in bus services from privatization. Western scholars always analyze the privatization of public service from historical, technological and legislative perspectives. Savas is a pioneer in the privatization experiment; From 1969 he began to explore the issue of privatization of public goods. He believes that the implementation of the privatization programs of public and private sector cooperation is an effective approach to achieve sufficient supply of public goods. In his "Privatization and public-private partnership", from the perspective of the background, theories and applications of privatization, he demonstrated that privatization is the best way to improve the government's regulation. A profound analysis of the problems in privatization movement and its practical and effective solutions are also discussed.(Savas,1999)

3 Applications of Innovations in Chinese Bus Service System Privatization Reforms

Apart from European and American countries, before the Chinese economic reform, the bus service has always been monopolized by the public sector. Public sector monopoly bus service is not the same as the West whose monopoly is because of the rise of private cars or by the impact of natural monopoly theory, but a reasonable application of planned economy in the transport sector. Until the 1990s, with the

emergence of self-CMB, bus service began to break the monopoly, and attempted to undertake privatization reforms. As a slogan, bus service privatization reform once voiced everywhere, called to break the "last brick of planned economy."

3.1 Bus service system reform and innovation

In 2001, it is encouraged nationally that private capital should enter the public service sector. As a county-level city, Lanxi City, in order to make effective use of some state-owned funds for the restructuring of loss-making enterprises and to offer jobs to more than 1,000 employees, Lanxi City bus company has naturally become the first one to start the bus industry restructuring, the auction process in the National Automotive Systems. April 20, 2001, Department of Transportation leadership team of Lanxi City decided to conduct an auction to sell Lanxi Bus Company as a whole in accordance with the corporate restructuring principles "two thorough, two implementations," i.e. state-owned assets completely quit, complete replacement of worker identity and implementation of business entity management, the registered capital prepared. It is Finally, after 69 bids, with the "national bus industry first auction gavel" sounded, Lanxi City bus company changed its name to Changda bus company, as the first Chinese private bus company. The director of the old company Zhichang Ge paid 14,688,000 CNY and became the owners of the company and had 20 years rights to operate the 12 routes. The new founded Lanxi City Changda Public Transport Service limited became the 1st privatized public transport service company.

3.2 Problems and contradictions in reforms

3.2.1 Conflicts with Changfeng Automotive Company

Since the rapid expansion of Lanxi City, the original bus lines must be extended, these extensions or adding a new line damaged the interests of Changfeng Automotive company. From January 17, 2002 Changda Bus Company and Changfeng Automotive company began a five-year dispute. During the five years, the two companies disputed frequently and fought for customers continuously, which seriously affected the development of public transport services and the public travels.

3.2.2 Intensifying conflicts between Shareholders of the Company

In the proposed privatization reforms, Lanxi private enterprises generally lack of funds, very few people have the ability to bid. Zhu Gezhi Chang used "tractor" approach to raise funds to bid. After successful bid, Zhu Ge Zhichang and other 14 small shareholders have jointly set up a joint-stock Changda bus company, and these shareholders also contracted a number of lines. When the bus company reform encountered problems, interests of shareholders have been damaged, dispute of economic interest escalating the conflict, which affects the bus company's operation and development of privatization reform.

3.2.3 Government questioned the bus company's ability

There is a conflict between the public interests in bus service and private interests in bus enterprise. Public benefits is the basic attributes of public transportation which cannot shirk responsibility of ensuring public's travels. It means that the bus lines have to be guaranteed no matter with profit or loss. Private bus services has the nature of satisfying its personal interests first and to maximize the profit. Therefore, when social and economic conflict occurred, private company would choose to stop or reduce new lines when its not profitable. When this happens, the government began to doubt whether the private bus companies can be competent in running business with the public nature like bus services.

3.2.4 Private bus companies dissatisfied with the government

When the bus service reform encountered difficulties, the Government did not give timely help and support. First, government subsidies were not fully in place. Transportation concession for the elderly, the disabled and soldiers should have been subsidized by the government, but the government did not transfer the welfare spending fully after the reform to private bus services company, which led the company faced financial difficulties. Second, the government does not regulate the market. After the establishment, Changda bus company developed rapidly, the need to develop new routes and business scope was pressing. Government did not plan or regulate the entire bus service sector, resulting in Changda bus companies and Changfeng companies disputed frequently, leading to market disorder, which made the bus company's management and operation facing difficulties.

3.3 Results of reform

With no government funding, policy support, Changda Company has been losing money after the reform. With the pressure of rising oil prices, the government was getting more and more worried about Changda Bus Company and decided to buy back the company. On September 15, 2006, Lanxi City decided to repurchase Changda Bus Company. On January 5, 2007, Lanxi city government repurchased the bus company with 18 million CNY which marks an end of the privatization reform in the past 5 years.

4 Reflection on Privatization Reform of Bus Service Systems

After the failure of the privatization of Lanxi transit service system, transit service privatization reforms happened elsewhere have also failed, which makes people began to doubt that the direction of the market is wrong. Then in the service sector, the state-owned power began to appear which is regarded as an inverse trend to what's actual happening in the global market. Since 2006, followed by the non-profitization of Beijing public transit service, many other transit services have been turned to state-owned status. From privatization reform, to failure, and then back to state-owned, it seems that the academia and government have reached a conclusion that the public nature of the transit service should not have market-oriented reforms. State-owned status guarantees its public nature. It seems to be too early to derive the conclusion that the failure of bus service privatization reform is equivalent to that the private power cannot play any role in the public service sector. We should analyze the reasons for failure of the reform, learn lessons, and search for the right path of reform.

4.1 Reasons of privatization reform failure

4.1.1 The reason of reform paved the stone for the failure

Experts believe that the government who wants to throw the burdens away did not pay enough attention on governing the performance of the public transport service, which led to the failure in future. Lanxi Bus Company had good economic returns before the reform. Simply because of the majority-owned subsidiary transportation systems, the entire enterprises are collectively at a loss. In order to make full use of the state-owned funds and settle the employment issues of more than 1000 people, the reform was started. The aim of the reform in Lanxi is more about the financial burden of the government, which means the transit service itself is a trouble and the reform is not in the correct form at the very beginning and the government forgot its governing role and responsibility.

4.1.2 Comprehensive private reform

Lanxi bus service reform is not just to go the road of privatization, but also in a role of fully privatization. Such “sudden change” reform usually cannot succeed. The Lanxi City Department of Transportation sold the whole bus company in auction and tried to implement a comprehensive private reform. In a competitive market, the private bus companies are usually more efficient than government institutions, but the market mechanism is not a panacea. Since the bus service is a kind of public service, the public interest must be taken into account and efficiency and quality must be considered. However, in front of the interests of private companies, such important factors are usually neglected.

4.1.3 Government subsidies are not in place

According to the State Council “Prioritizing the development of urban public transport service”, the bus company should be subsidized by the government because it offers social welfare to the public. (Yu Hui, Qin Hong, 2005) However, the reform in Lanxi was just about throwing off a burden from the view of the government and government did not offer any subsidies in the process of reform. Though the bus service itself can generate some profit, but in order to consider the social welfare, it will have little profit or even non-profit. Enterprises should pursue profit. They can only break-even by reducing wages, increasing ticket prices and operating efficiency. Ultimately, it may lead to disorder and conflicts.

4.1.4 Lack of government regulation

A good regulatory framework is always needed in the process of reform. As a kind of public service, bus service must be regulated by the government to ensure its public properties. The privatization of bus service does not mean that the government can abandon regulation and governing. Government should redefine the functions of supervision, specify the exit of management functions, and strengthen supervision. If the Government could strengthen the supervision of the reform initially, it would not lead to bus services market disorder and vicious competition among operators. Private bus service companies can only operate effectively and efficiently when the regulation is in place.

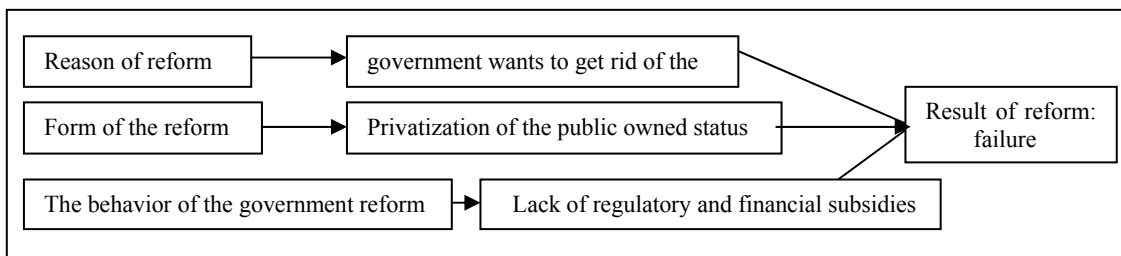


Figure 1 Analyzing the Reasons of Failure of Privatization of Public Transport Service

In sum, the initial causes and motivations of privatization are not correct, which lead to a series of reactions and privatization has become a failure. Only analyzing from the reason and form of reform and the responsibility of government can help the stakeholders to find the right approach to reform and succeed in the reform.

4.2 Lessons learned from the reform

4.2.1 A way of limited market-oriented privatization

Practice has proved that we cannot have bus service 100% privatized but we should follow a limited market-oriented privatization. Western market is the product of its specific historical conditions, and it is built on highly developed of civil society. China's national conditions determine that the bus service can determine that the privatization of bus service is limited to the mechanism of the service, not the overall transportation market. And in affirming the effectiveness of market-orientation, we also see that the market is a double-edged sword. Market is an effective measure to improve public transport services, but we cannot fully rely on market to solve all the problems.

4.2.2 Government is the key to the success of reform

Bus services in the market-oriented reforms, the government is the key to the success of reform. Comparing with developed countries, the market-oriented reforms of China transit service is more focused on government functions in the market. The privatization reform of transit service is based on the fact that government has financial constraints. The reform is a way to get rid of the financial burden. Government exists because it is in charge of public goods and services. Although private companies may have better efficiently than the government, but it cannot fully consider public interests in front of private interests. Therefore, government must play a functional role to ensure the public welfare.

4.2.3 Failure of privatization does not mean the failure of the market

Because of lack of theoretical understanding and guidance in the reform, we have encountered some setbacks. Some people began to suspect that the role of the market, resulting in an argument that the market-oriented reforms have failed. Cheap bus in Beijing and Shanghai city emphasized the return of state-owned transit service. Market-oriented reforms and repeated setbacks make people more skeptical about the direction of market-oriented reforms. Denying transit service market reform is increasingly becoming the mainstream of public opinion. Here we must recognize that the failure of privatization does not mean the failure of the market. Privatization is a specific form of the market reform. The failure of privatization can only prove that this model is not suitable for market-oriented mechanism but cannot prove other market-oriented models will fail.

4.2.4 Path selection of bus service market reform

In addition to the bus service innovation in Lanxi, Shenzhen and Changshu bus service also carried out market-oriented reforms. The two cities did not simply choose between government and market, but take public-private partnership approach. The underlying rationale of public-private partnership mechanisms is that the government and the market can make full use of the unique advantages of themselves and achieve complementary advantages. Public-private cooperation or privatization is both market-oriented reform models. The different is that the public-private cooperation is a limited market-oriented approach. In such a mechanism, private bus transit service becomes a long-term producer. It gives up part of autonomy in exchange for political influence, or other hidden benefits while the government becomes regulators and plays planning, monitoring functions. Bus service public-private partnership is a win-win mechanism which can take the unique advantages of all parties and its ultimate performance can exceed any party acting alone.

5 Conclusion

Though we have faced the failure of privatization of transit service in some places, we cannot simply decline the trend of using market power to operate bus service more efficiently. State-owned service still cannot solve the efficiency issue and the financial burden. We must find an innovative approach and have the courage to improve the public transit service.

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The Innovation of Regulation of Food Safety Management and System Innovation: The System of Public Participation*

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Abstract: In recent years, food safety accidents arise endlessly in China and food safety problems become the most concern of the topics. Safeguarding food safety is involved with national economy and people's livelihood, international image, the Chinese economy's healthy, continuing, and steady development, and social stability. Frequent accidents reflect that the legal system of food safety supervision in our country is still not perfect, the supervision idea is relatively backward, and the supervision system needs to be innovative. Through fact method, probing into the cause of the food safety regulatory weakness, this paper puts forward to establish people-oriented scientific outlook on development and the concept of public participation in social governance, and through the perfect achievements appraisal mechanism, food supervision accountability and oversight daily public participation system to implement the system of public participation, hope to help to solve this problem.

Key words: Food safety; Food regulators accountability system; Food regulatory system of public participation

1 Introduction

Food safety regulatory system innovation—the public participation system, is the key factor to solve the problem of food safety. But for this question, the domestic scholar's research is still in the primary stage, related works is limited. Ceng Na in 2011 on the constitution and administrative law review published research on the public participation in the food safety risk assessment, puts forward the system of public participation should be part of a food safety risk assessment. Wang yue in 2012 in his master's thesis “the analysis the public participation mechanism in the food safety regulation in China” is discussed in detail the concept of public participation system, the necessity, existing problems and improvement Suggestions. All in all, food safety regulation system of public participation is still in its infancy, less attention of scholars, the discussion on theory is not mature and perfect, can't meet the needs of the current social situation of food safety.

The United States food safety public participation has successful experience for reference. The federal “administrative procedural law” made the provisions of public participation and transparency. The us food and drug administration regulations formulated process is in open and transparent way, encourage the relevant enterprises, consumers and other stakeholders involved in regulations formulate and publish the whole process. When issued new regulations and revising the existing laws and regulations, government agencies, usually by issuing “proposed regulations formulated notice” for the public to provide a discussion and comments in advance. It lists the problems, the government suggested solutions as well as the public, please answer a choice problem. Government agencies and then using the information gathered from the public to decide whether to continue and how to develop laws and regulations. All of the important public evaluation must be stated in the final regulations.

2 The Concept of Food Regulatory System of Public Participation

Food safety public participation system, refers to the public as a main body involved in the food safety supervision and management, the realization of social public management rights and the right of supervision of government, improve the efficiency of government food safety regulation, protection of life and health of the public and economic order of the benign operation. Here refers to participate in, not only refers to the public in some administrative areas, limited participation, passive participation in the administrative procedures, but to the public in the administrative decision, administrative enforcement, administrative supervision and administration in the process of full participation, active participation, it is also the process of positive interaction between administrative organs and public.

3 The Necessity of the Implementation of Food Safety Public Participation System

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3.1 Public participation is helpful to eliminate local protectionism

Along with the rapid development of China's economy, people's material and cultural level has been greatly improved, but food safety problems are highlighted in the explosive way in recent years, such as lean meat powder, illegal cooking oil, poisonous milk powder, DiaoBaiKuai cadmium rice, rice, plasticizer, etc. Food safety problems the serious damage to people's life and health, disrupt social economic order, damage the government's credibility, harm the social harmony and stability, damaged the reputation of made in China and the country's image. Many facts show that behind every major food safety crime, there is more or less regulatory oversight dereliction of duty, malfeasance, and local protectionism is one of the important reasons for the regulation of dereliction of duty, malfeasance. Food regulation of local protectionism is refers to the food safety regulators in order to protect the local local economic interests and achievements, to perform the regulatory functions dereliction of duty, malfeasance, leads to low efficiency, inefficient, and even negative regulatory behavior efficiency, cannot make up for market defect and attain the goal of regulatory behavior and the floorboard of the phenomenon. That local protectionism is to protect the illegal enterprise operated, wanton, law-abiding enterprises was cheated, follow, lead to violations of the law and hurt consumer interests and the long-term economic development, damaged the government's credibility and image.

People used to think that the government food regulation organizations take public interests improvement as basic goal, but the reality is often not the case. The government is not only responsible for social and public health, but also responsible for the economic development. Government responsibility clashed in the field of food safety problems is to adhere to safeguard people's health, persisted in GDP is the highest. From a long-term and fundamental view, is not a contradiction between them, the rapid development of economy is for people to live and work in peace and contentment, guarantee people life and health is also to live and work in peace and contentment. But from local and stages, two exists not only conflict, and conflict is intense, seeking rapid growth of GDP is still some government officials and even the entire government system of "consensus", for example. Sanlu milk powder incident, the local government after know the truth, had dragged on for a month to report the state organs at higher levels, and sanlu group should apply "the control and coordination", strengthen the media to review progress made a lot of resistance. As a responsible government departments, the human life in the big problem, not only don't take measures to prevent the harm of further expanding rapidly, rather ill, indulge. Reason is clear, sanlu is Shijiazhuang city leading enterprise, profit tax, sanlu collapsed, the economic development of Shijiazhuang city will be hit hard, followed by a "domino effect", local governments face shame, official's limited promotion. As for the victims of infants and young children, are not considered. Enterprises and local government in certain degree formed the interests of the community, in fact, both for local governments to provide the rolling financial income and the huge jobs, and provides a promotion, the rich, the promotion, both a glorious all glory, broken. Try to ask the government for the enterprise how to form effective supervision? As long as no liability by outside, some local government departments to enterprise's illegal behavior is bound to it.

3.2 The public participation system is conducive to improve accountability by the regulatory authorities

In recent years, each major food safety accidents have been accompanied by massive accountability "storm", but food regulatory dereliction of duty, malfeasance phenomenon common occurrence, still visible accountability didn't play their effectiveness. Consubstantiality accountability is the accountability system design model in our country, this kind of accountability mode leads to the following questions:

One is the consubstantiality accountability subject set up single, the lack of checks and balances. Within the current accountability system mainly is the administrative system of accountability from top to bottom, to high-level leaders often lack of effective accountability system. Leadership is a responsibility, or to evade responsibility, it all depends on the personal leadership consciousness and accomplishment. The smaller is the greater the power, responsibility, and power is smaller, the greater the responsibility, a "scapegoat", even be pitied;

Second, accountability range is relatively narrow, start at random. Consubstantiality accountability is easy to form the content of the accountability, the narrow scope of accountability only lock in major accident, the media exposure has significant social impact, instructions, etc. Such as the 2004 tainted milk powder incident "big head doll", because of the wide media coverage, to the attention of the leadership, Anhui Fuyang city mayor, vice mayor of two and four deputy director is accountability, those responsible have 47 people were detained. Events, while concentrated outbreak in Anhui Fuyang, in Inner Mongolia, Hainan, Shaanxi, Gansu, Guangdong, Shanxi, Sichuan, Chongqing, Heilongjiang

provinces have similar event to occur, due to insufficient media exposure, the impact is not big, accountability is not in place. Passive because accountability, there is no normalized, a large number of useless “agent officer” of “lazy” (don’t perform their duties, the administrative nonfeasance) could not be accountability. In our country has been under the premise of corresponding standards of using food additives, 2005, 2006, 2006, Japan, Korea, Hong Kong SAR have detect malachite green in aquatic products in China exceeds bid, detection of dereliction of duty for such supervision, accountability, failed to put in place.

The third is weaker, superficial formal accountability efforts. Consubstantiality accountability, in the same administrative system internal relations between higher and lower complex and closely related interests, stakes, personal emotional factors such as affected, to a certain extent, there is a brief, intended to protect and avoid trouble phenomenon, to resign, the organization process, an administrative sanction to circumvent the law responsibility and the accountability efforts to weaken, the limelight after, can stage a comeback again.

Four principal officials back anomie. Quick comeback officials quickly, return procedure black-box, not to solicit public opinion, regardless of the feelings, little less than a year, more than four to five years. For example, because of the “sanlu incident” in the accountability of officials, deputy director general of quality supervision, inspection and quarantine of food production and supervision the original BaoJunKai have moved as early as in 2008 in anhui province as the entry and exit inspection and quarantine bureau chief. Hebei province agriculture department of the original director of liu daqun back in November 2008 after the xingtai vice secretary of municipal party committee, and in January 2009, was elected mayor of xingtai. The two officials because of accountability and didn’t even have time to “step down” over a year. On September 22, 2008, quality supervision, inspection and quarantine bureau chief li changjiang, resigned. On December 24, 2009, quality supervision, inspection and quarantine bureau chief li changjiang to “against pornography and illegal publications office full-time deputy team leader” of the country’s identity to visit jiangsu. At the beginning of 2010, li changjiang to the CPPCC national committee. On March 2, 2010 three session of the 11th CPPCC press conference spokesman zhao qizheng in the reporter’s question, is this reply: “Mr Li can use his experience in the work in the middle of the Chinese people’s political consultative conference and the suggestion, in our political consultation, democratic supervision, that can make a corresponding contribution to participate so eighth appointed him as the 11th Chinese people’s political consultative conference (CPPCC) standing committee, deputy director of the preparatory committee of Hong Kong and Macao this after discussion, we were agreed to.” because “everyone” agreed, no problem, as to common people agree with, it doesn’t matter. Inside the consubstantiality accountability model, the same system between higher and lower level, flat between “mutual understanding and agreed” easily. Return black-box operation, public transparent, the public is the last one to know. So these examples guide give to other officials, work is bad it doesn’t matter, like li changjiang, head of the first severe food safety accident, between gears, executives still can give the, retire. Return the consubstantiality accountability mode problem officials high proportion, mystification, rapid, high, make accountability can be evaded. This is the key of the accountability system has failed to deter the reason.

3.3 public participation system is the intrinsic demand of democratic politics

“According to the nature of the pure sense of the power, power should be all the members share a common exercise together, and can truly reflect the interests of the members of the community of common will and common political power”^[1] “the only real bottom-up granted power, only to express people’s will to power, only some expressed the basic consensus based power, legitimate power is”^[2]. Under the democratic politics, countries all power comes from the people, the government through the licensing for the power of the state and public affairs management. The constitution “all power in the People’s Republic of China belongs to the people.... The people in accordance with the law, through various means and methods, management of state affairs, manage economic and construction, and management of social affairs.

4 Set Up a Sound Food Regulatory System of Public Participation

4.1 Public participation food regulatory management idea innovation

The innovation of management system, is rooted in management innovation. Correct management concept is the premise and basis for the implementation of institutional innovation and. Only the change of social management concept, to promote the system innovation. Deep understanding to the core concept of management innovation, value orientation and management innovation to deepen to the level

of value from the system level, from the behavior level, deepen to the mentality level from surface reform deepening to substantive reforms, to form the understanding of public management consciousness and action consciousness.

4.1.1 Rectifies the subject status of the public participation in food regulation.

Public participation in social management should not stay in form, slogans, should not stay in the report, also be for advice and other ancillary work, but to establish the public participate in the host status of food regulation, on the concept and institutional arrangement reveals the public host status, restore the true nature of people's sovereignty. However, in terms of specific implementation mechanism, the government and the public relations is often embodied in the government management and control of citizens, the people are masters of the country is more of an abstract meaning or the embodiment of the basic system. To reverse this situation, must from the political height to recognize the legitimacy of the public participation in social management, the necessity, break "ranking of officials, to establish the idea of" people-oriented ". In addition to adhere to "the power used for the people, the feelings and plans for the people for the people", also should be deep understanding to the rights granted by the people, "the power used by the people". Government must give up the feudal patriarchal management pattern of top-down, unify the whole country, and government officials also have to give up high above the "sky'm" superiority "for the people in charge", real returns to the original position of "public servant". Government and officials must build up the idea of government and public cooperation work, building a new partnership between the government and the public, truly implement the eighteenth big report put forward the function science, structural optimization, integrity efficient "construction, people's satisfaction of service oriented government".

4.1.2 Adhere to the people-centered economic development appraisal mantra effect.

Change everything with economic construction as the center of the guiding ideology, adhere to the people-oriented. The protection of the economic development is prosperous, but if the thread of the deviation from the people-oriented, will do more harm than good. The development of the famous American economist Michael p. Joe dareau says: "we must regard development as involved in social structure, people's attitude and state institutions as well as to accelerate economic growth, reduce inequalities and the eradication of absolute poverty and so on many aspects of major changes. The process of development, from the essentially speaking, must represent all scope changes." [3] the people's livelihood problem is the state. At present, food safety has become the biggest livelihood issues today. Food safety has become a people care about most, the one of the most direct and most realistic interests problem. Shun public opinion over the people, social harmonious stability. Without the food safety, there is no public health, there would be no economic development and social harmony and stability. The ruling party and the central government must be attach importance to this problem from the height of the political. The basic function of the government performance management, score is the target of to clear, accurate and can distinguish them accordingly, the effective assessment between government departments and levels of government, the guide of government organs at all levels and departments to set up correct achievements view and development view. Assessment of the current government cadres index focuses on the local economic development, which leads the government officials in order to obtain maximum performance, the expense of other interests, blind development of the economy. For investment promotion and capital introduction, some officials to give up the bottom line, just do well relationship and business, to form community of interests. This is the root cause of local protectionism.

4.2 Innovation public participation food regulation of concrete system

Although some administrative areas in the recent ten years in the public participation has made some achievements, but because of the lack of legal provisions and system guarantee, at present most of the public participation depends on the governing level and orientation of the government. Public participation in administrative accountability legalization, institutionalization is the premise and guarantee. Although for public participation in administrative accountability in our constitution provides the system guarantee of the fundamental, specific legal system is not perfect, but must use laws and regulations make clear a regulation on public participation in accountability.

4.2.1 Establish a public evaluation institution

The traditional government performance evaluation is primarily a top-down assessment system. Within a closed system of operation, easy to cause a few officials only on, not only only, leads to higher satisfaction and the masses are not satisfied, the so-called "self-evaluation every, the crowd said no"; Easily lead to official one-sided pursuit of a few assessment indicators, many statistics contains water, produce "digital officer, GuanChu number". Within the government system appraisal, be helpful for

self-examination, through interaction to promote the social recognition of evaluation result, improve the scientific nature, credibility of the government performance appraisal evaluation. Evaluation mechanism must be geared to the needs of the public, by the public for government performance to make a scientific and fair evaluation. Performance evaluation of the performance management organization agencies, according to the performance evaluation content, CePingBiao design service object and the social public questionnaire. Assessment standard, assessment content, assessment results will be open in the government website, and in the major media widely publicized. During the appraisal, any citizen (except herself) all can access to the Internet, every citizen participation will get message feedback and explanatory. Consumer organizations, institutions of higher learning, scientific research institutions, civic organizations, etc. Can also be authorized or entrusted by the government, independent of government and its departments performance evaluation.

4.2.2 Establish a sound food regulators supervision accountability system

In the form of legal norms to determine its content and form of citizen participation, the public has the right to participate in the accountability process each link, including accountability starts, investigation, treatment, be accountable officials argue, is principal officials back program, and clearly define the rights of citizens in each link, such as the right to know, the right to express, the resolution power, supervision, and to the hearing, the right to relief rights, ensure the legal effect of the public participation. In starting the program, for example, meeting the standards, the public that can be filed, without having to depend on the leadership instructions and social impact, such as in cadmium rice incident, officials have not been investigated regulatory responsibilities, at this point, the public can be according to certain procedure, start the accountability system; Comeback in investigation, handling and application, the public participation can reduce the internal administrative system of "bureaucrats shield one another", in the return procedures, the public have been dispose all principal officials during the period of performance evaluation right back and was principal officials and promotion decisions.

4.2.3 Establish and perfect the food regulatory system of public participation

Restraint food regulation of local protectionism, in addition to the shift from the source to blindly taking economic construction as the center, perfect food supervision accountability for curing, also needs to strengthen the beforehand prevention, improve the food regulatory system of public participation is the best route. Has a long food regulation of local protectionism, big economic community of the collapse of the overnight, must in the process of food regulation in the public supervision and checks and balances of power.

Public participation in food regulation legalization and institutionalization. Citizens have the right to participate in every link of food regulation, the first is legislation, each about food safety legislation, all should widely absorb the public participation, through to the society regularly release planning legislation, legislative matters for the social public opinion. Argument to establish and improve the legislation, the hearing, the evaluation mechanism, give full play to the role of the panel discussion, feasibility study meeting, hearing symposium, extensively solicit the public especially the grassroots opinion and the suggestion, set up a sound public opinion feedback mechanism, actively response to social concerns, strengthen the public participation in legislative work of the actual effect, truly "from the crowd, to the crowd to" the mass line. In terms of hearings, resolutely put an end to "fake hearing", namely, policy makers have already decided to exercise some decision, most is in the case of the irrelevant to do some modify and perfect. Other public participation in the field of advanced experience for reference. Such as. In February 1994, the xi 'an people's congress passed "about sales, fireworks regulations, the rules forbid setting off firecrackers in xi 'an city. In October 2003, xi 'an city National People's Congress law committee held a hearing to listen to the amendments to the law. At the same time, the xi 'an people's congress to issue copies questionnaire, were back more than 8000 copies, of which banned the sale of accounts for more than seventy percent. Soon, the xi 'an people's congress (NPC) issued by the modification of the provisions of the notice, finally respect the questionnaire reflects public opinion, also adopted the opinions of the participants in the hearing. 13 in law enforcement link, the public can according to the popular will start the enforcement procedures, such as sampling observation at the food and drug administration in May 2013, guangzhou investigate cadmium rice ", "hubei province adjacent to hunan, also have a lot of hunan rice on the market, but due to various reasons not as a regulatory authority, the public is able to start sampling law enforcement procedures; At the scene of the enforcement of the law, take public representatives, law enforcement, and law enforcement officials with the exercise of the executive, the practice of social management and public brought to authority to supervise. In addition, a sound system of public complaints system, criticism, Suggestions, feedback system, reward system, security system and relief system, etc. In institutions

should have clear statutory time limit and the provisions of the steps are set out in the relief system of public participation or for refusing to infringe upon the public right of supervision and punishment measures.

5 Conclusion

Food regulation of local protectionism lead to regulatory inefficiency, low efficiency and even negative efficiency. The problem is not solved, the current situation will not change frequent food safety problems, the resulting profound social problems will aggravate the existing social contradictions, once the government credibility fell below the bottom line, is bound to encounter more difficult crisis, a harmonious society will become empty talk. Single from the aspects of legal system and improve the solution to this problem is not enough, must rise to the height of political attention to the final solution.

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Innovation in Teaching Strategy: Using of Sports as Cognitive Metaphor

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Abstract: Teaching strategy is particularly challenging because it involves developing the ability to think strategically. Yet, many material on strategy present it in a procedural manner that involves a number of steps. At the heart of strategic thinking is creativity. This paper proposes that instructors can rely on using *cognitive metaphors* to help stimulate thinking and questioning about strategizing. Specifically, we propose that sports can be used as *cognitive metaphors* to help students think deeper about competitive issues faced by businesses. We propose some guidelines on the metaphorical use of sports in teaching strategy

Key word: Cognitive metaphor; Strategy; Creativity

1 Introduction

Teaching strategy can be challenging. At the heart of teaching strategy is developing students' develop strategic thinking skills. Yet, the available teaching material on the subject do not usually help develop such a skill. Some are too procedural in that strategy is presented as a sequent of steps to be followed. As a result, there is the risk that strategizing may end up being understood more as a bureaucratic process. Strategy becomes more like "strategic programming" (Mintzberg, 1994).

Early thinking in the field of strategy was largely influenced by the "planning model" which depicts strategizing as a formal, highly ordered, mechanistic and linear process (Mintzberg, 1978). This implies that the process of formulating a strategy is rational and logical process with the implementation proceeding in an orderly manner, akin to steering a airplane. This outlook continues to prevail in some discussions about strategy. Bessire and Baker (2004) point out that this understanding of strategy can be seen in discussions the Balanced Scorecard. Indeed, anecdotal evidence suggests that some organizations continue to operate in this manner with an elaborate strategy formulation process that results in a thick strategy documents that spells out in considerable detail the key performance indicators and detailed action plans.

The way strategy is presented and taught in many textbooks perpetuates this outlook. Many books still depicts strategizing as consisting of discrete steps to be implemented with the use of a plethora of analytical tools. To a certain extent, the presentation of strategy formulation and implementation in this manner do help to make the process easier to understand. It helps authors and instructors explain the main component in strategy formulation and implementation. However, in doing so, it risks oversimplifying the dynamic and fast changing reality that organizations face. Companies competing in a high velocity environment have to deal with a high degree of uncertainty and constant change. New challenges and opportunities emerge at a fast rate and it is not possible to develop elaborate plans with a high degree of certainty. Instead of detailed analysis and elaborate actions plans, these companies have to create success by seizing "fleeting opportunities" (Eisenhardt and Sull, 2001). Mumford et al. (2007) argue that in such a situation, strategizing should focus more on creating a sound base plan instead of a detailed plan. This helps build in flexibility while maintaining constancy of purpose. Eisenhardt and Sull (2001) propose that organizations competing in high velocity environments should rely on a more flexible approach to strategic planning. Instead of developing detailed routine to execute their strategy, these organizations rely on a set of simple rules that serve as the premise that defines their decisions and actions.

To be fair, more books are paying attention to the dynamic and sometime fluid nature of strategizing. We propose here that the use of metaphors can be one way of explaining the nature of strategy and how it is formulated and implemented. Metaphors can be used to describe the different conceptualizations and descriptions of strategy. We offer the use of metaphor as a way to instill more

creativity and use of imagination in the way strategy is described, communicated and taught. The use of metaphors will complement and enrich other approaches in teaching strategy.

2 Definition of Metaphor

Metaphors are mental constructions of our imagination (Von Ghyczy, 2003). A metaphor joins two terms normally regarded as belonging to different classes of experiences (Foss, 2009). These two terms or the two parts of metaphor are called the tenor and vehicle. The tenor is the topic or subjects that being explained. The vehicle is the mechanism or lens through which the topic is viewed.

Metaphor is seen as a major means for constituting reality. We do not perceive reality and then interpret or give it meaning. Rather, we experience reality through the language by which we describe it; description is the reality we experience (Foss, 2007). Metaphors contain implicit assumptions, points of view, and evaluations. They serve as vehicles that help us organize attitudes towards the tenor they describe and provide motives for acting in certain way. The choice of different metaphor to describe a tenor, enables us to view and experience the subject differently. The metaphors we select help us filter and organize our perception and experiences. They are important because the choice of a metaphor means choosing its rules, along with the roles and scripts that are embodied in those rules (Elgin, 1997).

Metaphor is not just a matter of language and using metaphor cannot just be approached from a linguistic perspective. Using metaphor also demands a social approach (Steen, 2011). A metaphor helps the speaker move his audience, to make his argument memorable, and to enhance his prestige in the eyes of his listeners. The use of metaphor enhances the credibility of a speaker, for this reason we might expect the usage could increase audience respect for the speaker (Bowers & Osborn, 1966). The use of metaphors can also help capture change. Anzaldua (1983) is a proponent of the use of metaphors to evoke individual and social change. She argues that shifting metaphor means changing perspectives and that metaphors help make new connections and seeing in new ways, for both the creator of and the audience for the metaphor

Von Ghyczy (2003) proposes that metaphors can be categorized into *rhetorical metaphors* and *cognitive metaphors*. He defines *rhetorical metaphors* as metaphors that are used to compress an idea for ease of communication and aids in making an idea, event or concept more apparent. A *rhetorical metaphor* describes a phenomenon but does little else. An example would be describing speculative price increase as a “bubble”. It indicates that price may soon collapse, akin to the bubble coming to the point where it is about to burst. However, such a metaphor does little to describe what causes the “bubble” effect. *Cognitive metaphors* on the other hand, conveys information quickly and can serve to stimulate learning and discovery. It is efficient in communicating a meaning but it also contains a certain ambiguity and stimulates curiosity and more information search. Von Ghyczy (2003) argue that whereas *rhetorical metaphors* are familiar symbols or events that are used to explain something less familiar to the audience, *cognitive metaphors* is used to stimulate the audience to think creatively about something they think they already understand. The purpose is to get the audience to use the metaphor to explore alternative interpretations of a phenomenon.

Metaphors are by nature imprecise and depicts certain aspects that the communicator is trying to highlight (Tsoukas, 1993). Deeper understanding of the phenomenon of interest can be achieved by seeking a deeper understanding of the metaphor. Tsoukas (1993) argues that the communicator should use multiple metaphors as vehicles to generate a rich understanding of a tenor. The use of multiple *cognitive metaphors* help to liberate insight and generate alternative conceptions.

3 Strategy and Metaphor

The use of metaphor in the business is fairly common. For instance, warfare metaphors are often used as vehicles to describe competition in business (Von Ghyczy, 2003). Kaplan and Norton (1996: 29) use the metaphor of “piloting” to describe the role of key performance indicators in steering an organization towards its objectives. Burns and Stalker describe organizations using the mechanistic-organic metaphor to describe flexibility and rigidity (Lussier, 2012: 43). These metaphors help depict and explain certain aspects of business strategy.

However, many of these metaphors are *rhetorical metaphors* that are used to provide a simple and concise descriptions of various aspects of business strategy. While these *metaphors* serve their purpose, they are what is considered by linguists as “dead metaphors” (Von Ghyczy, 2003). They describe a phenomenon but do not stimulate further thinking and deliberation.

As Mintzberg (1994) points out, strategizing is first and foremost about creativity. It involves the use of intuition and the synthesis of ideas. Creative people rely on exploration of alternative ideas when

encountering ambiguity (Mumford et al. 2003). They are able to engage in critical thinking and divergent thinking (Mumford et al. 2007). Hunter et al. (2012) propose that creative thinking also requires analogical ability and associational ability. Analogical ability is about the ability to use similarities between earlier encountered problems and new problems and utilize the ideas and solutions used in the former for the dealing with the latter. Associational ability is basically the ability to connect ideas that would otherwise remain separated in generating something new. These abilities are crucial in enabling strategist to overcome the tendency to succumb to vertical thinking, help them create short cuts in problem solving and enable them to synthesize new products and approaches to exploit opportunities.

It is in this regard that we argue that developing strategic thinking skills would be aided with the use of *cognitive metaphors*. The key to teaching strategy and developing strategic thinking skills is developing the willingness to consider alternative ideas and interpretations, explore beyond the obvious, examine an issue from the different angles and see connection between ideas and possibilities. We propose that the use of sports as a *cognitive metaphors* in teaching strategy has the ability to help stimulate the students' imagination and thinking about strategy.

4 Sports Metaphor and Strategic Thinking Skill

Sport metaphors are useful for teaching a difficult concept by paralleling that concept with something the reader is familiar with and excited about. Sports metaphor should be able to help to clarify some of the basic concepts related to strategic planning (Wilsey, 2011). Team sports can be used as a metaphor for corporate organizations. The owner of the team, like shareholders in a corporation, do not play the game. Instead, players act on behalf of the owners, much like employees working as agents of shareholder. In this agency relationship, it is critical that all the employees in the organization understand and align their actions with the organization's mission, vision and strategy. The players, like employees in a corporation, must be able to make their own decision and take action on behalf of the owners. Like business, sports are competitive activities. Success depends on the ability to understand one's abilities, the environment and opponents' behaviours.

Many instructors would have used metaphors to explain a point in their strategy class. Most of the time metaphors are used mainly as a heuristic tool. They are often used briefly and occasionally as *rhetorical metaphors*. *Cognitive metaphors* extend the use of metaphors beyond this and can instead help stimulate discussion. The use of sports as *cognitive metaphors* in teaching strategy and strategic thinking has the potential to develop the thinking skills and abilities needed to be an effective strategist. Each type of sports is governed by a set of rules, logic and winning formula. However, the different types of sports differ considerably. Even though the aim of every player is to win, the key success factor and capabilities needed to win is unique to each sport. In fact, the key success factors differ across different matches in a particular sport. For instance, badminton and tennis are similar in that both use rackets, are played on courts and the players are separated by a net. However, the skills needed to excel in these two sports differ considerably. The similarity between badminton and tennis is the importance of hand-eye coordination and the ability to mislead the opponent when making a stroke so as to have him run in a different direction from where the player intends to send the ball or shuttlecock. However, badminton requires the ability to use wrist in maneuvering the racket to hit the shuttlecock to the desired direction. Tennis, on the other hand, requires arm strength without the use of the wrist. This example shows how sports metaphor can be used as a vehicle to help students develop analogical abilities in assessing the difference and similarities between situations.

The potential to use sports as a *cognitive metaphor* is due to the fact that most students have a certain degree of familiarity with the main sports but do not necessarily have a deep understanding of the key factors that will determine how to win a match. Thus, while the use of sports as a *cognitive metaphor* provides something most of us can relate to, a deeper understanding of the different key success factor requires that we explore deeper the dynamics of a sport. Performing this will help sharpen the students' critical thinking as well as divergent thinking.

Sports can be used as a *cognitive metaphors* in three basic ways. First, is to use different sports for comparison and stimulate a discussion on similarities and differences as well as about key factors for success. An example is a comparison between American football and soccer. Soccer is played in two halves lasting 45 minutes each whereas American football has many pauses and are played in four quarters of 15 minutes each. And soccer players use their feet whereas American football is played with both hands and feet. American football is more choreographed with teams relying on well developed playbooks to plan their moves. Teams practice these moves repeatedly to ensure their smooth execution

during matches. Soccer on the other hand, is less structured and choreographed. Teams decide on basic issues such as their formation, which opponent player to be marked, pace of their game but players have considerable flexibility and autonomy in how they play the game and how they conduct an attack. The more choreographed nature of American football makes the team behave more like mechanistic organizations compared to soccer. On the hand, the greater flexibility that players have in deciding on their moves in soccer makes the sport resembles organic systems. Students can then be steered to think about the different key factors for success in the competition in the fast food industry compared to management consultancy.

The second approach is to use a match in a particular sport to discuss why the winning team won and their relative advantage over their opponents. An example is a comparison of the match between Spain and the Netherlands during the 2010 World Cup finals. Both teams have a strong reputation. Recognizing that their opponent have some very capable players, the Spanish team relied of good passes between their players to gain control over the tempo and progress of the game. And to ensure higher scoring chances, the Spanish avoided long range shots. The Dutch, on the other hand, relied on long range shots that did not succeed in getting into the goal. The Spanish were also skillful in exploiting weaknesses in the Dutch defense by making attacks from the sides, drawing out the less agile Dutch defenders, and then making a pass to the centre for the final kill (Farah, 2010a). The use of this historic match as a metaphor enables students to discuss the dynamics of the game and develop their ability to dissect the key success factors and relative advantage in the strategy and tactics used by the teams. For instance, students can be encouraged to identify the relative advantage Spain had over the Dutch in deploying its strategy. Lessons can be drawn on the importance of good execution, adaptiveness and the ability to exploit opponent's weaknesses. Here also, students can then be asked to compare Apple with Samsung in the way they compete in the smartphone market.

The third approach is to use the top teams as comparisons and to get students to explore and identify what makes these teams consistently outperform other teams. A discussion along this line will not only help students identify key factors for success and relative advantage, it can also get them to identify how each team configure its resources and help them identify rare and tacit capabilities that the top teams have. For instance, the Brazilian national team, is probably the strongest team in the world, being the only team to have won the World Cup five times. Their success is attributed to a number of strengths (Farah, 2010b). This includes highly skilled player, defenders with good tackling skills and good passing technique. Their midfielders are very good at dribbling and quickly push the ball to the strikers for the final kill. And their strikers are known for being creative and attack minded. Here students can be encouraged to examine how seamless execution that exploited the individual strengths of Brazilian players is crucial. They can use this understanding to compare soundly executed and poorly executed strategies. For instance, in the discount airline segment, why does Southwest Airline continue to thrive whereas People Express collapsed? Why was it that the Hong Kong based discount airline Hong Kong Oasis Airline failed (Stanley, 2008)? How can the insights from the Brazilian team be used to understand how Southwest configure its resources to support its competitive approach?

In each of the three possibilities mentioned above, the answers are not obvious and will require considerable debate among students. This provides the opportunity for each student to offer his analysis and arguments to support his views. The use of sports as *cognitive metaphors* also goes beyond simple descriptions offered by *rhetorical metaphors*. Students can examine a phenomenon from various angles. In terms of teaching strategy, it enables instructors to not only describe which teams are superior compared to their rivals but also how these teams develop their strengths. In other words, instructors can use *cognitive metaphors* to generate insights from an Industrial Organization perspective as well as a Resource Based View of competitive strategy. Thus, *cognitive metaphors* can serve as an integrative tool that help students link various theoretical perspectives in strategy.

Zhou & Heineken (2009) argue that the use of metaphors to conceptualize a theoretical construct or communicate new knowledge in an academic setting requires that the metaphor is carefully selected and presented in appropriate contexts so as to ensure that the students can easily derive the intended metaphorical meaning. We propose some specific steps that instructors can take in using metaphors to teach strategy includes:

(1)Instructors need to choose a sport that are more commonly known to most students. In most countries it is easier to use soccer or tennis as metaphors than lacrosse or Gaelic football. This will enable them to examine these sports. Their understanding doesn't have to be thorough or complete. The basic idea is to use the lack of complete understanding to stimulate sense making in the discussion.

(2)Students should be encouraged to do some background reading to familiarize themselves the different types of sports and games. Instructors can also get students to watch a match to gain more

understanding of the dynamics of game. It is not necessary that everyone has the same interpretation of the match. The ensuing discussion should be an opportunity to share their insights.

(3) Instructors need to rely on the use of questioning to stimulate debate and discussion about the metaphor and how the insights from a particular sport or match can be used in business situations. They need to resist the temptation to lecture and feed answers to students. Questioning should be used to help students explore ideas, alternative explanations and see parallels in between metaphors and business situations.

5 Conclusion

The use of *cognitive metaphors* in teaching strategy is meant to complement other methods. It can help make class discussions more alive. Sports, because of its competitive nature, can help students examine problems with the context of rivalry that businesses usually encounter. We believe this help make the discussion more lively and insightful to students.

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Talent Retention Strategies in Different Organizational Contexts and Intention of Talents to Remain in the Company

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Abstract: This article presents a case study of two companies operating in the Brazilian market; one in the electrical energy sector, and the other in the pharmaceutical sector, both of which appeared on the list of 150 Best Companies to Work for in Brazil in 2012, and have stated that they consider retaining talents to be essential to their Human Resources strategies. These companies identified the professionals they considered to be talents, through the application of a questionnaire to the employees, with 51 statements, the results of which were used to analyze the link between retention factors and intention to remain in the company. Together with the application of the multiple regression technique for associations between the variables, the retention factors, measured by means of the employees' perceptions, were qualitatively linked to the practices of talent retention adopted by the companies. Among the results, it is highlighted that the retention factors explained 86% in company A, and 83% in company B, of the variation in the variable "intention to remain in the company." It was observed that the talents are determined by the management model of each company, and that the employees who were considered talents based on their current performance, together with those with potential to be considered talents in the future, represent 20% of the company's staff. Based on the results, we believe that before implementing a talent retention strategy, companies need to understand the influence of the macroeconomic scenario on the job market; the social influences that impact on employees' career expectations; and the individual personalities of the talents.

Key words: Retention; Strategy; Talent

1 Introduction

The resource-based view of the firm (RBV), a term coined by Edith Penrose (1959), provides support for understanding the present-day search to retain talents in companies, which are increasingly finding it necessary to maintain talented people, capable of occupying strategic positions in the organizational hierarchy (Holtom, Mitchell, Lee, & Eberly, 2008). It can be assumed that the mobilization and retention capacity of these companies can guarantee sustainable competitive advantage for companies.

In the literature on talent management, it is difficult to find definitions, concepts and processes that assist in the creation and adoption of effective practices in companies seeking to manage their talents. Authors like Lewis and Heckman (2006), Huang and Tansley (2012) mention the lack of integration between talent management and strategic management, both in the area of Human Resources and in the company as a whole.

According to Lewis and Heckman (2006) this is a major problem that needs to be resolved for the proper planning and management of employees, and various articles have described talent management as a new way of thinking within Human Resources management. One of the main challenges for the theoretical and practical advancement of talent management is the need for a theory, or principles that can provide guidance on the group of talented people the company should look for, and the areas its retention strategies should focus on.

According to Allen, Bryant and Vardaman (2010), research into the effects of the industry, the competitive and organizational environment, as well as the national culture, would be of great value for understanding talent retention in different work contexts.

In a scenario where the importance of managing and retaining the skills of employees that are valuable to the company is increasing (Wright & Snell, 1991), the question that remains is how Human Resources management can provide a working environment that will encourage employees to remain in the company (Allen et al., 2010; Holtom et al., 2008)

For 57% of Brazilian employers, the current difficulties in filling job positions are related to the candidates' lack of qualification. To resolve the challenge of this deficiency in the workforce, the main initiative of companies has been to apply training and development actions for their staff (Manpower, 2011).

Brazilian human resources professionals, when questioned about the challenges and trends for this area over the coming years, generally mention talent management as an underlying concern (Barreto, Silva, Fischer, Dutra, Veloso, & Amorim, W., 2010). According to these authors, HR professionals mention, among these challenges, the need to stimulate young professionals, and the imminence of loss of professionals' knowledge when they retire, among other factors related to the use and retention of valuable people for the company.

This article, which seeks to understand the search to retain these professionals and ensure they remain in the companies, begins by discussing the approaches adopted in the talent management, and the challenges involved in retaining them. It then presents the conceptual model that formed the basis of the analyses, and finally, a discussion of the results in regard to talent retention strategies.

2 Theoretical Framework: Streams of Thought in Talent Management

According to Collings and Mellahi (2009), there are four main streams of thought in relation to the concept of talent management. According to the authors, in the first stream of thought, talent management is described in the literature, and in the business world, as a new label for the area of Human Resources management, since in this line of reasoning, managing talents means ensuring that these individuals carry out their actions with greater efficiency.

The second stream of thought found in the literature focuses on "pockets of talents," and defines the process of talent management as being practically the same as that of personnel management. The objective here is to plan for future needs (leadership, or in general) for which it is necessary to map the professionals, considering their present and future needs. This stream of thought reinforces well known practices of succession management, and also of forecasting demands versus actual offer, the costs involved, growth of the company, and mergers and acquisitions, for example (Lewis & Heckman, 2006). Therefore, the contribution of this approach in the literature does not show the strategic role of talent management for the company (Collings & Mellahi, 2009).

The third stream of thought defines the idea that all the functions within the company should be filled by professionals with high performance and potential, and affirms that the talent management should concentrate on managing these professionals. While this approach appears not to favor the employees with average or low performance, Collings and Mellahi (2009) recognize limitations to this reasoning, and argue that it is neither desirable nor appropriate to fill all the positions of the company with talents.

Huselid, Beatty and Becker (2005) add that few employees work in positions considered strategic: approximately 20% of the entire staff. Thus, it is only to these positions that talent retention would apply. Accordingly, if the talent management system is applied in the same way to all the employees of a company, it becomes difficult to differentiate talent management from traditional Human Resources management. Following this reasoning, the fourth stream of thought in talent management relates to the identification of key positions, which have the potential to impact on the competitive advantage of the company. In this case, the talent management strategy involves activities and processes aimed at systematically identifying strategic positions that contribute to the company's competitive advantage.

With this in mind, research on turnover and retention has been replacing a focus on understanding "why people leave" with a focus on "why they stay" in companies (Holtom et al., 2008). Our study considers this trend, and puts the focus back on professionals who are more highly appreciated by companies, and who, according to the reasoning developed here, are called "talents."

2.1 Challenges to talent retention

Talent retention strategies should adapt to the assessment of how critical the employees' competencies are for the company; the employees, in turn, depend on the organizational competencies, and vary from one company to another (Ortlieb & Sieben, 2012). We can therefore assume that the definition of a talented employee will also vary from one company to another.

However, one thing that all companies have in common is the existence of direct costs arising from loss of talents, due to interruptions in the work, generating a loss of knowledge associated with these employees. However, even if a company makes substantial investments in talent retention, a portion of these employees may still leave the company voluntarily (Trevor, 2001; Allen et al., 2010). These are

factors over which the company has little or no control, such as health issues, or questions of double career. These authors also suggest that the start of the process of leaving the company is generally initiated by some shock or event that prompts someone to consider leaving their current job.

2.2 Strategies for talent retention

Ortlieb and Sieben (2012) developed a taxonomy of five talent retention strategies associated with the level of criticality of the employees' competencies. In this study, the criticality of the competencies was defined by the human resources managers of the companies analyzed. Thus, two taxonomies emerge: 1) competencies associated with internal knowledge of the company (technical skills, leadership, or knowledge of aspects of the product or process); 2) competencies associated with external knowledge (of the consumer market, and negotiation with other stakeholders). The retention strategies are mentioned below:

Incentives (monetary and non-monetary): salary increases and variable remuneration, responsibilities and career opportunities.

Norms and values: involvement with the company's objectives, and a sense of belonging.

Coercion: job regulation contracts, with penalties for leaving the company.

Recruitment of new professionals: recruitment of new professionals and managers (internal or external).

Knowledge management: obtaining know-how through manuals and guides, use of information technology or specialized systems, and exchange of experiences.

Regardless of the competencies involved, in the study of Ortlieb and Sieben (2012), the retention strategy based on norms and values was considered the most effective one, followed by a strategy based on incentives, and then on recruitment of new professionals. Knowledge management was in fourth place, and coercion was the least frequently adopted strategy.

We therefore consider that in a model that seeks to involve people in the goals and values of the company, there is an influence of perception on the human resources management practices to retain employees, according to the reasoning of Yamamoto (2012). We therefore link the retention strategies (Ortlieb & Sieben, 2012) with the factors that prompt employees to remain in the company (Hausknecht et al., 2009) and, as shown in Table 1, we present the structure that will be used in this article to analyze the results.

Table 1 Relationship Between Retention Strategies and Talent Retention Factor

Retention strategy of the company	Retention factor, according to employees' perceptions
Incentives	Extrinsic rewards Flexible work arrangements
Norms and values	Organizational prestige Organizational commitment Job satisfaction Organizational justice
Coercion	Lack of alternatives Investment Nonwork influences Location
Recruitment of new professionals	Advancement opportunities
Knowledge management	Constituent attachments

Source: Elaborated by the authors

In the description of the retention strategies, there is no consideration of external factors, which are unexpected and are not related to the job (Allen et al., 2010). Therefore, in the coercion strategy, besides considering the formal contractual aspects for staying in the company, we also considered the informal influences that are not under the company's control, such as family situations, employees' propensity to invest in their career in a company, job alternatives in the job market, and the ease with which the employee can travel from their home to their job.

The incentive strategies were linked to the extrinsic rewards, and to the employees' desire for flexible work arrangements. In norms and values, we considered prestige, commitment to the company, and job satisfaction. And in knowledge management, we considered the constituent attachments between colleagues, leaders and clients of the company, from a perspective of turning tacit knowledge into explicit knowledge (Nonaka & Takeuchi, 1997).

In short, based on the above reasoning, we present the objective of this study, which is to link the

talent retention strategies of two companies, operating in different business contexts, to the employees' intention to stay in the companies.

3 Methodological Procedures

The case study is a research strategy that seeks to understand a particular dynamic in unique configurations. More than one case can be analyzed, in a so-called multicase study, or a single case, with more than one level of analysis. Case studies can fulfill various objectives, which may be either descriptive, or to test or generate some theory (Eisenhardt, 1989).

Therefore, this research can be classified as a multicase study (two companies), with more than one level of analysis (employees and the area of Human Resources management).

Yin (1995) states that when carrying out a case study, it is necessary to establish a protocol, which besides presenting the common content of a collection tool, establishes the procedure and rules to be followed during its use. Once the protocol is defined, the research is initiated, based on the following variables: strategies for talent retention, perception of talent retention factors, and intention to stay in the company.

The case study was carried out using both qualitative and quantitative methods, i.e. adopting the multi-method of data triangulation (Eisenhardt, 1989; Yin, 1995). Following the research protocol, the stages described below were followed.

The first stage of the study involved the selection of the companies, which represent the units of analysis of the case study. This selection was based on document analysis of descriptive reports of human resources management strategies and practices.

These reports were prepared by the people responsible for the areas of human resources of the two companies operating in different sectors: one in the electrical energy sector, and the other in the pharmaceutical sector, which were included in the list of the 150 Best Companies to Work for in Brazil in 2012. These two companies were selected by the researchers because they had stated, in the above-mentioned reports, that they considered talent retention to be essential for their Human Resources management strategies. Also in this stage, the descriptions were selected, of Human Resources practices adopted by these two companies that could be linked to the talent retention strategies described by Ortlieb and Sieben (2012).

The choice of this database for the selection of the units of analysis was based on the fact that this group of companies contain information on major companies operating in Brazil, and which can be considered references in Human Resources Management.

It is important to mention that the initial requirement to take part in this survey, which involved 500 companies, was that it must have 100 employees, a criterion that ruled out a number of smaller companies that may have similar practices to those presented.

The second stage of the study consisted of asking the two selected companies to indicate which employees they considered talents. After this indication, the third stage consisted of the application of a questionnaire to these employees, with responses on a 5-point Likert scale to measure "perception of retention factors" and "intention to remain in the company." The 51 statements (Appendix 1) were elaborated based on the categories identified by Hausknecht et al. (2009), and were used to analyze the relationship between the retention factors (independent variables) and intention to remain, among the people considered to be talents by the company (dependent variable).

The interpretation of the results followed the recommendations of Miles and Huberman (1994), which guide the researcher in the identification and comparison of standards, and is presented below.

4 Analysis and Discussion of the Results

In the analysis of the cases presented here, to preserve their identities, we have called the company in the electrical energy sector company A, and the one in the pharmaceutical sector company B. First, we present the challenges to talent retention, which were described by Human Resources professionals of the companies, in the reports indicated in the first stage of this study. This is followed by the statistical validity of the measuring model used, and finally, the retention strategies adopted by the companies, and their results in terms of the intention of talents to stay with the company.

4.1 Measurement model

According to the employees' perceptions, lower mean values were found for coercion strategy: lack of alternatives (2.49), nonwork influences (2.77), investment (3.30), and location (3.96). The highest mean values were found for the strategy knowledge management: constituent attachments (4.48); and

for the strategy norms and values: organizational prestige (4.10), job satisfaction (4.16), organizational commitment (3.57) and organizational justice (3.19). The Cronbach's Alpha reliability indices were satisfactory; only the factor flexible work arrangements (0.60) did not reach the reference value of 0.7.

We conducted a confirmatory factorial analysis (CFA), applying the estimate of maximum likelihood to the Analysis of Moment Structures software (AMOS) v. 18. The main absolute fit index of the model is the chi-squared (χ^2). Other commonly used absolute fit indices are the Goodness of Fit Index (GFI), an index that is less sensitive to sample size, whose reference value is 0.9, and the Root Mean Square Error of Approximation (RMSEA), a measurement that seeks to correct the trend of the chi-squared index by rejecting models with large samples or a high number of observed variables, with a reference value of 0.08 (Hair, Black, Babin, Anderson, & Tatham, 2009).

Although the chi-squared statistic presented a significance value, when considered on the degrees of freedom ($\chi^2/df = 1,77$), it attests to the quality of the model, with values below 3 being considered good (Hair Jr. et al., 2009; Kline, 1998).

The other indices also show that the adjustment of the measuring model obtained satisfactory fit to the data $\chi^2(1314, N = 141) = 742, p < 0.01, \chi^2/df = 1.77, GFI = 0.90, RMSEA = 0.07$.

The standard factor loading of forty-three statements used in the measurement model were between 0.5 and 0.93, all significant ($p < .01$). The results demonstrate the fit of the statements to the constructs that the researchers sought to measure. However, eight statements presented loads lower than 0.5, and were therefore excluded from the model (Hair et al., 2009).

Below, the retention strategies adopted by the two companies studied here, and the relationship between these strategies and employees' intention to remain, are described.

4.2 Strategy of Incentives

Although practices of job flexibility, with home-office and flexible working hours, were mentioned, in both companies the adoption of flexible work arrangements was not a statically significant factor in influencing the talents' desire to remain (Company A: $\beta = -0.10, p > 0.01$ / Company B: $\beta = -0.21, p > 0.01$).

Company A seeks to attract and retain professionals through the adoption of best practices in the market, remunerating the employee by the market average, which is checked periodically by salary surveys. The remuneration consists of a fixed part and a variable part. The fixed part consist of the funds of a habitual nature, and the variable part is performance-based, whether through the performance bonus, or parcels allocated by the profit sharing program, based on Profits and Results.

Meanwhile, Company B has limitations in relation to the promotion of speed of career and salary practices aligned with companies in the same sector and of a similar size. The question of salary, particularly when compared with the large pharmaceutical companies, is described as the main motive for employees leaving the company.

4.3 Recruitment strategy

In Company A, talents are included in a succession plan, and their development is monitored in the talent management program. The performance matrix is the main factor that guides the actions of development, recognition and retention. The employees are assessed once a year, based on their competencies and goals, and depending on their position, specific actions are analyzed and implemented for each group.

The selection processes of Company B, meanwhile, seek to identify candidates whose professional expectations are aligned with the value proposal of the company, analyzing, in particular, their priorities in relation to salary, job position and quality of life. Another of the actions adopted is the use of indication of new employees by employees of the current staff, to fill vacant positions. In both companies, no significant relationships were found between the advancement opportunities (Company A: $\beta = -0.15, p > 0.01$ / Company B: $\beta = 0.17, p > 0.01$), through its programs for recruitment of new professionals, and talents' intention to remain in the company.

4.4 Strategy of norms and values

New recruits in Company A go through an induction period, and are received by a host. This corporate training path consists of three stages. First, the employee is received by a work colleague, who introduces him to the other members of the team, shows him around the workplace, and accompanies him during the first few days. In this stage, the new employee is also informed of the company's benefits. The new recruit then learns a bit more about the history of the company, the communication channels, his rights and duties, Human Resources policies and management programs, the strategic guidelines, and the certification processes, among other things.

4.5 Strategies to mitigate coercion

In both Company A and Company B mechanisms of formal coercion, such as minimum-term contracts, were not mentioned as talent retention methods. The external factors of coercion and continuance of the employee in the company are considered, and the company seeks to mitigate them. The working environment is used to improve the employees' quality of life. In both companies, the quality of life programs are based on the pillars of physical, emotional, social, environmental, and spiritual well-being, as well as security, and financial health.

4.6 Knowledge management strategy

Little information was found on strategies and practices of knowledge management of talents. Likewise, only one mentoring program for young executives was mentioned in Company A. A structured program for specialist professionals with high expertise was also mentioned. In it, the key knowledge of the company is mapped, and professionals responsible for disseminating knowledge are identified. Based on this, the tutoring process of older to younger is begun, taking advantage of the experience of one and the youth of the other, to translate and retain the knowledge within the company.

Company B presents a more critical situation, because when it loses professionals, particularly at management level, it offers, where possible, funds or better salary proposals than those it offered to the previous occupant of the position to be filled, in a bid to attract highly qualified people. Management of the total payroll is used as a means of managing knowledge.

5 Theoretical Implications

Based on the findings of this study, we hope to contribute to understanding of the relationship between the company and its employees, particularly those wishing to remain in their current jobs. The retention factors explain 86% in Company A, and 83% in Company B, of the variation in the variable "intention to remain in the company." It is noted that there is a need to contextualize both the times the company is going through in the dispute for qualified professionals in the job market, and its sectoral and internal context (Allen et al., 2010).

We hope that the Brazilian scenario will contribute to demonstrating strategies for talent retention in two companies facing the same challenge in different ways. For this reason, the concept of competencies (Barney, 1996), derived from the resource-based view of the firm (Penrose, 1959), offers support for a detailed analysis between companies, particularly in relation to the key positions, which should be filled by individuals with certain profiles and competencies.

It was observed, in the analyses, that the talents are identified by the management model of each company (Ortlieb and Sieben, 2012). Although the talent management is different in each of the two companies studied, we could see that the employees who are considered talents for their current performance, together with those with potential to be considered talents in the future, represent 20% of the total employees.

The remuneration was deliberately considered as a factor of balance in the retention strategy in Company A, and the same could be said of Company B in terms of the involvement of the employees, with their objectives and values.

The proposal of this study to consider coercion caused by external, non-contractual influences, such as financial and family commitments, proved to be valid because employees who stay merely out of a sense of obligation tend not to be as physically, psychologically or socially healthy to carry out their jobs or add value to the company (Allen et al., 2010). Thus, neither of the two companies used coercion by means of contracts as their main retention strategy, on the contrary, they sought to mitigate the employees' sense of obligation to remain in the company arising from nonwork influences, through their quality of life programs. It is, then, the responsibility of talent management to interfere only in factors related to the working environment.

However, one factor that deserves attention is the profile of the employee who invests much of his time in his career in a company. Thus, some people are easier to retain, because they have a more conservative profile than others, who are more averse to dedicating their career to a single company (Hausknecht et al., 2009).

6 Practical Implications

We believe that companies, rather than creating a talent retention strategy, need to understand certain factors: the influence of the macroeconomic scenario on the job market; the social influences that generate an impact on the career expectations of the employees in relation to companies, and the personalities of the talents.

The success of the talent retention strategies is generally measured by organizational turnover (Holtom et al., 2008). We believe this indicator is too delayed, implying a reactive attitude on the part of the company. Measuring intention to remain is an indicator that other observable behaviors, such as absenteeism, precede the employee's departure. In other words, the company needs to take a proactive stance, before the talent leaves.

As a suggestion for the companies, the use of talent recognition management is recommended. Stimulating the sharing and explanation of knowledge of these professionals about the company and clients, through cooperative relationships, can help shift of focus of from retaining the individual to retaining their skills.

7 Limitations and Suggestions for Future Studies

There are limitations in relation to the number of people who responded to this survey. On the other hand, considering that talent management is considered strategic in the companies, few of them agreed to take part in the survey, enabling the application of questionnaires to their talents. The difficulty of many of the companies in defining who their talents are meant that some companies that wanted to participate in the process were not able to do so. We therefore opted for a convenience sample.

For future studies, we suggest consolidating detailed talent management and retention models for different organizational contexts. It is also important to determine whether talent retention involves discriminatory behaviors and lower added value for the company.

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Analysis on the Critical Factors of Leading Figures' Impacts on the Performance of Enterprise Innovation Teams*

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Abstract: The enterprise innovation team plays an important role in building an innovative country. The leading figures with professional knowledge and skills, high level of management ability and good personality are the core resources of the enterprise innovation team, and they can lead to higher efficiency of the innovation team work. This study aims at analyzing the factors of the leading figures that make influence on enterprise innovation team performance, and finding out the critical factors, in order to provide a reference for enterprises to select leading figures, to allocate human resources more effectively, and to improve the overall performance of the innovation team.

Key words: Critical factors; Leading figures; Performance; Enterprise innovation teams

1 Introduction

With the rapid development of information technology, the importance of innovation in science and technology research and technology competition is becoming more and more highlighted, building an innovative country has become the common sense of the most countries throughout the world. Our country has put forward the guidelines of building an innovative country on the basis of independent innovation, key span, support the development and lead the future. Independent innovation capacity has become the inner engine for a country's long-term development, and the power source of scientific and technological progress. Moreover, the enterprise innovation team is the important part of an innovative country, and the core of the implementation of independent innovation. Therefore, the development of enterprise innovation team is one of the important reflections of the development degree of an innovative country. The leading figures with professional knowledge and skills, high level of management ability and good personality are the core resources of the enterprise innovation team, and they can lead to higher efficiency of the innovation team. This study aims at analyzing the factors of the leading figures that make influence on enterprise innovation team performance, and finding out the critical factors, in order to provide a reference for enterprises to select leading figures, to allocate human resources more effectively, and to improve the overall performance of the innovation team.

2 Literature Review

In the early studies about the personality characteristics of science and technology leaders and the functions of team leader, Ama (1998) argues that science and technology leaders should have pioneering spirit and outstanding intelligence level, they are irreplaceable technology experts, and they can help team members to build confidence to reach success through personal influence and ability^[1]. Since the 21st century, Deschamps has divided the innovation leaders into the front leader of technology or product innovation, the back leader through industrialization and market implementation^[2]. Wang Dong(2006) pointed out that leader is the key to the formation and development of enterprise innovation team, in enterprise innovation team, the leader is not only the source of core technology, the core resource of the team, but also the important part of the human capital of the team^[3]. Thus, it shows that leader plays an important role in enterprise innovation team. At the same time, a large number of empirical studies have shown that the team leader has significant correlation with team performance, team leadership is one of the key factors that affect the team performance^[4]. Yang Chen (2008) has analyzed the connotation of innovation team in details, and explained that the operation pattern of a task innovative team is that the leader integrates strategically all innovation units in the whole system^[5]. So the leaders' influence on the performance of enterprise innovation team can not be ignored. Wu Jie, basing on the established hierarchy model of the performance evaluation of science and technology innovation team and its evaluation index system, using AHP analysis method, analyzed the hierarchy and draw a scientific and quantitative model of innovation team performance^[6], and the result showed that the team innovation ability and the teamwork are significantly affected by the innovative enterprise

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leader. The leadership process of innovation team and the mental models of leader fundamentally affect the team’s cognitive process. One of the responsibilities of the team leader is to train the team members to understand the environment, goal and task of the team and to communicate with team members about the mental models of the team^[7].

3 Leading Figures’ Characteristics and the Performance of Enterprise Innovation Team

3.1 The definition and characteristics of leading figures

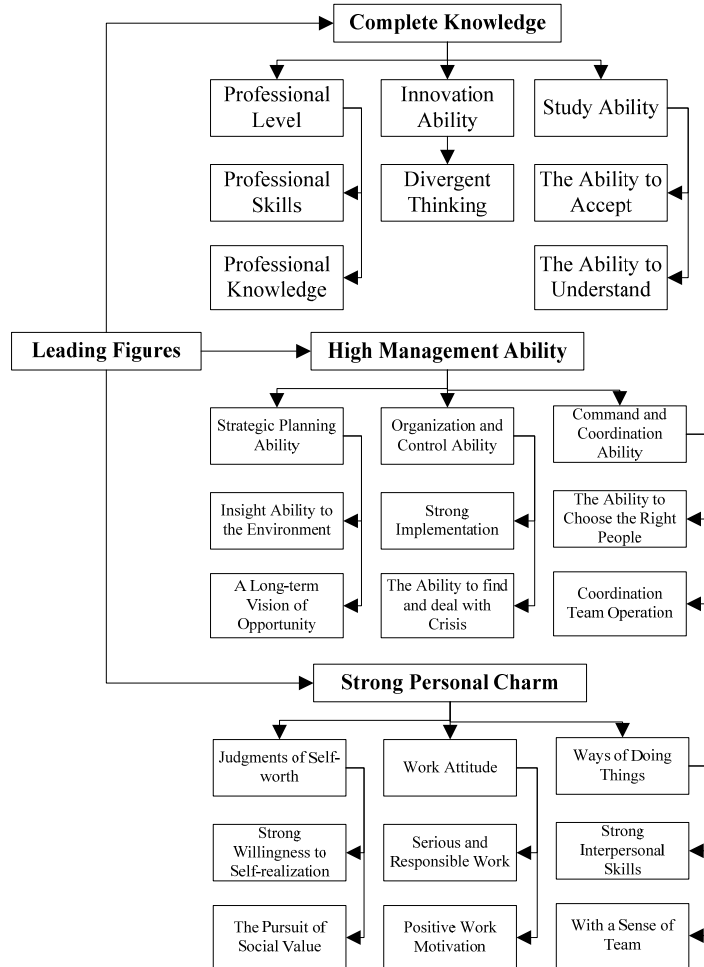


Figure 1 Enterprise Leading Abilities

About the definition of the leading figures, academia has not yet made a unified accurate explanation. Li Chunsen, talent research association of Shanghai, said that, leading figures, as the name implies, they are not only talent, but also equipped with lofty value pursuit, outstanding scientific literacy, excellent leadership, unique personality charm, tenacious perseverance, strong team cohesion, and extensive social influence. Chinese scholars Cai Xiuping(2007) argues that “science and technology figures” are those who, in the vast field of natural science, social science and technology-based enterprise operation and management, including the front of basic research, applied research, technology development and market exploitation, play a big role in academic technology leadership and team core, prompt the scientific to be turned into practical technological productivity, integrate and optimize social resources, explore and create value source, lead the trend of the times through continuous innovation, thus making an outstanding contribution to the development of economic and social people^[8]. Wang Dong(2007) argues that “leader” is the leader of the team, is responsible for providing guidance for the team and set long-term goals for the team, deal with the relationship with other departments within the organization on behalf of the team at the appropriate time^[9]. Lv Biao (2008) points out that “figures” are those who make a significant contribution in specific areas, promote or lead the development of specific

areas of the famous statesman, thinker, scientist, inventor, engineering and technical experts, etc^[10]. Combining with the understanding of these concepts, this article defines the meaning of “leader” as formal authority leading personnel in the enterprise, with professional technology and knowledge advantage, with management ability of organizing enterprise, with personality charm of leading a team.

It is generally believed that enterprise leader's quality can be divided into political quality, ideological quality, moral quality, cultural quality, professional quality, physical quality and psychological quality, leadership and management ability, etc. Spencer (2007) puts forward the iceberg model which points out that the characteristics of the enterprise leaders can be divided into dominant competence(knowledge skills and invisible competence), such as social role, self-concept, trait and motivation. At the same time, he puts forward the onion model, which argues the characteristics of the leader can be divided into core layer(trait and motivation), middle layer(self concept, attitude and values), Surface(skills)^[11]. These divided methods show that the formation of enterprise leaders, in addition to the external professional knowledge skills, more intrinsic characters are self-value judgment, value choice and value expectations. Thus, this paper argues that the enterprise leaders should have the following characteristics

3.2 The dimensions of measuring the performance of enterprise innovation team

Leader can exert important influence on the performance of enterprise innovation team, at the same time, and the dimension of measuring the performance of enterprise innovation team also affects leading figures to play a role. The measure of the performance of enterprise innovation team is one of the important factors involved in this paper. Zhang Chunxia(2001) argues, team performance includes two aspects, namely the individual level and team level, and each level is divided into two dimensions: namely the behavior dimension and the result dimension^[12]. Xu Fang(2003) argue that team performance is a system process, which is closely related to the individual performance and organizational performance^[13]. Wang Yanjie(2009) put forward a five dimensions measure of the performance of university innovation team, namely independent resource investment ability, the productive capacity, social influence, internal radiation ability, sustainable development ability^[14]. Lan Yujie(2001) took example and developed the performance measurement scale built up by Lovelace's and others, mainly from three aspects, namely, working achievement of innovation team, innovation team's influence on its members, and working process of innovation team, to measure the performance of innovation team^[15]. Combining the existing research with the particularity of innovation team, according to the standard of KPI index, this paper argues that the dimensions of measuring the performance of enterprise innovation team should include the following aspects: the economic benefits of enterprise innovation team(the contribution to the profitability), the operating benefits of innovation team(the impact on market share, company's internal management cost and operation expenses for the team itself), and organizational benefits of innovation team(the impact on corporate image, self-development and satisfaction).

4 Analysis on the Factors of the Leading Figures' Impacts on the Performance of Enterprise Innovation Team

The characteristics of the leader have overlapped and important influence on enterprise innovation team performance, as shown in Figure 2.

Leading figures of the professional level, innovation ability, learning ability and strategic planning ability, has impact on the economic benefits of enterprise innovation team. Leader is the core technology of enterprise innovation team. Leaders themselves who have comprehensive knowledge and professional skills can guide the knowledge progress of innovation team members, leader's innovation ability and learning ability can lead to technical exploration and innovation, conformability with international advanced technology, thus enhancing the production capacity of enterprises, reducing the production cost of enterprises, improving the profitability of enterprises, enlarging the advantage for enterprises to participate in market competition.

Leading figures of the innovation ability, strategic planning ability, organizational and control ability, command and coordination ability, self-value judgment, work attitude will influence the operating benefits of enterprise innovation team. Team leader is the development planner of enterprise innovation. The operating ability of the team itself will get fully embodied in its development process. Leaders having forward vision and sharp insight, can analyze the macro and micro environment, set the development direction and goal of innovation teams. Leading figures is the commander of enterprise innovation team, whose powerful executive ability and crisis-handling ability can guarantee innovation

team to operate efficiently and orderly, can reduce the cost of team operation and enterprise management. Leader is the coordinator of innovation teams, through the selection and training of enterprise management, reasonable distribution and incentive, they can improve team members' working enthusiasm and working efficiency.

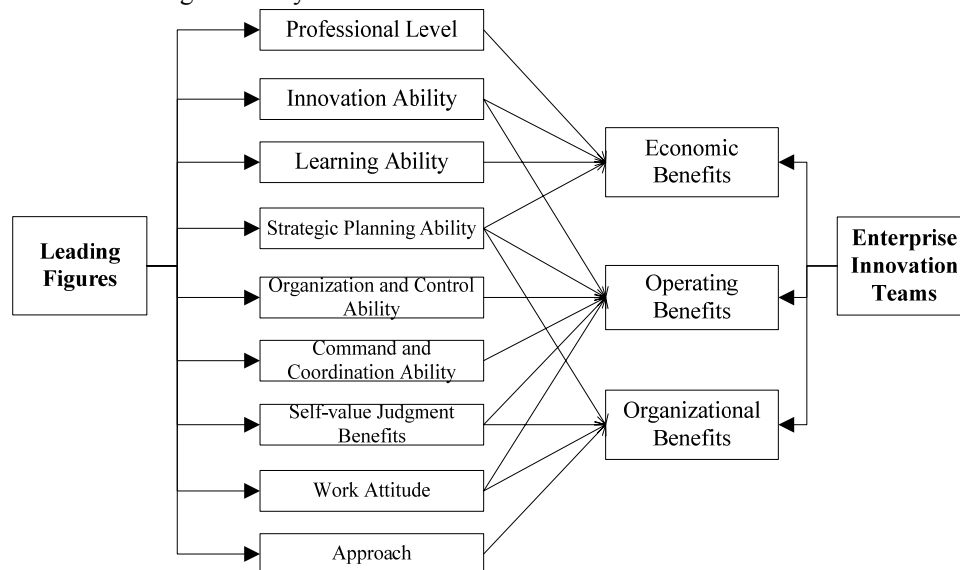


Figure 2 The Features of Leading Figures Associated with the Performance Evaluation of Enterprise Innovation Team

Leading figures of the strategic planning, self-value judgment, work attitude and approach will affect the organization benefits of enterprise innovation team. Leader is the motivator and promoters in the development of enterprise innovation team. Leading figures with strong self-fulfilling will focus more on work. At the same time, leading figures with a strong sense of social responsibility will prompt innovation team to undertake social responsibility actively, which play a big role in improving the entire social image of enterprise innovation team, and they can also improve the social reputation and credibility of innovation team. The character and charm of leading figures make them able to condense the power of the team members, encourage innovation team members to form a common vision and be confident to face difficulties and the future, in turn, can enhance the overall image of the innovation team can be improved, more public satisfaction can also be attained in external speech.

Judging the key factors of leading figures impacts on the performance of enterprise innovation team, we need to study the effect of every factors, especially the influence range and extent on the innovation team performance. At the same time, we should also take it into consideration that the different nature of the enterprise innovation team is affected by leading figures to different degree. The existing enterprise innovation team can be divided into scientific research science innovation team and non-technical research innovation team. There is a big difference in both work object, work goal, work task. But the two types of enterprise innovation team both need common development goals and team members who have work enthusiasm and cooperation consciousness. Leading figures of the charm is the spiritual power, which affects the development of enterprise innovation team, therefore, leaders of personal charm have affected the performance of the two types of enterprise innovation team. Therefore, through the study on the differences of two types of innovation team, the key factors' influence on the performance of innovation team can be concluded.

In the scientific research innovation team, the main task of innovation team is researching and developing new products and new technology. Leading figures of professional ability affects all the aspects, including new technology research, development in creative production, project planning, project evaluation, research, product testing and manufacturing. Creative novelty, height of conception, the feasibility and the success and development prospect are basically decided by the professional ability, so in the research and development of enterprise innovation team of science and technology, leading figures of the professional ability is the key factor that influences the performance of innovation team.

In non-R&D innovation team, the team's main job is the routine products, the task and the objective of the job is to sell the products well in market. In this kind of enterprise innovation team, the

rationality of the development strategy, the execution degree of development plan, the correctness of the executive direction, the handling of emergencies, the synergy degree of team members, the matching degree of team members and post are important factors that affect team work, and the orderly operation of these programs are affected by the leading figures of the management ability, management ability, which, to a great extent, plays a decisive role in the above factors. As a result, leading figures of management ability is the key factor for the performance of no-technical research and development of enterprise innovation team.

5 Conclusion

In the enterprise innovation team, performance affects the development of the team, and influences the development of enterprises as well. The leaders of innovation team performance play a key role. The conclusion of the study is that in the scientific research innovation team, the leader of the professional knowledge is the key factor that influences the performance of the innovation team; In non-technical research innovation team, leading figures of the management capability is the key factor that influences the performance of innovation team. So a reference basis of selection process for the enterprise leaders or leaders has been provided. When making the choice of the leading figures, the leader should examine the alternatives according to the nature of the enterprise innovation team, and with emphasis to achieve the mutual promotion and coordinate development of enterprise innovation team.

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An Empirical Study on Capital Allocation Efficiency of Listed Companies in Hubei Province of China*

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Abstract: Enterprise is the micro base of national economy, whose changes in capital allocation efficiency can reflect the changes of market which play a important role in resource allocation, The development and growth of listed companies in Hubei province depend on both the amount of capital accumulation and the efficiency of capital allocation. A lot of domestic and foreign experts and scholars has focused on the research of capital allocation efficiency, and has proposed a variety of ways to measure the efficiency of capital allocation. The paper makes an empirical study on the efficiency of capital allocation for 1995-2009 listed companies in Hubei province, China with a new method measuring the efficiency of capital allocation. It shows that net fixed assets (investment) and total profit (profit amount) is significantly empirically relative, and the increase in total profit leads to the increase in investment, and the leading effect of profit on investment becomes growing, the efficiency of capital allocation becomes higher.

Key words: Listed companies; Investment elasticity coefficient; Capital allocation efficiency; Empirical study

1 Introduction

Capital is the scarcest resource of listed companies in Hubei Province. The development and growth of listed companies in Hubei province depend on both the amount of capital accumulation and the efficiency of capital allocation. At a micro level, the development of capital allocation efficiency means that those companies who has high rate of return on capital and strong profitability can attract more investment, on the contrary, the investment for those companies who has low rate of return on capital and weak profitability may decrease.

In 2000, Jeffrey Wurgler put forward a method to measure the efficiency of capital allocation directly. The method measured the efficiency of capital allocation by using the sensitivity of capital on profit (investment elasticity coefficient). In recent years, some experts and scholars of china draw lessons from Jeffrey Wurgler's way of thinking. Most of them, like Jeffrey Wurgler, focus on country-level, regional-level and industry-level studies, but little study focused on the enterprise level.

Enterprise is the microcosmic base of national economy, and listed companies in Hubei province are the micro basis of Hubei economic development. it is great important for the development of listed companies in Hubei Provence(China) to enhance the efficiency of capital allocation The variety of capital allocation efficiency of companies can also reflect the market changes which play a role in the resource allocation to some extent, so as to reflect the economic marketization process. (Fang Junxiong, 2006) Therefore, the paper tries to do a empirical study on the efficiency of capital allocation and its changes with all listed companies in Hubei Province as a sample (according to the registered address).

2 Literature Review

Under the condition of market economy, the market plays a basic role in the allocation of resources. The capital allocation efficiency can reflect the perfect degree of the capital market and how the big role capital markets can play in the allocation of resources. Therefore, the domestic and foreign experts pay more attention to the empirical research on capital allocation efficiency, and put forward a variety of ways to measure the capital allocation efficiency .

First step is to measure the efficiency of capital allocation by using capital mobility. Financial liberalization and internationalization of financial markets can make capital free flowing among enterprises, industries, Regions, and even countries, it also can enable the investors to allocate capital throughout the world and spread risks, so as to improve the capital allocation efficiency. Those studies

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such as Ross L. and Sara Z. (1998), Almeida H. and Wolfenzon D. (2005) have supported the conclusion.

Second, to measure the capital allocation efficiency by using Tobin Q or variance of Tobin Q. Tobin Q is the ratio of the sum of stock market value and debt market value with the replacement cost of company assets, and reflects that 1 Yuan worth of asset represents the present value of future cash flows. If Tobin Q is greater than 1, the present value of future cash flows represented by 1 Yuan of investment is greater than 1. therefore, the company are incentive to issue stocks and to expand its investment, which may lead to a decline in the marginal return on capital. In a perfect market, Tobin Q should be equal to 1. So it can reflect the capital allocation efficiency by using Tobin Q or variance of Tobin Q. both Abdul A. (2005) and Fan Xuejun (2008) used the method.

Third, to measure the capital allocation efficiency by using marginal capital output or variance of marginal capital output. if, K-capital stock, ΔK - capital incremental, Y- annual output, ΔY -total output increment, then the incremental capital output ratio (ICOR) is equal to $\Delta Y/\Delta K$. It shows that the increase of output is brought by a unit of capital increment, capital allocation efficiency will happen when the ICOR has improved. Moreover, capital flows across industries with different efficiency will cause the convergence on the incremental capital-output ratio (ICOR) in various Sectors, therefore, the variance of incremental capital-output ratio (ICOR) from industries can reflect the capital allocation efficiency. Zhang Jun (2002)、Shen Neng 、Liu Fengchao (2006) used this method. Similar to the method, Liu Ganzhou (2003) used the first-order conditions of output maximization to judge whether the configuration of capital in various industrial sectors is at its best. That is to say, the marginal output of capital are equal when capital allocation efficiency is in the optimal state.

Forth, to measure the capital allocation efficiency by using the investment elasticity coefficient, which is put forward in 2000 by Jeffrey Wurgler (2000). Many experts and scholars in China learn from the method to study capital allocation efficiency of China's industries or regions. For example, Feng Yuming (2003); Shang Wei and Zhao Xin (2004); Han Liyan, Wang Zhebing (2005); Zhang Kuiwei and Xu ke (2006); Zeng Wuyi and Zhao Nan (2007); PuYanPing and Wang Weiqun (2008); Xia Tian (2008); Yu Ying (2008); Sun Wenbo (2009); Han yu and Hua Xiaoan (2009), etc.

In the above four methods, the investment elasticity coefficient, which Jeffrey Wurgler put forward in 2000, is more suitable to measure the capital allocation efficiency of Listed Corporation. however, if directly use the econometric model adopted by Jeffrey Wurgler, there are some problems.

The econometric model put forward by Jeffrey Wurgler in 2000 is as the following.

$$\ln \frac{I_{i,t}}{I_{i,t-1}} = \alpha + \eta \ln \frac{V_{i,t}}{V_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

This is a double log-linear regression model. In this model, I-net value of fixed assets, V-added value; I-industry, t-year. Obviously, η is the elasticity of I to V, namely the 1% growth of V leads to the growth rate of I, which can be used to measure the capital allocation efficiency.

If directly using this model to study the capital allocation efficiency of listed company, there are some problems. first, V can be expressed by the total profit, net profit or the net cash flow of the firm for a year, But some of the company's annual net profits or the total net profit, cash flow may be negative, the ratio of V in adjacent two years may also be negative, then its natural logarithm is meaningless. Second, due to the new listing, delisting or mergers and acquisitions, the number of listed companies in different years is not the same, the comparability of I and V in different years is not strong. Third, listed companies in Hubei Province is not much, a total of 70 can be found in the Shanghai stock exchange and Shenzhen stock exchange by the end of 2009, and there are a number of annual report in 2009 cannot be checked on the Shanghai stock exchange and Shenzhen stock exchange. the annual samples may be too small to affect the quality of the regression analysis.

3 Research Design

3.1 Econometric model

This paper uses the econometric model to study the capital allocation efficiency of listed companies in Hubei province, China.

$$Y_{i,t} = \beta_0 + \beta_1 X_{i,t} + \varepsilon_{i,t} \quad (2)$$

In the formula, Y-company's net fixed assets (investment), X-total profit of the firm (profit), i-Company, t-year. Obviously, β_1 expresses the relationship between investment and profit, and means

the investment which are caused by 1 Yuan of profits. As β_1 grow larger, the investment caused by 1 Yuan of profits becomes greater. for a company, the more profitability it has, the more investment it can attract. so the capital allocation efficiency is higher.

3.2 The research objects and sample data generation

With all compaies in Hubei province listed on the Shanghai stock exchange and the Shenzhen stock exchange from 1995 to 2009 as the research object, to select the sample data by using the CSMAR database: First, “portfolio selection” in Shanghai A shares and the Shenzhen A shares; Second, to choose the Hubei province in the “area selection”; Third, To query and derive the annual net value of fixed assets in each company in the balance sheet of " listing company's financial reporting database" in the CSMAR; and to query and derive the annual “total profit” in each company in the income statement.

4 Statistical Analysis

First of all, to analyze all the sample data from 1995 to 2009, to inspect the total capital allocation efficiency; Then, all sample data are divided into three sections, namely 1995-1999, 2000-2004, 2005-2009, to explore the changes of capital allocation efficiency by respective statistical analysis .Using SPSS11.5 for descriptive statistics, correlation and regression analysis, the results are as the followings.

4.1 The results of all sample analysis

The results of all sample analysis are shown in table 1, table 2, and table 3

Table 1 Descriptive Statistical Analysis of All Sample Data

period	sample number	Net value of fixed assets (Billion Yuan)				Total profit (Billion Yuan)			
		Min.	Max.	Mean.	Std.Error	Min.	Max.	Mean.	Std.Error
1995-2009	737	0.00	442.60	9.22	28.86	-9.86	94.07	1.27	5.90

Table 2 Correlation Coefficient of All Sample Variables and Its Significance

period	correlation coefficient of net value of fixed assets and total profit and its significance	
	Correlation coefficient	Sig.
1995-2009	0.754**	0.000

**： The correlation coefficient is significant at the 0.01 level (two-tailed test)

Table 3 Results for Regression Analysis

period	project	coefficient	Std.Error	t	Sig.
1995-2009	B ₀	4.538	0.715	6.349	0.000
	B ₁	3.686	0.118	31.119	0.000
	R ²	0.569			
	Adj.R ²	0.568			
	F	968.368			
	Sig. of F	0.000			

4.2 The results of segmented sample statistical analysis

The results of segmented sample statistical analysis are shown in table 4, table 5, and table 6.

Table 4 Descriptive Statistics Analysis of Segmented Sample Data

period	sample number	Net value of fixed (Billion Yuan)				Total profit (Billion Yuan)			
		Min.	Max.	Mean.	Std.Error	Min.	Max.	Mean.	Std.Error
1995-1999	144	0.38	30.68	3.34	4.01	-1.18	8.41	0.81	1.11
2000-2004	285	0.01	158.63	6.26	11.60	-7.88	47.22	0.66	3.23
2005-2009	308	0.0002	442.60	14.71	42.55	-9.86	94.07	2.05	8.50

Table 5 Correlation Coefficient of Segmented Sample and Its Significance

period	correlation coefficient of net value of fixed assets and total profit and its significance	
	Correlation coefficient	Sig.
1995-1999	0.712**	0.000
2000-2004	0.843**	0.000
2005-2009	0.747**	0.000

**： The correlation coefficient is significant at the 0.01 level (Two-tailed test) .

Table 6 Results for Segmented Sample Regression Analysis

period	project	coefficient	Std.Error	t	Sig.
1995-1999	B ₀	1.244	0.293	4.252	0.000
	B ₁	2.576	0.213	12.096	0.000
	R ²	0.507			
	Adj.R ²	0.504			
	F	146.314			
	Sig. of F	0.000			
2000-2004	B ₀	4.249	0.378	11.239	0.000
	B ₁	3.027	0.115	26.349	0.000
	R ²	0.710			
	Adj. R ²	0.709			
	F	694.277			
	Sig. of F	0.000			
2005-2009	B ₀	7.069	1.662	4.254	0.000
	B ₁	3.736	0.190	19.634	0.000
	R ²	0.557			
	Adj.R ²	0.556			
	F	385.484			
	Sig. of F	0.000			

5 Conclusions

First, All the sample statistical analyses show that the correlation coefficient of net value of fixed assets and total profit are 0.754, which are significant at 0.01 level. The results mean a higher degree between net value of fixed assets and total profits. The regression coefficient of B₁ is 3.686, which is significant at 0.00 levels. It shows that the investment brought by 1 Yuan of profits is 3.686, the efficiency of capital allocation is higher.

Second, the statistical analyses of segmented sample show that, the correlation coefficient of net value of fixed assets and total profits are respectively 0.712, 0.843, 0.747 from 1995 to 1999、from 2000 to 2004 ,and from 2005 to 2009,these are significant at the 0.01 level. It expresses there are significant empirical correlation between net value of fixed assets and total profits, the correlation degree from 2000 to 2004 is the highest, it is followed by the correlation degree from 2005 to 2009, and the correlation degree from 1995 to 1999 is the minimum; the regression coefficient of B₁ are respectively 2.576, 3.027, 3.736 from 1995 to 1999,from 2000 to 2004,and from 2004 to 2009, all are empirical and significant at the 0.00 level, and gradually increase. it indicates that the increase in total profit leads

to the increase in investment, and the leading effect of profit on investment becomes growing, the efficiency of capital allocation becomes higher.

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Research on Evaluation of Customer Knowledge Management Competence

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Abstract: Customer knowledge management, the integration of customer relationship management and knowledge management, arouses modern enterprise's attention increasingly. This paper aims at assessment of enterprise customer's knowledge competence and devises hierarchically the customer knowledge management competence evaluation system including working procedure index, enterprise customer index, learning & growing up index as well as the sales performance index by taking the reference of balanced scorecard, constructing the comprehensive evaluation model of customer knowledge management competence by applying the AHP

Key word: AHP; Customer knowledge management competence; Index system; Evaluation model

As the composed part of Customer Relation Management (CRM), Customer Knowledge Management can not only improve customer service quality but also promote the enterprise's sustainable development in order to enhance the enterprise's adapting ability of external market environment better. The level of customer knowledge management is embodied by the ability of customer knowledge management competence^[1]. Hence in this circumstance of hyper competition, the practical way of raising the competitiveness of enterprise and constructing the enterprise's competition advantage depend on analyzing the composition of enterprise's customer knowledge management, establishing the assessment model while taking the evaluation.

1 AHP and Customer Knowledge Management Competence

Analytic Hierarchy Process (AHP) was initially proposed by celebrated American operational researcher T.L. Saaty^[2]. It is the effective measure of decision-making and comprehensive evaluation dealing with multiple targets, factors and layers. The basic principle is to organizing the various factors in the complicated problem by dividing the orderly layers of mutual connections. Then the quantitative quota is given by judging the relative importance of each layer with the following step of defining the weight-important sequence of all the factors by using the mathematic measure. Consequently, the problem will be solved by arranging and analyzing the results. Commonly, it consists of 5 phases: constructing the layer structure model, forming the judge matrix; single hierarchical arrangement and coherence test; the ultimate layer arrangement; the coherence test of ultimate layer arrangement.

Customer's knowledge management competence is Customer knowledge management oriented applying by enterprise. Allocating, developing and integrating the resources inside and outside the enterprise as well as utilizing, analyzing and managing customer's information for satisfying the unique demands actively in order to integrate the competitive advantage knowledge and skill by setting up, developing and enhancing the customer relationship. It is the form of enterprise ability constituted by various sub-abilities.

2 The System Funding of Customer Knowledge Management Competence Index Test

Robert Kaplan from Harford Business School and Chief of Nolan Norton Institute David Norton proposed the method of organization performance management - Balance Score Card (BSC), which viewed the organization performance from 4 aspects: learning & growing up, operation flow, customers and finance. They consider the benefit can be brought only by the enhancement of sales, decrease of operational cost and the improvement of assets turnover rate^[3]. Taking the reference of BSC, this paper regards the operation flow, customer, learning and growing, sales performance as the 4 indexes for the judgment of enterprise's customer knowledge management competence.

2.1 Index of operation flow

Customer knowledge management activity includes the acquisition, sharing applying and innovation of customer knowledge. In such circumstance, the operation flow index is comprised of customer knowledge acquisition ability, effectiveness of customer knowledge sharing mechanism,

applying ability of customer knowledge, level of customer knowledge innovation ability. The customer knowledge acquisition ability requires the enterprise possesses the basic diathesis of customer knowledge acquisition. Such diathesis embodies the level of operation, management and technology as well as the strength of capital and human resource^[4]. The coverage rate of customer knowledge and the reaction ability of customer change are two major aspects for measuring the effectiveness of customer knowledge sharing mechanism.

There are 2 indexes for reflecting the applying ability of customer knowledge: the first one is the identification of gold customers. 80% of the profit is created by 20% of the customers. Such 20% of customers are called gold customers whom we should take special attention and preferential terms. The second aspect is the knowingness ability of customer's purchasing motivation. Only we acknowledge customers' demands and motivation so that the customers purchasing behaviors can be predicted and guided precisely. The level of customer innovation ability can mainly be reflected by 2 aspects of developing force of new products and custom-oriented product force.

2.2 Enterprise customer index

Enterprise customer index is reflected on the 4 aspects of diversification, Timeliness, effectiveness and dealing with the customer's complaints in the communication between enterprise and customers. The communication would be more convenient if there were more ways of communication between enterprise and customers. The aspect of timeliness embodies 2 factors of customer abandon rate and the length of waiting during the communication. The diversification and timeliness of communication is the base for customer maintenance. The effectiveness of communication reflects the quality of customer relationship. The reflection of it is through the length of time when answering customer's question and the friendliness, acuteness and knowledge of enterprise's personnel communicating with customers. The ability of dealing with customer's complaints refers to speed and effectiveness of handling complaints, which is the average time of resolving customers' complaints and the satisfaction degree of customers to such resolving scheme in other words.

2.3 Index of learning and growing up

The index of learning and growing up comprises the supportive force of organizational environment, the sustainable force of human capital, the level of informative technology and degree of importance from the senior leaders. Only when the organization possesses the strong force of adapting environment the favorable supporting of providing customer knowledge management could be formed from the organizational level. The supportiveness of human capital embodies on the aspects of knowledge employee ratio, the time and effectiveness of personnel training.

Taking the advantage of advanced information technology will facilitate the effective management of enterprise's customer knowledge and building up the system of knowledge management, enhancing enterprise's innovation ability. Customer knowledge management is a prominent reform of enterprise's management needing the support and facilitation of senior leaders for deploying the work smoothly. All these need the enforcement of awareness degree of the customer knowledge management from senior leaders as well as the promotion rate of implementation of customer knowledge management in order to make it practicable.

2.4. Sales performance index

There are 4 aspects reflecting the sales performance index. They are namely the customer acquisition rate, customer satisfactory rate, cross sale volume and sales growth rate. Customer acquisition rate refers to the rate that the enterprise obtains the target customers. Customer satisfactory rate is related to the products and service value provided by the enterprise. If the value of product and service provided by the enterprise exceeds the cost or the price paid by customers, it will raise the customer's rate of satisfaction and loyalty^[5]. Cross sale volume reflects the relation quality between enterprise and customers, which depends on the communicative ability between them as well as the ability of customer value creation and transferring. Such ability is one of the factors greatly influencing if customer's will do the cross sales in the future. Sales growth rate is the total ratio of this year's sale growth volume to the last year's sales revenue volume. It reflects the circumstance of increasing and decreasing of enterprise sales revenue and it is one important index of enterprise's growth and developing ability.

3 Model of Customer Knowledge Management Competence Test

3.1 Establishing the hierarchical structure model

Based on the index of customer knowledge management competence mentioned above, the

customer knowledge management competence test model is constructed according to AHP. (Figure 1). Such model is divided into 3 layers: the first one is target layer A, the second one is principle layer B, thirdly, the index layer. First level indicator is $X = (X_1, X_2, X_3, X_4)$. Second level indicator: $X_1 = (X_{11}, X_{12}, X_{13}, X_{14})$; $X_2 = (X_{21}, X_{22}, X_{23}, X_{24})$; $X_3 = (X_{31}, X_{32}, X_{33}, X_{34})$; $X_4 = (X_{41}, X_{42}, X_{43}, X_{44})$

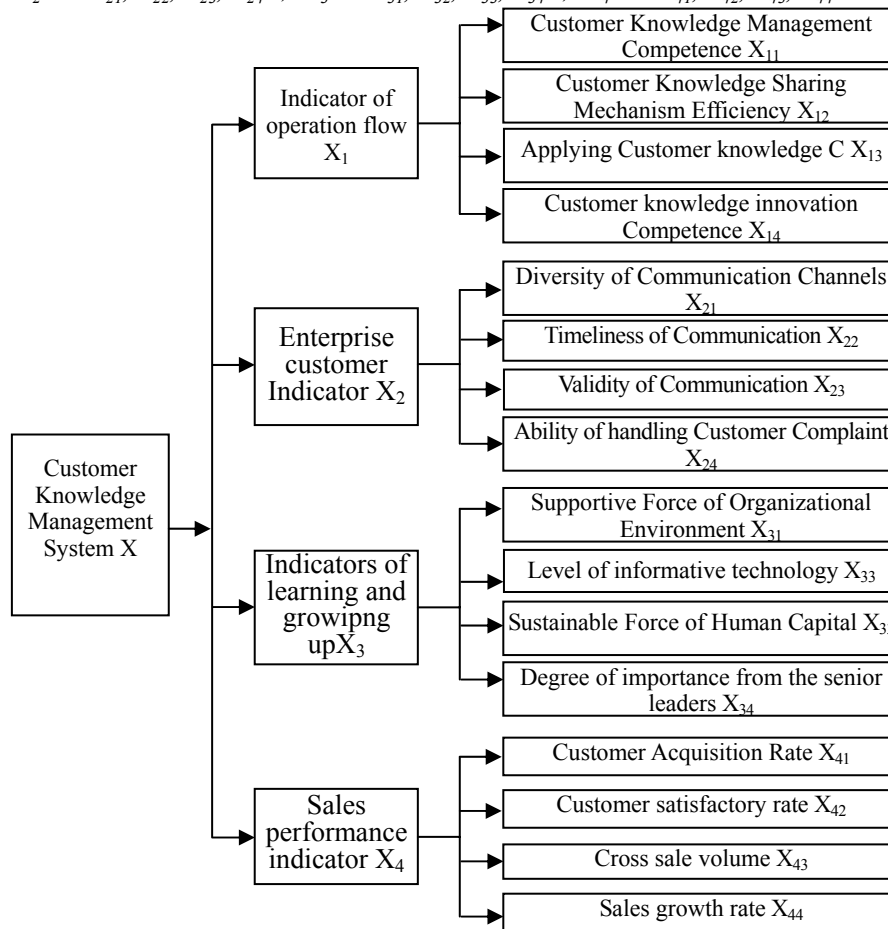


Figure 1 The Test System of Customer Knowledge Management Competence

3.2 Construction of judging matrix

This model adopts 1-9 rating scale method. The judging matrix is written by assessment specialists group. 1-9 rating scale method is shown in table-1

Table 1 Scale Table

Scale	Denotation
1	Comparing 2 factors, X_i is as important as X_j
3	Comparing 2 factors, X_i is slightly more important than X_j
5	Comparing 2 factors, X_i is prominently more important than X_j
7	Comparing 2 factors, X_i is especially more important than X_j
9	Comparing 2 factors, X_i is extremely more important than X_j
2, 4, 6, 8	The mid-value of 2 proximate judgment above

Carry on geometric mean procedure the paired comparison results which are according to indicator of operation flow, indicator of learning and growing up, enterprise customer indicator and sales performance indicator of each specialist. Then constructing the judging matrix A.

$$A = \begin{pmatrix} b_{11} & b_{12} & \dots & b_{14} \\ b_{21} & b_{22} & \dots & b_{24} \\ & & & \dots \\ b_{41} & b_{42} & \dots & b_{44} \end{pmatrix}$$

In same manner, construct 4 judgment matrixes on the principal of $C_i (i=1,2 \dots,4)$ corresponding to the indexes of third level.

3.3 Seeking characteristic value and Characteristic vector of matrix

In this paper, the Characteristic vector is sought by root method. The basic steps are as follow: firstly calculate the product M_i of the elements b_{ij} in each line of B : $M_i = \prod_{j=1}^s b_{ij}$, then calculate β ,

the root of n of M_i : $\beta_i = \sqrt[n]{M_i}$; Finally, carry on the normalization processing of vector $\beta=(\beta_1, \beta_2, \dots, \beta_n)$, command W_i vector $W=(W_1, W_2, \dots, W_n)$ which is Characteristic vector, the max characteristic root is $\lambda_{max} = \sum W_j \cdot b_{ij} / W_i$.

3.4 hierarchical arrangement and coherence test

Single hierarchical arrangement is seeking the characteristic value of judgment matrix A. Seeking characteristic vector W which is corresponded with max characteristic root λ_{max} . After the process of normalization, the result is considered as the importance ranking weights to certain factors of upper level. Total hierarchical arrangement is to calculate the arrangement weights of same level's factors' relative importance to the final task. The calculation method is to carry on the weight of certain index (the third level) and multiply the weight of target in such aspect.

When the judgment matrix totally satisfies the following 3 terms: $b_{ii}=1$, $b_{ij}=1/b_{ji}$, and $b_{ij}=b_{ik}/b_{jk}$. We consider the judgment matrix takes on the complete coherence. At this point, the max characteristic root is only the λ_{max} , and the rest of characteristic roots are 0. Generally $b_{ii}=1$, $b_{ij}=1/b_{ji}$ is easy to prove. However, $b_{ij}=b_{ik}/b_{jk}$ is not easy to satisfy, and this requires the coherence test of judging matrix, the indicator is :

$$C \cdot I = (\lambda_{max} - n) / (n - 1) \tag{1}$$

$$C \cdot R = C \cdot I / R \cdot I \tag{2}$$

And the value of R I can be found according to Table 2

Table 2 R.I Value

N	1	2	3	4	5	6	7	8	9	10
R-I	0.00	0.00	0.58	0.89	1.12	1.24	1.36	1.41	1.45	1.49

The test principle When $C \cdot R < 0.1$, it is considered the judging matrix meets the demand of coherence, the arrangement is valid. When $C \cdot R \geq 0.1$, it is considered the judging matrix does not meet the demand of coherence and it requires adjustment of judging matrix until $C \cdot R < 0.1$ which means new weight table is obtained.

3.5 The Quantization of Customer knowledge management evaluating indicator

Part of the qualitative indicator needs quantitative transformation in the evaluating indicators. However, there are no unified norms of quantization coefficient and it is ascertained according to the particular situation. This paper adopts the method of semantic difference membership valuation method. The quantized indicators are fixed from scale one to scale five as shown in the table 3. Each scale has the explicit and concrete requirement as well as establishing the relationship of each scale and degree of membership.

Table 3 The Evaluation of Qualitative Indicators

qualitative indicators	Better	Good	Average	Bad	Worse
Evaluation	1	0.8	0.6	0.4	0.2

Finally, calculate the scores of customer knowledge management. Suppose the weight of C is W_i with regard to C_i , the weight of C_i is W_j' with regard of C_{ij} , the evaluation of indicators is V_{ij} , the

score of customer knowledge management competence sub item is $V_i = \sum V_{ij} \times W_j$, thus, the total scores of w customer knowledge management is $V = \sum V_i \times W_i$

4 Conclusion

This paper takes the view of customer knowledge management definition and establishing the system of customer knowledge management competence test index according to 4 aspects of operation flow, customer, learning & growing up, sales performance and designing the testing model of customer knowledge management competence by applying AHP. However, the customer knowledge management is a complicated procedure and whether the test of customer knowledge management competence only comprises the indicators above still needs the practical testing. Thus, the issues on the system of customer knowledge management competence and designation of test model as well as the related problems are still deserved for further research and exploration.

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Barriers and Countermeasures of Information Sharing in Emergency Management*

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Abstract: While information is probably one of the hardest things to share in a coalition environment, there are still strong incentives to share information. Some obstacles to full information sharing lie in the lack of information sharing environment, of common structure and technology accessible and of supervision channel as well. Besides, participants in emergency management have to rely on advocating sharing culture and motivating the willingness to optimize multinational information sharing. And positive procedures are supposed to be setting up rules, creating a shared database and implement training, which facilitate effective sharing. Measures for the long-term success should also be taken into consideration.

Key words: Information sharing; Obstacle; Collaboration; Countermeasures

1 Introduction

Sharing of information becomes increasingly important for most military operation-other-than-war (MOOTW) successes. Governments and military authorities require timely and accurate information to deal effectively with most of the security threats they are facing today. A widely acceptable mechanism for obtaining such information is to share with other countries. After “9/11”, the Department of Defense (DoD) of the United States issues The DoD Information Sharing Strategy (DoDISS, 2007), aiming at establishing the vision and goals for information sharing and requires “innovations to enhance information sharing across the Department and with external partners”.^[1] From then on researches on the information sharing have been done from different dimensions such as the key barrier to intelligence sharing, information sharing in emergency response, as well as the assessment on the effectiveness of intelligence information sharing (Walsh, 2006; Babajide Osatuyi, 2011; Freedman, 2012). Prior studies that investigated information sharing report that information sharing, “including the two-way flow of information and analysis, and cooperation between law enforcement and intelligence entities, remains problematic”,^[2] and that there is a need for an understanding of the environmental factors that shape the information sharing behavior (Hansen & Kalervo, 2005). In many cases, technological, cultural and political challenges exist, all contributing to the less-than-perfect nature of the existing information sharing framework.

This paper aims to identify potential obstacles to information sharing and to study the possible contributing factors to information sharing failure. And it also explores the measures leading to successful information sharing and the solutions to leverage existing intelligence operations that can promote a favorable intelligence sharing environment.

2 Incentives to Share Information

In DoDISS (2007), information sharing is defined as, “making the information available to participants (people, process or system)”. Information sharing occurs when “the sender communicates information in its possession to the receiver”, which covers the cultural, managerial, and technical behaviors.^[3] Although information is one of the hardest things to share in a coalition environment, the tendency to get rid of masking information is transformed. And there are contributing three factors having created stronger incentives to share information.

Firstly an information-rich environment today with so much technology available facilitates the sharing of kinds of information. Electronic tools, the Internet resources, for instance, ensure daily exchanging and updating of communications. Sharing kinds of information in different fields is of great importance and becomes unavoidably a trend in both people’s daily life and business or military areas as well.

Secondly, some extreme events or emergencies, such as might be precipitated by natural disasters, present a strong need for effective information sharing. Managing such global emergencies requires people’s working together across diverse fields in response to the extreme situation. Information sharing

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strategies at a managerial level by analyzing reports of nature disasters such as an earthquake is what many countries are advocating. Managing these emergencies creates the need for collaboration in information so as to deal with the situation. In many cases, information in the after-action assessment is reported publicly.

Thirdly, the painful lesson learned from 9/11 that information related to the attack was not shared across the intelligence community,^[4] urges the United States to reform its intelligence policy with much focus on the sharing of information. A set of governmental documents such as DoD Information Sharing Strategy (2007), Intelligence Community Information Sharing Strategy (2008), National Strategy for Information Sharing and Safeguarding (2012) have been issued to reinforce intelligence sharing, which leads to a great demand for improvement in the capability and value of the existing information support structures even in the whole world. Other countries in the world make consequent efforts to adjust their practice to meet the new needs for information sharing.

3 Obstacles to Information Sharing

True information sharing is believed to ensure all participants have access to any information they need. Studies, however, report that there are still difficulties in the effective information sharing and failures in sharing information usually occur in the collaboration cycle.

Take the earthquake in Haiti in 2010 for example, the situation report from Haiti indicated that communication and coordination among agencies of the United Nations World Food Program (WFP), the International Organization for Migration (IOM), the International Federation of Red Cross (IFRC), the United Nations Development Project (UNDP), and the World Health Organization (WHO), suffered possibly as a result of lack of structure and familiarity with a common set of rules of engagement.^[5] From the report on this emergency event, the organizations cooperated disorderly, which resulted in the resistance to information sharing. Sometimes the same information is reported by different sections, which resulted from the lack of collaborative response. In some context, “cultural, bureaucratic, and technological barriers to the sharing of information among agencies”^[6] contribute greatly to the less-than-perfect cooperation.

Obstacles to information sharing fall into the following categories.

3.1 Lack of information sharing environment

Information sharing processes are considered to have great impacts on group work especially when an emergency occurs. Participants, however, seem to have a nature tendency to mask his capabilities, which is the key barrier to effective sharing. It is reported that member states in the European Union have little trust in each other to share completely.^[3] If they don't tackle the problem of mistrust, participants will find themselves put into a dilemma. When taking part in the operation, different organizations are expected to carry out the responding duties, rather than different activities without collaboration which likely brings about the information sharing failures.

3.2 Lack of a common structure

Movements to closer cooperation demand for a working coding scheme can facilitate the information sharing in sorts of operation efforts. The fact is that the system and procedure for the participants to share the relevant information still remain problematic. There appears no formal structure, identifying the information shared during the response efforts. Additionally, each country has established its own organizations for operations and there are differences in national doctrines and regulations, which also leads to the resistance to the sharing of information in the global commitment to emergency response. In some cases, the extent to which departments are willing to share information with partners is unclear. For example, in Haiti earthquake relief, inconsistencies are noticed to be prevalent in the form of information delivery. (Babajide Osatuyi, 2011) And access to any given information only open to some participants can also be expected to hamper sharing information

3.3 Lack of accessible technology

It is stated in DoDISS(2007) that improving information sharing constitutes a cornerstone of American national priorities, which makes it clear that efforts to address the threats posed by terrorism have led to a reconsideration of how anti-terrorism information can be shared. In the assessment of the effectiveness of post-9/11 intelligence information sharing, the obstacles to information sharing are attributed to such factors as turf battles, organizational culture and technology and knowledge management (Freedman, 2010). Less effective information mobility in some cases result from less perfect management and processing the information. What's more, there is no “metadata tagging standards established to investigate and index the information needed”^[7]. Multiple data bases usually

require a more complex management system so as to fulfill technical information sharing.

3.4 Lack of supervision channel

Organizations that worked together without monitoring system are not able to make response quickly to the emergency because much information from many different sources should be acquired and analyzed. Processes and procedures of current technology can't meet the demand for multinational information. Situational operation depends much on a comprehensive supervision framework that is critical to improve the capability for information sharing. Without highly developed monitoring technology support, effectiveness of information sharing will not be achieved.

4 Steps to Effective Information Sharing

As complex information source is, agencies have to rely on systematic steps to optimize multinational information sharing, which covers environment advocating and willingness motivating. And positive procedures should also be involved.

4.1 Challenging new environment

Since The 9/11 Commission Report calls for the creation of an information sharing environment (ISE) to facilitate the sharing of terrorism information among all appropriate federal, state, local, tribal, and private sector entities ^[4], promoting a broader information sharing culture among people and organizations becomes a heated issue. High trust is encouraged so as for international agencies obtain freely the information in a reliable manner. The Office of the Director of National Intelligence of America calls for transition from its historic culture of "need to know" to one of a "responsibility to provide". This new policy should assist in removing "cultural barriers and create incentives to encourage collaboration that is so critical to counterterrorism efforts."^[4]

The willingness to share is another essential factor that should be taken into consideration. Each participant has strong sense to take part in collecting information and its delivery. The intention of extensive coordination may compensate for the effect of the lack of information. Sharing as open as possible can get rid of mistrust that is thought as the key barrier to deep sharing of information. Effective information sharing requires all participants hold a strong degree of trust in each other.

4.2 Information sharing strategies

In addition to willingness to share, several critical missions pertaining to information sharing include: ".....ensure maximum availability of and access to intelligence information within the Intelligence Community, establish objectives and priorities for collection, analysis, production, and dissemination of national intelligence, and ensure the most accurate analysis of intelligence is derived from all sources to support national security needs".¹ And specific changes include the following adjustments to ensure the sharing of information:

4.2.1 Set up rules

Rules are helpful in achieving multinational shared awareness and providing guidance for effective information sharing. Proper levels of rules will enhance the cooperation and coordination among the participants. In some cases, when there exists no agreement, then platform for participants to meet and to discuss regularly matters of common concern has much priority. Requirements for processes, standards, and technologies can be established in the development and integration of policies. Providing an organizing framework to guide collective efforts will be meet needs for information sharing.

4.2.2 Create a shared database

While information sharing cannot be relegated to only an issue of technical information sharing aspects, the technology issues related to information sharing cannot be overlooked,² establishing a particular structure to foster sharing and easy comprehension among agencies becomes urgent. In any operation, standardized operating procedures would allow sharing and releasing of information early in the process. A common vision to facilitate the development of standards, policies, and collaborative processes is one of the top priorities. With standardization network, technical mechanisms such as setting up institutions, establishing website, and issuing policy, budget, process, and technology relating to information sharing can facilitate or improve exchange information.

4.2.3 Training

¹ See: Office of the Director of National Intelligence, "About the ODNI". <http://www.dni.gov/who.htm> (accessed December 28, 2009).

² See: Office of the Director of National Intelligence, "About the ODNI". <http://www.dni.gov/who.htm> (accessed December 28, 2009).

Any difficulty from sophistication in technology and automation will lead to ineffectiveness in information sharing. The purpose to carry out personnel training among participants is to develop their ability to achieve true advancements in information sharing. People work there should have the capability to use the classification levels, reliability system, information procedures and especially in multilevel security system, which should provide incentives for sharing and restore a better balance between security and shared knowledge. As a matter of fact, personnel's technical capability will result in a need for facilitating information sharing.

4.3 Measures for the long-term success

Since The Intelligence Reform and Terrorism Prevention Act (IRTPA) of 2004 that makes the principle of 'responsibility to provide' take its shape, a number of reforms have strengthened information sharing capabilities. Efforts in the long run should be made to foster cooperation in information providing and analyzing. And a high degree of supervision of coordinating and interacting in information sharing is needed.

4.3.1 Collaboration based on net-worked systems

To improve information sharing, cooperation is a relatively new trend. In most cases, information sharing is characterized by complexities and dynamism, especially in extreme events or emergencies, which creates the need for collaboration transcending traditional boundaries. With the initiatives to provide, many efforts will be made to accelerate and improve the ability to exchange resources, maximize functions of the mechanism, and establish and employ the common database. Net-worked systems relegate the complexity of information sharing, allowing the degree to share to the full play. In other words, coordinate with standardized procedures can support the information sharing requirements at any levels. Sometimes the common policy and regulations should also be taken into consideration for different organizations work together.

4.3.2 Supervision to enhance sharing information

Different teams or agencies from several backgrounds usually develop their own approaches to manage a response effort in an operation. That needn't mean an environment without supervision. It does mean supervision under some new committees or organizations that ensures effective collaboration. For example, a standardized exchange system with common control may be extraordinarily helpful to avoid failure to share information. Monitoring timely can prevent working against full sharing. For sharing purpose, a give-and-take relation is required between the new committee and its partner member, where facilitating sharing is the top priority. A high degree of interaction may ensure the information product available. In other words, the committee takes the responsibility to provide policy, process and technology issues to guide information sharing, and the participants members have the duty to carry out the contact and its procedures.

5 Conclusion

Much has been achieved in creating the coordinating environment, which makes information sharing the future trend. But it needs to be kept in mind that different levels of mistrust still exists and the degree to share is not yet satisfactory. Sharing is not becoming dependent on the participants' information sources nor being forsaken. As the American intelligence communities expect, full information sharing has a long way to go.

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A Research on the Operating Mechanism of the Management Innovation of Pale-biotic Fossil

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Abstract: This paper has analyzed the connotation and the influencing factors of the operating mechanism of the management innovation of pale-biotic fossil from the point of view of system theory, thinks that the management innovation of pale-biotic fossil must have the internal operating mechanism and the external operating mechanism in conformation with the two aspects i.e. internal and external driving forces; has tentatively established the operating mechanism of the management innovation of pale-biotic fossil; come to conclusion that the operating mechanism of the management innovation of pale-biotic fossil is the foundation that the activities of the management innovation of pale-biotic fossil can continuously operate with high quality and high efficiency in the right decision.

Key words: Management innovation; Operating mechanism; Pale-biotic fossil

1 Introduction

The fossils is an irreplaceable resource, the scientific value and economic value of this resource determine that it needs not only the protection and utilization and also the management innovation, the innovation is in the core position of the management of pale-biotic fossil. The mutual relationship and mutual influence between all levels of government, relevant departments and the public form a whole of the protection, utilization and management innovation, which shares out the work and help one another,. But because the system and mechanism are not reasonable, the protection, utilization and management innovation of pale-biotic fossils don't adapt to the requirements of local economic and social development, it seriously restricts the development of the protection, utilization and management innovation of pale-biotic fossils, so it is very necessary to research the operating mechanism of the management innovation of pale-biotic fossil from the point of view of system theory.

2 The Connotation of the Operating Mechanism of the Management Innovation of Pale-Biotic Fossil

The word “mechanism” was taken from the Greek; its original intention is the structure and operating principle of the machine^[1]. The mechanism is system plus way or the systematized way. The mechanism of the management innovation of pale-biotic fossil is that continuously seek the internal function and operating mode of the innovation under the guiding of the idea of the management innovation of pale-biotic fossil.

The operating mechanism of the management innovation of pale-biotic fossil refers to the management of pale-biotic fossils operates the restricted relations and functions of the mutual relationship and effect between all the component elements, Its role is to coordinate the various component elements to run regularly according to a certain way and to play the whole function in the process of the management innovation of pale-biotic fossil, it is the most complex mechanism in the mechanism of the management innovation of pale-biotic fossil, covers the whole process of the protection, management, scientific research, popularization of scientific knowledge and rational use of the pale-biotic fossils, plays a crucial role to promote the process of management innovation of pale-biotic fossil.

So, the operating mechanism of the management innovation of pale-biotic fossil is the relationship and operation in the specified innovation process, rather than isolated elements. The functions the operating mechanism of the management innovation of pale-biotic fossil mainly focus on coordination of the elements the whole process of the management innovation of pale-biotic fossil, ensure that the management innovation of pale-biotic fossil is carried out smoothly and comprehensive benefits are increased continuously, the management innovation of pale-biotic fossil is achieved by playing the role of each function contained inside the operating mechanism.

The activity of the management innovation of pale-biotic fossil is a complex process, intertwined with a various powers in it; its behavior is a result of joint action driven by the external power and

internal interests. So, the management innovation of pale-biotic fossil must have both internal operating mechanism and the external operating mechanism which are compatible with the two aspects of internal and external driving forces. The internal operating mechanism mainly includes the mechanism of scientific management, the mechanism of talent management and the mechanism of fund investment; the external operating mechanism mainly includes the government mechanism, market mechanism and social mechanism. Only establish and promote the organic combination of the two mechanisms, can give full play to the two mechanisms, can also make the management of pale-biotic fossil really has innovative behavior, and then can improve the level of the management innovation of pale-biotic fossil.

3 The Factors to Influence on Management Innovation of Pale-Biotic Fossil

3.1 The replacement of the protection of the resources and the long-term interests by economic benefit

Find according to investigations that the pale-biotic fossil resources of our country are basically located in poor mountain areas, the economic development of these areas are more backward, on the one hand the government and masses of the locality have very strong desire to be lifted out of poverty and to develop the economy; on the other hand because the basic conditions of the locality are poorer, the information is not quick access, thus the economic development strongly depends on the resources, the life and production of the masses maintain close link with natural resources, and then because of being driven by the interest, so illegal stealing and excavating, reselling at a profit and smuggling the fossils frequently happen. Many governments excessively construct the highway in the protection area in the name of the developing of the tourist trade, and so on and so forth. The pale-biotic fossil resources are seriously damaged, thus the specialists loudly appeal to the public: "If the departments concerned don't quickly adopt scientific and effective ways to deal with this situation, the pale-biotic fossil resources of the state will certainly sustain irretrievable serious losses in 5 to 10 years". If it goes on like this, not only the environment and resources are damaged, the existence of the animals and plants is threatened, but also the existence of the mankind as one member of natural world is greatly threatened! The protection of resources and long-term interests are replaced by immediate economic interests, the relationship between the protection and development use is not handled well.

3.2 The laws and regulations are being perfected progressively but have still shortcomings

"The Stipulations of the Protection of the Pale-biotic Fossils" issued by the state and had been officially put into effect on January 1, 2011. In addition, Liaoning, Yunnan, Shandong and other provinces had also issued the stipulations of the management of the pale-biotic fossils.

The above-mentioned laws and regulations provide the guarantee of the laws for strengthening the protection and the management of the pale-biotic fossil resources, take great promoting effect on social benefit, economic benefit and ecological benefit of the pale-biotic fossil resources. But Facing reality, we must recognize, the legislation of our country on the protection, management and sustainable development of the pale-biotic fossils resources is not far enough.

3.3 The plan of pale-biotic fossil resources lags behind

The main objective of the development plan of the pale-biotic fossil resources is the achieving of continued development of the resources, so ensure that not only can gain the economic benefit and but also do not damage the resources during the development and use of the pale-biotic fossil resources, simultaneously can achieve the social benefit and environmental benefit, this is important content of the development plan of the pale-biotic fossil resources. The clause 7 of "The Management Way of the Pale-biotic Fossils" issued by the Ministry of Land and Resources clearly stipulates: all parts of the country must work out the plan of the pale-biotic fossil protection of the administrative area according to the plan of the pale-biotic fossil protection of the country. So at present the task is very pressing that work out the development plan of the pale-biotic fossil resources that plan takes the pale-biotic fossil resources of the region as the foundation in coordination with the interests of economic, social and environmental benefits and in unitization with the strategy of the plan of national economy and social development.

4 The Establishment of the Operating Mechanism of the Management Innovation of Pale-Biotic Fossil

The above analysis shows that in China because it has not yet formed the scientific and perfect operating mechanism of the management innovation in consistent with the management of pale-biotic fossils, overall innovation ability is relatively weak, so, should process the relationship between

short-term development and long-term development well according to the science, not only fully play the basic role of the market mechanism on the allocation of the resources, but also give full play to the guiding role of the specialists and foundation. Specifically say, in China the operating mechanism of the management innovation of pale-biotic fossil is the foundation that the activity of the management innovation of pale-biotic fossil can continuously operates by high-quality and high-efficiency under the correct policy decision, mainly includes the mechanism of the comprehensive body of natural protection area, the mechanism of the government, market mechanism, social mechanism and other contents (as Figure 1)

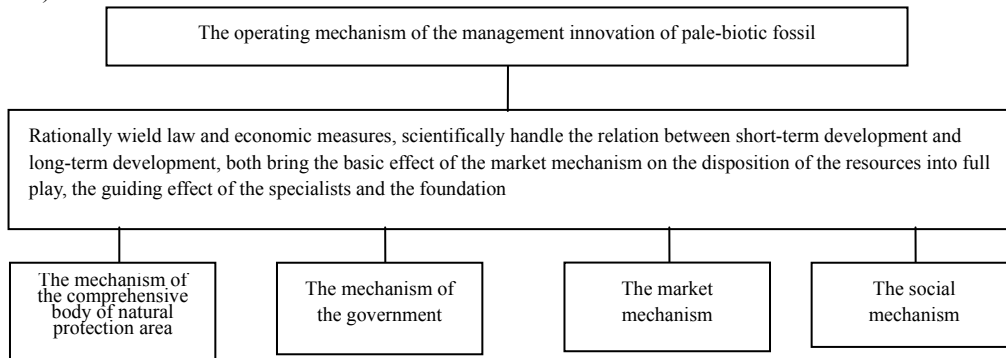


Figure 1 The Operating Mechanism of the Management Innovation of Pale-Biotic Fossil

4.1 The mechanism of the comprehensive body of natural protection area of pale-biotic fossil

China attaches great importance to the construction of the natural protection area to take important producing area of the pale-biotic fossils as protected object, had constructed 32 natural protection areas, 23 state geological parks, over 100 state paleontology museums in relation to the pale-biotic fossil trace. But present laws and regulations of the pale-biotic fossil protection are not enough perfect, the protection work is short of fund and qualified personnel, has not quick access to information, these hinder the activity of the management innovation of the comprehensive body of the natural protection area of pale-biotic fossil. In fact above-mentioned factors are also a problem of the mechanism. So, should make great efforts to perfect internal and external mechanism of the comprehensive body of the natural protection area of pale-biotic fossil, advance the action of the management innovation of the comprehensive body of the natural protection area of pale-biotic fossil.

4.1.1 The mechanism of scientific management

The theory of scientific management is a very clear comprehensive concept. It is not only a thought, a sense, but also the operating rules. So the comprehensive body of the natural protection area of pale-biotic fossil must take the idea of the management innovation of pale-biotic fossil as the guide, probe a set of scientific and high-efficiency management mechanism, strengthen the management of the resources, the management of the scientific research, the management of the scientific popularization and the management of the sale etc. of the comprehensive body of the natural protection area of pale-biotic fossil, strengthen the management to integrate knowledge and information as the focal point, promote the management innovation of the comprehensive body of the natural protection area of pale-biotic fossil to develop towards information, network and modernization. For example, for the sake of raising the level of policy decision, the management of policy decision of construction project of geological park first must invest research the geological parks of each level at home and abroad; next invite the specialists to evaluate, sum up the constructing characteristics which can be studied and adopted, work out overall plan, and then choose a optimum design of the plan by bids and other modes; strictly supervise according to relevant standards during construction, ensure the quality and level of the project; pay attention to close combination of all links including scientific characteristics, characteristics of scientific popularization, admirable characteristics, characteristics of mutual movement, finally achieve the continuous increase and continued development of the comprehensive benefit of the economy, ecology and society.

4.1.2 The mechanism of qualified personnel management

The competition of the market is a competition of qualified personnel management in a sense. The human resources are the most precious resources in the developing of the comprehensive body of the natural protection area of pale-biotic fossil. At present, the great majority of the natural protection area

and the geological park of pale-biotic fossil are located in remote mountain area, the income is lower, encouragement policy is not very effective, and the importing of the qualified personnel is difficult, the force of the qualified personnel ranks is weak, so should enthusiastically create the conditions, positively adopt powerful measures, establish a management ranks to take fixed professional personnel as core, the specialists of all subjects and the personnel of enforcing the law as the main body as quickly as possible.

The mechanism of qualified personnel management of the comprehensive body of the natural protection area of pale-biotic fossil mainly includes the training of qualified personnel, importing of qualified personnel, use of qualified personnel, encouragement of qualified personnel, guarantee of qualified personnel, movement of qualified personnel, disposition of qualified personnel etc., its core is the encouragement mechanism and competition mechanism of the qualified personnel.

4.1.3 The mechanism of fund investment

The natural protection areas and geological parks etc. of pale-biotic fossil of our country are basically located in remote mountain area, sometimes their wages are difficult, so the establishing of the operating mechanism of the management innovation gives a new problem to the government, the government must change the mechanism of financial investment to the comprehensive body of the natural protection area of pale-biotic fossil, first can use concentrative coordination type innovative of investment management system for reference, its core content is "policy of overall coordination, resources of overall disposition, budget of unified management", this concentrative system gives stress to the top design, unified plan, has been adopted by many countries in the world. Next the government should carry out the innovation of investment mechanism by using commercial and financial operating mode; use market means^[100]. Third establish long-term effective investment mechanism as quickly as possible, achieve a good circulatory way of self accumulation and continued development.

Thus it can be seen, today our country should make great efforts forming multi-unit and overall investment mechanism of the funds, fully use various financing measures, ensure the demand of the fund of investment management. This is forming the investment mechanism of the management innovation to take the financial support of the state as guide, financial loan as support, local financial investment as main body, social investment (contributed by non profit organization, social group, resident individuals and enterprises as well as from overseas) and foreign investment as supplement, provide the guarantee of fund for the management innovation of pale-biotic fossil.

4.2 The mechanism of the government

The government plays its leading role in the activity of the management innovation of pale-biotic fossil, the government should make rational use of economic means, full use of law means, continuously perfect and encourage the operating mechanism of the activity of the management innovation of pale-biotic fossil, integrate the strong points of various qualified personnel at home and abroad, arouse the enthusiasm of all sides by every means, make great efforts to create a good economic and social environment for the management innovation of pale-biotic fossil, strengthen the actual strength of the whole of the management innovation of pale-biotic fossil.

4.2.1 The mechanism of the training of qualified personnel

The qualified personnel are key and basic factors for gaining the practical results of the management innovation of pale-biotic fossil. So the government should take measures to strengthen the controlling of the qualified personnel resources, take the finding and training of outstanding qualified personnel especially young qualified personnel as important strategic measures of the developing of paleontology cause, form the mechanism which is advantageous for merging the good points of various personnel, arousing the enthusiasm that the personnel of all sides are engaged in creative work, promoting that the composite qualified personnel flow from scientific research institutions, colleges and universities to basic units of the management of pale-biotic fossil, this is important guarantee of the developing of the pale-biotic fossil cause, ecological equilibrium, social progress.

4.2.2 The mechanism of legal guarantee

Doubtless, the law should and can bring its special effect into full play, make basically innovate incorrect sense of the people on environmental resources, cultivate correct attitude towards the pale-biotic fossil resources in the whole society, and establish the harmonious relation take ecological equilibrium as foundation.

In the activity of the management innovation of pale-biotic fossil that it takes the government as leading and main body formed by multi units participate in, can produce the contradiction and conflict of interests of different natures, this is needed that the government establishes perfect mechanism of

legal guarantee by working out the laws, regulations, rules and policies etc., correctly standardizes, guides and supervise the actions of all main bodies.

4.2.3 The mechanism of fund investment

Under the influence of the factors of many sides, the natural protection area and geological park of pale-biotic fossil cannot become the main body of the management innovation and protected investment, the investment of the government still takes a considerable proportion, so the government should strengthen the investment strength in the management innovation by financial and tax policies etc., perfect the investment mechanism of the funds as quickly as possible, strengthen the support of funds in the management innovation of pale-biotic fossil.

4.3 The market mechanism

The activity of the management innovation of pale-biotic fossil must be carried out around the change of the market demand; the market demand and the market competition are internal motive force, the innovation of the market mechanism is a complicated work system, its core stresses to take the market as the guide, the management innovation of pale-biotic fossil must be brought into operating process of the market, so that create and achieve the maximum of comprehensive benefit of the management innovation of pale-biotic fossil. So the management innovation of pale-biotic fossil must persist in taking the market as the guide, perfect the market mechanism step by step, probe the change of the market, pursue the development of the market, accurately grasp the demand of the market, establish and perfect the operation mechanism.

4.3.1 The mechanism pulled by the demand

The demand of the market is the power source of the management innovation of pale-biotic fossil, make the demand pull the management innovation of pale-biotic fossil; let the demand provide the market, so that regulate and control the process of the management innovation of the natural protection area of pale-biotic fossil. When gain the demand of the market, must be in combination with the developing state, analyze the situation and the demand of the market in view of the direction of the development, and then according to one's resources and capacity, continuously gain the superiority of the market competition, establish the management mode to be suited to one's development, impel the forming and formulating of the market strategy, promote continuously raising the capacity of the management innovation of pale-biotic fossil, achieve the goal to gain good achievement and result.

4.3.2 The mechanism of the market competition

In the market competition which is a sharp day by day, on condition that the demand of the market continuously changes, the successful key of the management innovation of pale-biotic fossil is the quick reaction mechanism to the market change, quick reaction requires high sensitivity of the manager to the market change, according to feedback information of the demand of the market, the manager should decide and regulate coming development direction, strengthen the competitive capacity of the market. If an innovation can not take quick reaction to market opportunity, a greater innovation can only look at market helplessly. Today, the man who won success nobody is not the first to run. For example, successful operation of Yunnan "World Dinosaur Valley" is just a very good example.

4.4 The social mechanism

The management innovation of pale-biotic fossil is huge system engineering, a system process that many elements participate in, the comprehensive body of the natural protection area of the pale-biotic fossil is main body in the activity of innovation, the government is the leader, the scientific research organization and the protection foundation as well as other essential factors play the indispensable role. So must actively create the condition, establish the cooperation mechanism of scientific research and service mechanism of the protection foundation etc., perfect social mechanism of the management innovation of pale-biotic fossil, provide good social environment for the management innovation of pale-biotic fossil.

4.4.1 The mechanism of production-teaching-research cooperation

The comprehensive body of the natural protection area of the pale-biotic fossil (the producing area of the pale-biotic fossils), the scientific research organization and the institutions of higher learning are key essential factors. At the present stage, the comprehensive body of the natural protection area of the pale-biotic fossil has not the scientific research force, the scientific research force of the scientific research organization and the institutions of higher learning are stronger, the disconnected phenomenon of the production-teaching-research is more serious, on the one hand the scientific and technological results are changed difficultly, on the other hand the demands of economic development of the locality are satisfied difficultly. So must establish grand union, large-scale cooperation and big innovation with "zero distance" among multi-unit main bodies i.e. the comprehensive body of the natural protection area

of the pale-biotic fossil, the scientific research organization and the institutions of higher learning, establish the mechanism of production-teaching-research cooperation at higher level. The innovation of production-teaching-research cooperation focuses on integrating scientific and technological essential resources at home and abroad. Achieve a good circle among three essential factors by bilateral or multilateral cooperation that the advantage is complementary, it gives full play to your strengths and to make up for your weaknesses, is mutually beneficial win-win, continuous and stable in importing famous research organizations, outstanding personnel and practical talents at home and abroad.

4.4.2 The mechanism of public cooperation

The Chinese Fossil Protection Foundation was founded in Beijing on April 10, 2008. The Foundation has opened up the form that “the ancient biological culture sets up the stage, the public interest starts before the others, the enterprise pushes”, innovated a new public mechanism to promote international cultural exchange in the paleontology, drive the cooperation and use of the resources.

5 Conclusions

The operating mechanism of the management innovation of pale-biotic fossil is the foundation that the activities of the management innovation of pale-biotic fossil can continuously operate with high quality and high efficiency in the right decision. Only truly establish main body position of the comprehensive body of natural protection area of the pale-biotic fossil in the management innovation activity and accurately grasp the positioning of government functions, can promote the participation and effective combination of the diverse capital, production-study-research and foundation in the activities of the management innovation of pale-biotic fossil.

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On the Institutional Innovation of Resettlement Compensation of Water Conservancy and Hydropower Projects in China

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Abstract: The large-scale construction of water conservancy and hydropower projects brings huge social and economic benefits, and thus, the social development is promoted; however, with huge amount of land expropriated, involuntary resettlement has become a bigger issue of concern. The resettlement compensation system of water conservancy and hydropower projects in the New China has undergone three stages in history: the stage of land acquisition approach, the stage of land acquisition regulations and the stage of land management law. After a thorough research of the current resettlement compensation system of water conservancy and hydropower projects in China, this essay initiates several new methods to the innovation of resettlement compensation system in China on the basis of long-term resettlement compensation mechanism of land acquisition in the Guizhou section of Longtan Hydropower Station.

Key words: Water conservancy and hydropower projects; Resettlers; Compensation system; Innovation

1 Introduction

China is rich in water resources, with total water resource amounting to 2,800 billion m³. However, due to China's large population, per capita water resource only stands at 2300 m³, just 1/4 of world average level. Besides, the spatial and temporal distribution of water resources is extremely uneven, which makes China a country with frequent floods and droughts. In order to meet the social needs of survival and development, China has built water conservancy and hydropower projects of all sizes, which have produced great economic and social benefits in terms of flood control, irrigation, water supply, power generation and comprehensive utilization, etc., and guaranteed a sustained, steady and rapid development of national economy.

On the one hand, the large-scale construction of water projects produces huge social and economic benefits, and promotes social development; on the other hand, with a lot of land expropriated, involuntary resettlement has become a bigger issue of concern. According to statistics, after 1949, the total number of project-induced involuntary resettlers is more than 40 million by now. They have made a great contribution for the national economic construction, and the state has developed a series of policies and measures on involuntary resettlement compensation. Especially from the mid-1980s, China has proposed the policy of development resettlement and has been embarking on a virtuous cycle path concerning resettlement. These policies can bring benefits to involuntary resettlers in the short term to some extent, but in the long run will have far reaching adverse effects on the development of their descendants due to the loss of land on which they depend and chance of sustainable development, which is especially true to those who do not benefit from project construction; and even worse, some involuntary resettlers find it is hard to get rid of poverty. Therefore, it has become an important topic facing us to further reform and improve the resettlement compensation system to ensure that resettlers can share the benefits and achievements in construction so as to ensure a sustainable and coordinated development of local economy, and to reach the goals of an overall and well-off harmonious society.

In order to study the resettlement compensation system of water conservancy and hydropower projects in China, the resettlement compensation practice in Guizhou section of Longtan Hydropower Station is taken as an example for analysis, and innovative ideas are proposed.

2 Historical Evolution of Resettlement Compensation System of Water Conservancy and Hydropower Projects in China

The historical evolution of resettlement compensation system of water conservancy and hydropower projects in China has undergone three stages.

2.1 Stage I: land acquisition approach (1953-1981)

In 1953, China enacted the *Approaches on National Construction Land Acquisition*, the first land requisition compensation act, aiming at compensating individual-owned or collective-owned house and land. The compensation standard is generally based on the total land output value of the three to five

years preceding land acquisition. In actual operation, the compensation standard of reservoir flooded farmland is generally 3 times of annual land output value per mu. Due to the narrow scope of economic compensation and low compensation standards, the compensation fees are extremely low, with average financial compensation amounting around 100-300 RMB yuan. In 1953, the act was revised and the compensation standard was set to 2 to 4 times the average annual land output value of the three years preceding land acquisition. In 1958, the State Council revised it again and the compensation standard was set as before. After 1958, China undergone, in succession, several political turmoil, i.e. "the Great Leap Forward", "the Cultural Revolution", and resettlement in the construction of water conservancy and hydropower projects was greatly disturbed. Such erroneous tendencies as "construction first, resettlement second", "relocation first, resettlement second" and "production first, livelihood second" were very common, and due to low compensation standards and narrow compensation range, each rural resettler can only get 300 to 500 RMB yuan in compensation on average in 1960s and 600 to 1200 yuan in 1970s. Besides, the way of relocation and resettlement was simple and rough, which left many problems, and consequently, a considerable number of resettlers were put into long-term poverty.

2.2 Stage II: land acquisition regulation (1982-1985)

In 1982, the State Council promulgated the *Regulations Concerning Land Requisition for State Construction*, and abolished *Approaches on National Construction Land Acquisition*, setting the compensation standard at 3 to 6 times of the average annual land output value of the three years before acquisition. On June 19, 1981, the Ministry of Finance and Ministry of Power Industry jointly issued *The Notice on Extracting Reservoir Maintenance Fund from the Cost of Power Generation*, deciding that hydroelectric power stations directly under management of the Ministry of Power Industry should extract one thousandth of one yuan from per kilowatt hour to finance a reservoir maintenance fund aiming at providing subsidies for resettlers. On August 24, 1985, it was decided in *The Meeting Minutes of Central Financial Work Leading Group Office No. 22* that From January 1, 1986, found-raising for supporting resettlers would be addressed by extracting fees from benefits of reservoirs or income of power generation of hydropower stations. After *Land Regulations*, *Land Administration Law* and other laws and regulations were promulgated, maintenance fund and construction fund of hydropower station or reservoir were established, and these efforts played an important role in addressing resettlers' difficulties with extended scope and higher Standard in compensation. However, it still could not guarantee the basic production and living needs of resettlers, and they still had huge difficulties in production and living, and groups of poor resettlers became factors of social instability.

2.3 Stage III: land administration law (1986 - present)

In 1986, the National People's Congress enacted the *Land Administration Law of the People's Republic of China* (hereinafter referred to as the *Land Administration Law*), and abolished *Regulations Concerning Land Requisition for State Construction*. The land compensation fees was set at 3-6 times the average output value of the three years preceding land acquisition, the resettlement fees cannot exceed 10 times, and the total amount shall not exceed 30 times. In 1998 and 2004, the law was revised twice, and the compensation fees was increased to 6-10 times, the resettlement fees cannot exceed 15 times, and the total amount shall not exceed 30 times. On September 1, 2006, the newly revised *Regulations on Land Requisition Compensation and Resettlement of Large and Medium-sized Water Conservancy and Hydropower Projects* (hereinafter referred to as *Regulations*) was formally put into practice, and the compensation and land acquisition in resettlement is 16 times the average output value of the three years preceding the requisition of the cultivated land. The initiation of these policies and regulations indicates that resettlement work of water projects in China has achieved a historic leap, which is a milestone in safeguarding and realizing the interests of the reservoir resettlers, reflecting the full range protection of reservoir resettlers' rights.

It can be inferred from the above analysis that though involuntary resettlement compensation system in China undergone three stages, but in general, it can be divided into two stages, with the first two stages defined as the regulatory management stage, and the third stage, the legal management stage. In the first two stages, there were no resettlement subsidies. Only after the *Land Administration Law* was enacted, the resettlement subsidies came into being and compensation standards gradually increased.

3 The Status-Quo of Water Conservancy and Hydropower Project Resettlement Compensation System in China

3.1 Research status-quo

In theoretical circles, the studies on resettlement compensation system are abundant, but it has not yet formed a complete theoretical system. Wang Junhai thinks that under the existing compensation mechanism the acquired land is compensated only according to its agricultural value, but its future use and value is not compensated (Wang Junhai, 2005). From Chen Guiyang's view, the reason lying behind the current unsatisfactory resettlement model is that the land-owners get one-time land requisition compensation fees in accordance with national accredited standards; however, with such compensation fees resettlers cannot regain their basic means of production, and thus, he proposes that a long-term compensation is helpful to the resettlers and social stability in the reservoir area (Chen Guiyang, 2005). Peng Weijie put forward the model of benefit-sharing compensation after an analysis of the amount of compensation of in the resettlement of the Changzhou Reservoir in Guangxi, China, and initiated a bonus calculation model (Peng Weijie, 2006). Wen Liangyou summarized the compensation and resettlement experience of small-sized power stations, and analyzed the feasibility, necessity and problems which may arise of long-term compensation in resettlement (Wen Liangyou, 2006). Jia hua thought that the long-term compensation system of land requisition can help resettlers maintain their original living standards and is of important practical significance to safeguard their legitimate rights and interests (Jia Hua, 2006). Duan Yuefang pointed out that the investment-oriented compensation and resettlement mode provides a way to solve resettlers' problems of long-term stability and prosperity (Duan Yuefang, 2009). Michael M. Cernea proposed the IRR model, i.e. impoverishment risks and reconstruction model for resettling displaced populations, and pointed out that after resettlement the relocated people may face economic, social and cultural risks and fall into poverty; and thus, a relevant reconstruction strategy should be set up to get rid of risks.

3.2 Current compensation systems

In order to provide a legal basis and ensure a smooth progress in resettlement compensation, in 1991, China promulgated the regulation of *Regulations on Land Requisition Compensation and Resettlement of Large and Medium-sized Water Conservancy and Hydropower Projects Construction*. The basic policies consist of compensating in the earlier stage and follow-up support in the later stage. The compensation and subsidy for reservoir resettlement is based on a full investigation of physical indicators submerged; and according to the principles of "original scale, original standards, restoring the original function", the specific compensation standards for losses is decided, and the total investment of compensation is included in the project cost budget. In 1993, China formulated a specific guidance *Regulations on Three Gorges Project Resettlement* for the Three Gorges Project resettlement. It provides that the investment calculated according to the three-original-principle can be classified in resettlement investment after approval; and the investment arising from expanding reconstruction scale or upgraded standards need to be solved by relative units themselves.

3.2.1 Basic principles in resettlement compensation

The following principles should be followed in the land requisition compensation and resettlement of water conservancy and hydropower projects construction. (1) The relationships between the nation, collective organizations and individuals should be handled appropriately, and the development in reservoir areas and resettlement areas should comply with national overall arrangement. (2) The resettlement should be combined with reservoir construction, resource exploitation, water conservation, and local economic development, so as to ensure that resettlers' living standards reach or exceed their original level. (3) The resettlement should be adapted to local conditions, overall planning, rational using of resources in the reservoir area, and in-place resettlement to sites above the inundation line, and in case of without the condition for in-place resettlement to sites above the inundation line, other forms of resettlement such as the utilization of deserted beach, land transfers, and relocation etc. can be taken with full observe of national laws and regulations.

3.2.2 Compensation standards

As to land requisition compensation standards of water conservancy and hydropower projects, it is clear in *Regulations*, i.e. the land requisition compensation fees in large water conservancy and hydropower projects construction consists of land requisition compensation and resettlement subsidies. Land acquisition compensation fees for the cultivated land is 3 to 4 times the average output value of the three years preceding the requisition of cultivated land, and the subsidies for each among the agricultural population is 2 to 3 times the average output value of the three years preceding the requisition of cultivated land. In large-scale project construction of flood controlling, irrigation and drainage etc. the land requisition compensation fees can be less than the standard above, and specific standards should be decided jointly by the department of water resources with relevant ones. Compensation and resettlement subsidy standards of other land requisition shall be decided by the related provinces, autonomous

regions and municipalities with reference to the cultivated land requisitioned. In accordance with the above standard, if the resettlement remains cannot go well, resettlement compensation fees can be increased appropriately.

3.2.3 Follow-up support

Reservoir follow-up support policies was decided in the *Regulations*, and based on these policies, the state established a reservoir construction fund for large and medium-sized water conservancy and hydropower projects for reservoir maintenance and supporting resettlers' production. The regulation of extraction, management and usage of the fund of newly-built water conservancy and hydropower projects should be jointly prescribed by related departments. In March 1996, the State Council and its related departments jointly issued the notification of *Notification on the establishment of hydropower and Reservoir Follow-up Support Fund*. The notification has made corresponding provisions on the extracting principles, source of funds, extracting standards and methods, usage of funds etc. In April 2007, the Ministry of Finance issued a nationwide unified reservoir fund collection and management regulation.

The above-mentioned compensation systems and regulations seem reasonable in a particular historical context, because they ensured that the construction run in an orderly way, and resettlers can also get some compensation. But in the long run, particularly in the context of building a moderately prosperous society and a harmonious society, there are still some shortcomings and deficiencies in them.

3.3 Deficiencies of resettlement compensation system of water conservancy and hydropower projects

3.3.1 Path dependence in the resettlement system

From 1953 till now, the standards of resettlement compensation fees in land requisition in China is always based on the average annual output value. Once this institutional mechanism embarked on a path, its established direction will get self-reinforcing in the future development.

3.3.2 Ignorance of the wide participation of resettlers in policy-making

In current policy-making, resettlers' wide participation is neglected.

3.3.3 Distortion of land-lost farmers' substantial property rights by institutional arrangements in resettlement compensation

Due to the limitation to land property rights system and farmland ownership transfer system, farmers' substantial property rights are often distorted. Although *Rural Land Contract Law* provides farmers in the 30-year land contract period with the right of use, management, usufruct, handling gains and ownership-transfer right, but in current laws in China, rural land is collectively-owned, which results in "property incompleteness" of substantial property rights of farmland. In land requisition compensation practice, the rural collective economic organizations catches attentions first, followed by the relation between farmers and their organizations, which results in farmers' inability to realize their rights in land requisition.

3.3.4 Ignorance of resettlers' intangible losses.

The current resettlement compensation system in China is still limited to resettlers' direct physical losses, and their indirect intangible losses are not included. Duan Yuefang argues that resettlers' intangible losses mainly includes the dysfunction of their original labor skills, traditional non-market income loss and loss of job opportunities, as well as resettlers' original social network being damaged and advantageous traffic and market conditions disappeared.

4 Practice of Resettlement Compensation System Innovation of Water Conservancy and Hydropower Projects in China

Longtan Hydropower Station is one of the important power base projects in the national strategy of "West Power to East", its designed capacity is 4.2 million kW, and its actual capacity is 4.9 million kW. Under its 375 m normal inundation line, nearly 50,000 resettlers in Guizhou section of the reservoir are involved, with a flooding area of 48,000 mu of arable land, among which nearly 15,000 mu are garden plot. In Guizhou section of Longtan reservoir, resettlement work was delayed by more than six years because of the deficiency of arable land available. Due to the outstanding problems in resettlers' production cannot be solved Guizhou took a new measure, the long-term yearly compensation mechanism of flooded land, to address these problems. In December 2009, Guizhou Provincial People's Government approved the long-term compensation program, and in January 2010, the program was officially launched. Through efforts of more than 8 months, up to August 31, 2010, there were 23,413 mu flooded farmland included in the long-term compensation program in Guizhou section of Longtan

reservoir, and the per capita arable land included in the long-term compensation program was close 0.5 mu, which, equally speaking, shows the per capita arable land was restored to approximately 1.3 mu. This new mechanism provided more than 40,000 rural resettlers with long-term means of livelihood.

4.1 Object and scope of long-term compensation

There are three types of objects for long-term compensation. The first group is resettlers who in their original resettlement plan would obtain a certain amount of cultivated land, but get no cultivated land or the cultivated land obtained cannot reach their previous level after relocation; the second group is resettlers whose original plan was to take part in non-agricultural industries but failed, and are willing to return land compensation fees and subsidies; the third group is farmers whose houses are above the reservoir inundation line, but farmland is inundated. The scope of the program is paddy fields and dry land flooded by the inundation line, i.e. the altitude of 375 meter. Usually, the compensation standards of suburban garden plot, vegetable rice field, sugarcane field, dry vegetables land, orchard, etc. are higher than paddy fields and dry land. If they are evolved from paddy fields and dry land, they shall be brought into long-term compensation corresponding to the class of paddy fields and dry land compensation standards, and compared with paddy fields and dry land, the part of their higher value will be cashed to the rural collective economic organizations or statutory contractors one time. Land requisition in towns and cities or for the reconstruction of specific programs are not included in the program.

4.2. Long-term compensation standards

The standard in the long-term compensation program in Guizhou section of Longtan reservoir is 1247.50 RMB yuan for paddy field per Mu per year (with value equivalent to 650 kilograms of rice at 2010), and 850.50 RMB yuan for dry land per Mu per year (with value equivalent to 440 kilograms of rice at 2010). Power station owners pay that in the form of cash, the compensation is executed by the resettlement department at county level, and the local banking institutions are commissioned to handle the cash to each relocated family. The cash is set to be transferred to resettlers on April and October each year, the annual harvest period in agriculture. The standard of combination of land acquisition will be adjusted according to paddy price. After 2010, according to the local paddy rice price index announced by provincial statistics department, the provincial resettlement department will negotiate with the power station owners once every three years. Therefore, the standard of long-term compensation adequately reflects changes in price index as well as agricultural subsidies, agricultural science and technology progress and other factors, and thus, it is in resettlers' interests compared with one time compensation.

Table 1 Present Value of Long-Term Compensation Fees of 1 Mu Paddy Field in Guizhou Section of Longtan Power Station (Annual Output Value in 2007:1247.5 RMB Yuan)

Fixed number of years	Present value according to rural consumer price and average interest rate(RMB yuan)	Fixed number of years	Present value according to rural consumer price and average interest rate(RMB yuan)
5	5663.1	30	22134.06
10	10316.06	35	23941.82
15	14143.24	40	25427.12
20	17342.85	45	26648.82
25	19971.74	50	27670.15

Annotation: The result shows that the total present value of 1 Mu paddy field in 50years in long-term compensation (27670.15 RMB Yuan) is 1.39 times the value of one-time compensation (19960 RMB Yuan). Long-term compensation of land acquisition is in the interest of resettlers.

4.3 Time limit for long-term compensation corresponding to the period of the power station in function

In 2007, the first generating unit of Longtan Hydropower Station started to generate electricity, so it is the starting point of compensation on January 1, 2007. As long as the power station exists, the compensation will be implemented yearly, until the station closed. It broke through the existing statutory compensation standard of land requisition, i.e. 16 times the annual output value of the three years preceding land requisition, and extends the standard to N times. Generally the life cycle of a power station is 50 years or more, and if then the power station is scrapped, the method of reclamation can be taken to resume production and rehabilitation funds and other problems of farmers during rehabilitation time can be solved in accordance with national and the relevant provisions of Guizhou Province.

4.4 Related safeguard measures

First, the station owner pre-fetches compensation fees for two years as long-term compensation risk fund to bank designated account by station owners and provincial resettlement authorities for rainy days when finance problems appears due to poor hydropower generation benefits, corporate restructuring, juridical person change, etc. Second, the annual cost of carrying out the program, 3% of the total amount of compensation, should be reasonable and listed separately. Third, in the reform of local government bodies, resettlement agencies at county level should be further strengthened to enhance their capability in work, so as to guarantee that long-term compensation has a long-term, normal, special handling mechanism. Moreover, there is need to manage resettlers' files well and provide them with fine service, and make sure that "the water is drained to the field", and "the program not be abolished in one hundred years".

The establishment and implementation of long-term compensation mechanism in Guizhou section of Longtan Hydropower Station has yielded good results. The practice shows that the compensation method from one-time to dynamic changes yearly has effectively resolved the historic difficult problem of reservoir resettlement in Guizhou, and realized triple-win situation of the resettlers, power station owners and the government.

5 Path of System Innovation of Water Conservancy and Hydropower Projects Resettlement Compensation in China

5.1 Reforming cultivated land transfer system and the resettlement compensation system in accordance with principles of market economy

At present, China should establish and improve the ownership-transfer market of the farmland to reform the unidirectional compensation mechanism of land requisition in which the compensation fees is based on annual crop output value, ensure that compensation fees should in line with the real value of the land with full consideration of land gains and social security value, and list the fees into its investment cost. In addition, China should realize marketization of resettlement compensation system and compensation mode, and fundamentally overcome the phenomena of artificially lowering resettlement compensation standards and damaging the legitimate rights and interests of resettlers, to ensure resettlers to return to normal production and living conditions as soon as possible.

5.2 Improving and standardizing procedures in resettlement compensation policy-making

Open, transparent and normative means such as expert consultation, public hearings etc. should be taken in resettlement policy-making to promote a democratic and scientific decision-making process. Moreover, the social assessment method should be introduced, and compensation in resettlement should be decided in accordance with market prices of farmland with full consideration of their location, purpose, quality, size and other factors.

5.3 Flexible means of resettlement compensation based on local conditions

Various flexible means such as monetary compensation, property replacement (land, houses, enterprises and other replacement), equity dividends, production resettlement, urbanization jobs resettlement, social insurance pension resettlement, vocational training, education self-resettlement, and other ways can be taken in resettlement.

5.4 Exploring and promoting the long-term resettlement compensation mechanism

By reforming of rural resettlement from the one-time compensation of land requisition compensation to long-term compensation mechanism based on the annual output value of farmland, it can not only reduce one-time investment of water conservancy and hydropower project construction, but also allow rural resettlers to share benefits and achievements of reform and development to a certain degree.

5.5 Establishing development fund and improving the social security system for the settlements

Government need to establish resettlement development funds for infrastructure construction in resettlement areas, and the supporting fund for creating new employment opportunities, providing interest subsidies for resettlers to develop their own businesses and loan interest discount. Also, a basic social security system consists of medical care, unemployment insurance, pension, etc., should be established to safeguard resettlers' legitimate rights and interests of all kinds, and promote the building of a harmonious society in resettlement areas.

5.6 Speeding up the legislation of resettlement law

There is need to strengthen the "top-level design" and accelerate legislation in this field to guarantee the innovation of resettlement compensation system. It should establish specialized laws on

involuntary resettlement and water conservancy and hydropower project resettlement. The law should focus on the principles of involuntary resettlement, regulatory agencies, the standard of financial compensation and resettlement ways, resettlers' rights and obligations, social involvement, participation of resettlers, resettlement follow-up support policies and legal liability, etc.

6 Conclusions

As construction of China water conservancy and hydropower projects came into being, the resettlement compensation system of that was formed at the same time. From 1949 to present, the resettlement compensation system of water conservancy and hydropower projects in China has undergone three stages in history: the stage of land acquisition approach, the stage of land acquisition regulations and the stage of land management law. New resettlement compensation system should be based on economic and social development and the increasingly diverse needs of resettlers. By discussing the existing resettlement compensation system of water conservancy and hydropower, this paper identifies system deficiencies which need to be improved. Given the wealth of content of resettlement compensation system, this paper selects the long-term compensation resettlement mechanism in Guizhou section of Longtan reservoir as a node for basic description, and then explores the innovation paths of China water conservancy and hydropower engineering resettlement compensation system.

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An Innovative Thinking on the Concepts of *Ex-Ante* Value, *Ex-Post* Value and the Realized Value (Price)

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Abstract: Researchers have been considering the realized value as the ex-post realization of the ex-ante value. They have argued that the realized values have failed to estimate the expected value in asset-pricing models. We provide a new definition of the ex-post measurement and we show that considering realized value as the ex-post realization of the ex-ante value is misleading and this has led to the failure in estimating the expected value.

Key words: Ex-post; Ex-ante; Realized value; Expected value

1 Introduction

In theory, researchers can establish risk-return relationship; empirically, the unobservable nature of the *ex-ante* expected return hinders the estimation of the relationship between the risk and return. In general, it is believed that investors know their expected value and the variance-covariance matrix, and based on these, they form the price of an asset in the market. Thus in the text books, researchers have been using realized returns assuming that realized returns are normally distributed with mean μ_i and a variance of σ_i^2 ; $R_{it} \sim N(\mu_i, \sigma_i^2)$, and over the sample period, the average of these realized returns will match the *ex-ante* expected return. This implicit belief has led the researchers to assume realized returns as a sample of returns in estimating the expected return, i.e., they consider realized value as the ex-post realization of the ex-ante expectations.

We argue that this belief on the convergence of realized return on *ex-post* return is misleading. The disparity between *ex-post* realization and *ex-ante* prediction is well addressed by Sharpe (1978); and Campello *et al.* (2008) also believe that the distribution of expected returns does differ from the distribution of realized (*ex-post*) returns. Elton (1999) concluded that the realized (*ex-post*) return is a poor proxy for the expected return because of its deficiency in reflecting the nature of *ex-ante* expectations. None of the researchers have identified the reason behind this disparity between these two values, however. From the point of view of asset-pricing model, we introduce new definition of the *ex-post* value and show clear distinction between the realized value (price) and the *ex-post* value, and in turn, it proves that realized price cannot be the *ex-post* realization of the *ex-ante* values. *How the ex-post value and the realized value differ from each other?*

2 The Ex-Ante Return, Ex-post Return and the Realized Returns

The main focus of the asset-pricing model is to explain the risk-return relationship. Theoretically, we can establish risk-return relationship (for example, CAPM). However, unobservable nature of the ex-ante expected return hinders estimating the empirical risk-return relationship. As a result, in empirical analysis, most of the researchers consider realized return as the ex-post realization of the (ex-ante) return, i.e., they assume realized return as a sample of return. For example, they assume that (ex-ante) return¹ are normally distributed with mean μ_i and variance of, $\tilde{R}_{i,t} \sim N(\mu_i, \sigma_i^2)$. They have used the average realized return and sample variance as estimators of the ex-ante expected return and the ex-ante variance. Nevertheless results of the empirical analysis were almost inconclusive.

Some researchers intuitively believe that the realized return cannot be the ex-post realization of the (ex-ante) return and consequently empirical estimation differs from the ex-ante expectation. In this section we depict the inability of the realized return as the ex-post realization of the ex-ante and present that ex-post value is different from the realized value. We portray our argument from the pricing point

¹ In general, expected return has been considered as the 'ex-ante return' by the researchers. As we have discussed later in the paper that the *ex-ante* literally means the random future values. If we define *ex-ante* return as the expected return, we are disregarding the randomness of the future values. Therefore, we have defied the returns as '(ex-ante) returns' in this paper instead of the 'expected returns' as has been considered by the other researchers.

of view and in doing so we show that the information set in the price is different from the information set in the ex-post value. Our argument is based on the following simplified assumptions:

(i) In an one-period setting, price is the discounted value of the next period's expected price,

$p_{i,t} = \frac{E(\tilde{p}_{i,t+1})}{d_i}$ where $d_i > 1$. In addition, we assume that $E(\tilde{p}_{i,t+1})$ incorporates all future information available at t .

(ii) The state of future economy changes with time.

Assumption (i) states that for any risky asset the investors are assumed to expect positive payoffs in future and can be considered as one of the basic assumptions in valuation. Assumption (ii) can be considered as the base of our argument. Most of the researchers assume a steady state of the economy where there is no change in the fundamental economic variables. Rather they consider any change in the information set (surprises) as a change in variables other than the fundamentals. And for a sample, these surprises are expected to be cancelled out. We assume that any change in the economy is a result of the changes in the economic variables, both fundamentals as well as firm specific ones. This may lead us to assume that investors' forecasts about the asset's expected price would increase (decrease) with forecasted positive (negative) changes in the economic variables. Besides, researchers have been using the realized return in empirical tests, and in reality the economy is changing also. Thus our second assumption is much closer to the reality.

Most of the researchers have been using realized return in establishing the empirical risk-return relationship; we introduce 2 scenarios and argue on the inability of the realized return to explain the risk-return relationship. As we proceed, we discussed on the different information sets in the asset-pricing, and gradually, we present the difference between the realized value and the ex-post value. We conclude that realized return cannot be a sample of return.

An example:

We begin with a simple example for better understanding of our argument. We show that when the assumptions (i) and (ii) hold, average realized returns cannot estimate the expected return. Investor's expected price would rise (fall) with the favorable (unfavorable) future economic forecasts. We start our argument with a series of unfavorable future economy in scenario 1. Under one-period model settings, we assume that price in every period is formed based on the expected price of the next period. Let us assume the expected prices for $(t+1)$ to $(t+4)$ at $t, (t+1), (t+2)$ and $(t+3)$ are 105, 95, 89 and 83 respectively. If we assume 5% expected return¹ for the investors, we would get the price for t to $(t+3)$ as $(105/1.05)$, $(95/1.05)$, $(89/1.05)$ and $(83/1.05)$ respectively. For this series the average realized return would be negative. Note that our expected return is 5% in scenario 1. The sample average realized return for these types of series cannot estimate the expected return of 5%. Why average realized return fails to estimate the expected return?

Scenario 1 Realized return and the risk-return relationship in downward Market

This table forecasts the future values from $(t+1)$ to $(t+4)$ in a down-ward market.

The expected return (cost of capital) is 5% (i.e., discount rate, $d_t=1.05$). For simplicity of the argument we assume expected return as constant.

	t	$t+1$	$t+2$	$t+3$	$t+4$
$E(\tilde{p}_{t+\tau})$		105	95	89	83
$p_{t+\tau}$	105/1.05	95/1.05	85/1.05	83/1.05	...
$r_{t+\tau+1} = \frac{p_{t+\tau+1}}{p_{t+\tau}}$		0.905	0.937	0.933	...

¹ Although the expected rate of return (the discount rate) might change with the changes in the economic forecasts, for simplicity, we consider constant discount rate in this paper. Note that, the argument of this paper can support a model with changing discount rate scenario also.

For $(t+1)$ in scenario 1, researchers would consider $(95/1.05)$ as the *ex-post* realization of *ex-ante* price for t , i.e., $(95/1.05)$ is treated as a realized value of the *ex-ante* distribution of future price of $p_{i,t+1}$ for $(t+1)$ at t . Can $(95/1.05)$ at $(t+1)$ be a *ex-post* value of the future price of $(t+1)$ for t ?

The price at $(t+1)$ is the discounted expected price of $(t+2)$. In this example, the price $(95/1.05)$ at $(t+1)$ is derived from the information on the future price for $(t+2)$ which is available at $(t+1)$. In general, the *ex-post* value at $(t+1)$ is the observed value from the information on t to $(t+1)$. $(95/1.05)$ cannot be the *ex-post* value at $(t+1)$ as this value is derived from the information of $(t+2)$ instead of the information set of t to $(t+1)$. Under assumption (ii), the expected price of $(t+2)$, $E(\tilde{p}_{i,t+2})$, has no relation to the distribution of $\tilde{p}_{i,t+1}$ at $(t+1)$. So the realized return can neither be the *ex-post* return nor the sample of return.

In scenario 2, with favorable economic forecasts, the expected values increase from 105 in $(t+1)$ to 150 in $(t+3)$. We can consider scenario 2 as an illustration of the Japanese bubble during 1985-90. With this increase, the prices also increase from 100 at t to 143 in $(t+3)$. The average realized return for this type of upward series will be much greater than the expected return of the asset (5% in this case). Besides, as we have argued before, $(120/1.05)$ cannot be considered as the *ex-post* value at $(t+1)$ because $(120/1.05)$ is derived from the information set on the expected price of $(t+2)$ available at $(t+1)$.

Scenario 2 Realized return and the risk-return relationship in upward Market

This table forecasts the future values from $(t+1)$ to $(t+4)$ in an up-ward market. The expected return (cost of capital) is 5% (i.e., discount rate, $d_t=1.05$). For simplicity of the argument we assume expected return as constant.

	t	$t+1$	$t+2$	$t+3$	$t+4$
$E(\tilde{p}_{i,t+\tau})$		105	120	135	150
$p_{i,t+\tau}$	105/1.05	95/1.05	89/1.05	83/1.05	...
$r_{t+\tau+1} = \frac{p_{t+\tau+1}}{p_{t+\tau}}$		1.143	1.125	1.111	...

None of the researchers have argued on the information sets in the price as well as in the *ex-post* return. In this section, with simple illustrative examples under assumption (i) and (ii), we have shown that the information sets in price and in *ex-post* return are different, and price cannot be considered as the *ex-post* realization of the *ex-ante* expectation.

2 Realized return and the ex-post return

In this section, we provide a general discussion on the difference between realized return and *ex-post* return. We have divided information at t into two parts for better understanding, and we define information as:

$$\phi_t = \phi_t^{H_t} + \phi_t^{F_{t+1}} \tag{1}$$

where, ϕ_t is the total information set available at t , $\phi_t^{H_t}$ is the past information set on $(t-1)$ to t available at t , and $\phi_t^{F_{t+1}}$ is the future information set on $(t+1)$ that is incorporated at t . Past information set is assumed to be comprised of the results of the operating activities between $(t-1)$ to t . In contrast, the economic information as well as the firm's future policies is incorporated in the future information set. Under assumption (i), price p_{it} is the discounted value of $E(\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}})$. Similarly, price $p_{i,t+1}$, is the discounted value of $E(\tilde{p}_{i,t+2} | \phi_{t+1}^{F_{t+2}})$. At $(t+1)$, $p_{i,t+1}$ does not incorporate

past information set $\phi_t^{H_t}$; it is derived from the future information set of $\phi_{t+1}^{H_{t+2}}$. The figure 1 explains the difference between information sets in price and the *ex-post* value.

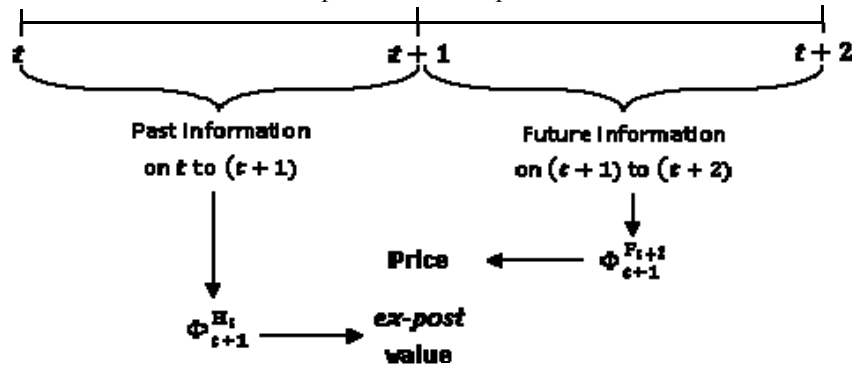


Figure 1 Price and *ex-post* value

In the following discussion, we provide further explanation to confirm that the realized return cannot be the *ex-post* return. We define (*ex-ante*) return at time t , $\tilde{r}_{i,t+1}$ as,

$$\tilde{r}_{i,t+1} = \frac{\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}}}{p_{i,t} | \phi_t^{F_{t+1}}} \tag{2}$$

and, the realized return, $r_{i,t+1}$, is defined as,

$$r_{i,t+1} = \frac{p_{i,t+1} | \phi_{t+1}^{F_{t+2}}}{p_{i,t} | \phi_t^{F_{t+1}}} \tag{3}$$

The researchers consider $(p_{i,t+1} | \phi_{t+1}^{F_{t+2}})$ as the *ex-post* realization of $(\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}})$, i.e.; they have been assuming $(p_{i,t+1} | \phi_{t+1}^{F_{t+2}})$ as the sample of the distribution of future random price of $(\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}})$. The return at t in equation (4.2) incorporates the information about the time period $(t+1)$, available at t . In equation (3), $(p_{i,t+1} | \phi_{t+1}^{F_{t+2}})$ has no relation with $(\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}})$ under assumption (ii), however. Instead, $(p_{i,t+1} | \phi_{t+1}^{F_{t+2}})$ is the discounted expected value of $(\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}})$. The realized return of $(t+1)$ in equation (3), includes information about periods $(t+1)$ and $(t+2)$ for $(p_{i,t} | \phi_t^{F_{t+1}})$ and $(p_{i,t+1} | \phi_{t+1}^{F_{t+2}})$ respectively. The information sets in $\tilde{r}_{i,t+1}$ and $r_{i,t+1}$ are different. These two values are derived from different information sets of different time periods. As a result realized return can neither be *ex-post* return nor a sample of return.

3 Alternative Definition of *ex-post* Value

In section 3, we have shown that the present believe on the *ex-post* return is misleading. How can we measure the *ex-post* return? At t , we consider, the *ex-ante* prediction follows²,

¹ Past information, for example as cited by Elton (1999), high earnings announcements of MacDonald, has little or no role in forming future expectation of the investors. *Does high earnings announcement really lead to higher future price?* In TSE, the annual earnings for Nintendo was the highest in March of 2009 at JPY 279 billion (approx); the price dropped from JPY 71,900 in 2007:10 to JPY 23,180 in 2009:10 following the earnings information, however. If positive (negative) past information has an impact on the following price, the price would have increased (decreased) following the information. The drift in Nintendo's price, even with the highest earnings information, can be an example of the absence of the effect of past information on the price.

² Readers might question that: How the investors will forecast the future when the future looks gloomy and next period's expected value is thought to be negative? that is, when $\tilde{x}_{i,t+1} | \phi_t^{F_{t+1}} < 0$, how the investors will make their future forecasts?

$$\tilde{p}_{i,t+1} = (p_{i,t} | \phi_t^{F_{t+1}}) + (\tilde{x}_{i,t+1} | \phi_t^{F_{t+1}}) \tag{4}$$

where, $(\tilde{x}_{i,t+1} | \phi_t^{F_{t+1}})$ is random operating value for t to $(t+1)$ based on available information set $\phi_t^{F_{t+1}}$ at t . We assume earnings, $\tilde{x}_{i,t+1}$, as the random operational outcome from t to $(t+1)$ realized at $(t+1)$. We observe earnings for t to $(t+1)$, i.e.; $(x_{i,t+1}^* | \phi_{t+1}^{H_{t+1}})$. Thus, we define the *ex-post* value at $(t+1)$, $(v_{i,t+1}^* | \phi_{t+1}^{H_{t+1}})$ as,

$$v_{i,t+1}^* = (p_{i,t} | \phi_t^{F_{t+1}}) + (x_{i,t+1}^* | \phi_{t+1}^{H_{t+1}}) \tag{5}$$

where, $x_{i,t+1}^*$ is the observed earnings at $(t+1)$. The value in equation (5) is the realized value of *ex-ante* random price of $(\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}})$ for $(t+1)$ made at t . The realized price, $p_{i,t+1}$, is not the *ex-post* realization of $(\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}})$; whereas, $x_{i,t+1}^*$ is the observed earnings for t to $(t+1)$ at $(t+1)$. The *ex-post* return, $r_{i,t+1}^*$, can be written as:

$$r_{i,t+1}^* = \frac{v_{i,t+1}^* | \phi_{t+1}^{H_{t+1}}}{(p_{i,t} | \phi_t^{F_{t+1}})} \tag{6}$$

As a concluding remark of section 4, the *ex-ante* value at t is the expected value of $E(\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}})$ for $(t+1)$. $E(\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}})$ is discounted to derive $p_{i,t}$ at t . The *ex-post* value at $(t+1)$ is the realized (observed) value of timer's anticipation of $(\tilde{p}_{i,t+1} | \phi_t^{F_{t+1}})$ that we would observe as we move to $(t+1)$. In contrast, price $p_{i,t+1}$ is derived from $E(\tilde{p}_{i,t+2} | \phi_{t+1}^{F_{t+2}})$ at $(t+1)$. In section 3 we have argued that the information sets in these values are different. At $(t+1)$, price $p_{i,t+1}$ incorporates the information set $\phi_{t+1}^{F_{t+2}}$ on $(t+2)$, whereas the *ex-post* value at $(t+1)$, $v_{i,t+1}^* | \phi_{t+1}^{H_{t+1}}$, is observed from the operational activities of t for $(t+1)$.

4 A Numerical Example on the Ex-Ante Return, Ex-Post Return and the Realized Return

The Latin word ‘*ex-ante*’ means ‘beforehand’. In models where there is uncertainty, that is resolved during the course of events, the *ex-ante* values are those that are calculated in advance of the resolution of uncertainty. In finance, for example, *ex-ante* is the future random values. As a numerical example, let $E_t(\tilde{p}_{i,t+1})$ and R_i be \$110 and 10% respectively. The price at t , $p_{i,t}$, would be \$100. Now, as we move to $(t+1)$, the price $p_{i,t+1}$ will be the discounted expected value of $(t+2)$, i.e., $E_{t+1}(\tilde{p}_{i,t+2})$. If for some reasons, at $(t+1)$ the investors predict a macro-economic downturn in $(t+2)$. At $(t+1)$ investors predict $E_{t+1}(\tilde{p}_{i,t+2})$ to be \$99.¹ Thus the price at $(t+1)$, $p_{i,t+1}$, will be \$90. This downward movement

Following equation (4.4), when $\tilde{x}_{i,t+1} | \phi_t^{F_{t+1}} < 0$, investors will consider another variable $(\tilde{\theta}_{i,t+1} | \phi_t^{F_{t+2}})$ which includes the information on the periods $(t+2)$ onwards.

$$\tilde{p}_{i,t+1} = (p_{i,t} | \phi_t^{F_{t+1}}) - (\tilde{x}_{i,t+1} | \phi_t^{F_{t+1}}) + (\tilde{\theta}_{i,t+1} | \phi_t^{F_{t+2}})$$

The idea behind this is that, even though the next period's values are negative, the following periods information makes the forecasts positive in the sense that:

$$-(\tilde{x}_{i,t+1} | \phi_t^{F_{t+1}}) + (\tilde{\theta}_{i,t+1} | \phi_t^{F_{t+2}}) > 0$$

In the later section we conduct an empirical test on the *ex-post* measure of the above relationship. And we have provided proof supporting our assumption.

¹ For simplicity, we have assumed that the variance-covariance matrix for the investor is constant and any change in the macro-economic variable will be reflected in the changing expected value.

of the price is the result of the unfavourable forecast of $E_{t+1}(\tilde{p}_{i,t+2} | \phi_{t+2})$. Under these circumstances, the *ex-ante* returns for both t and $(t+1)$ are 10% whereas the realized return at $(t+1)$ is -10%. The price \$90 at $(t+1)$ is not observed from $\tilde{p}_{i,t+1}$, rather $p_{i,t+1}$ is the discounted value of $E_{t+1}(\tilde{p}_{i,t+2})$. Thus, realized value (or the price) cannot be the sample of the *ex-ante* expectations. *Can realized return be the ex-post realization of the ex-ante expectations?*

Continuing with the numerical example, let the operating earnings for t to $(t+1)$, i.e.; $x_{i,t+1}^*$, be \$8. Thus the *ex-post* value $v_{i,t+1}^*$ becomes \$108 and the *ex-post* earnings is 8%. The realized return at $(t+1)$ is -10% whereas the *ex-post* return is 8%. *How rational will substituting 8% with -10% be?* In other words, we cannot substitute the *ex-post* return of 8% with the realized return of -10%. The *ex-post* earnings is positive whereas the realized earnings is negative. The realized return cannot be the *ex-post* realization of the *ex-ante* returns.

In the empirical tests of CAPM, researchers are assuming that the realized return, $r_{i,t+1}$, is a sample of return \tilde{r}_i , and the average of the realized return, \tilde{r}_i , will be the best estimate of the expected return, $E(\tilde{r}_i)$. We have argued in this section that, the realized return cannot be a sample of return. We believe, the intuition that realized return as the *ex-post* realization of the return is misleading. Redefining the *ex-post* value will portrayed the distinction between the *ex-post* value and the realized value. When the realized value is not the *ex-post* realization of the *ex-ante* value, it concludes that realized return is not the sample of return.

The term *ex-post* literally means “after the fact”. For any *ex-ante* value, the *ex-post* value will be observed as we moved to that particular period and when all the uncertainty has been resolved. For example in figure 6.2, at t , the future value of asset i for $(t+1)$ can be considered as the *ex-ante* value, i.e.; $\tilde{p}_{i,t+1}$ would be the *ex-ante* value for t . In contrast, the *ex-post* value is the observed value at $(t+1)$ from, and this value is the result of operations from t to $(t+1)$. In other words, the *ex-post* value can be defined as the observed value of $\tilde{p}_{i,t+1}$, forecasted at t , that is realized at $(t+1)$. However, the realized price at $(t+1)$, $p_{i,t+1}$, is the discounted future value of $(t+2)$. Although we get two values at $(t+1)$, the *ex-post* value and the realized price, these values are different as they are derived from different time periods.

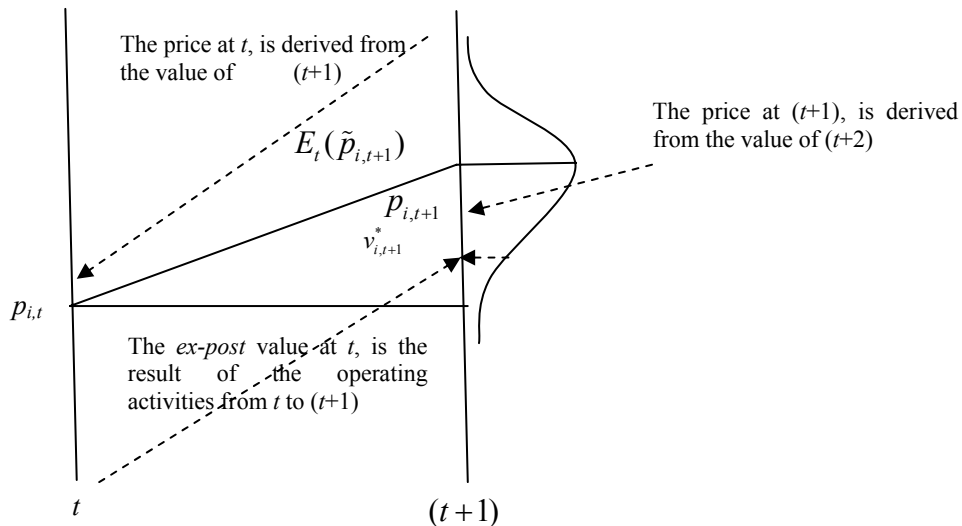


Figure 2 Derivation of Prices and *ex-post* value

We defined $x_{i,t+1}^*$ as the *ex-post* earnings of the distribution of random values of $\tilde{p}_{i,t+1}$ in $(t+1)$, which is observed as we move to $(t+1)$. The researchers believe that the *ex-post* average return provides a good estimate of the *ex-ante* expected return. As the *ex-ante* expectation is unobservable, empirical tests of CAPM assumes that the probability distribution generating the *ex-post* outcomes is stationary

over time and realized return could be substituted as the sample of *ex-post* realization of the *ex-ante* expectations. *Are both of these values, the ex-post and the realized value (price), generated from the same distribution of future values? Are both $v_{i,t+1}^*$ and $p_{i,t+1}$ derived values of the distribution of $\tilde{p}_{i,t+1}$?* Figure 2 clearly explains that these values are not the same. Instead, these values provide different information to the researchers. Although these two values rarely coincide, none of the values can be treated as substituting the other value.

5 Conclusion

In this paper, we focused on the belief of considering realized return as a sample of return. Under assumptions (i) and (ii), we have shown that realized return cannot be the *ex-post* realization of the *ex-ante* expectation.

The researchers can establish the risk-return relationship in theory. The unobservable nature of the expected return has led the empirical researchers to use realized return as a sample of return. And the measurement of the empirical risk-return relationship has been inconclusive and controversial. As a result, a number of researchers have introduced new models to measure the empirical risk-return relationship.

For example, Fama and French (1992) have introduced the 3-factor model in an attempt to explain the empirical risk-return relationship. Their model gained popularity as they focused on forming an empirical model that would fit the realized return data. The model is used to explain the *ex-ante* risk-return relationship from the realized return data. We have shown that realized return can neither be the *ex-post* return nor the sample of return. What economic implication does the realized return data contain?

This thesis is the first one to explicitly define the *ex-post* value, and we have shown that realized value and the *ex-post* value are different because of the differences in the information sets. We conclude that realized return cannot be the *ex-post* realization of the (*ex-ante*) return, i.e., realized return cannot be a sample of return.

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A Study on Purchase of Service Contracting and Community Care for the Disabled

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Abstract: The stability of the disabled is conducive to the social stability and the extension of national governance. This article starts from the living status of the disabled in China, introduces the concept of “community care for the disabled”, and compares the role orientation between government and social organization in the community care for the disabled. The conclusion is that in the current stage, the affairs of the disabled should be dominated by the government, and supplemented by social organizations, in government purchase of contracting service to promote the development of the affairs for the disabled.

Key words: POSC; The disabled; Community care

1 Introduction

The disabled refer to the people who are deprived of or abnormal in a certain organism or function of psychology, physiology and body structure, or those who are totally or partly unable to be engaged in certain activities in a normal way. The disability includes vision disability, hearing disability, speech handicap, physical disability, intelligence disability, mental disability, multiple disability and other disabilities. According to the total population of the sixth population census, and the second nationwide sampling survey of the disabled, as well as the percentage of the disabled in the total population and the proportion of all kinds of disability in the total number of the disabled, it can be calculated that until the end of 2010, the total number of the disabled in China was 85.02 million. The population of all kinds of disability was respectively: vision disability 12.63 million, hearing disability 20.54 million, speech handicap 1.3 million, physical disability 24.72 million, intelligence disability 5.68 million, intelligence disability 6.29 million, and multiple disability 13.86 million. The population of all levels of disability was respectively: severe disability 25.18 million, and moderate disability 59.84 million. Apparently, the disabled is a large group of the complicated structure. Because of their vulnerability, and lack of the social fairness and justice, the disabled are deprived of the due protection of civil rights and personal dignity.

In addition, the disabled cannot be ignored in the human evolution and the social development. The disability has two categories of primordial disability and posterior disability. The former refers to the congenital disability caused by heredity. The latter refers to the disability caused by “irresistible forces” in social activities (such as the disability caused by aging). These two kinds can be alleviated or cured by the professional rehabilitation. However, because of the scarcity of public resources and the unbalanced regional distribution, a majority of the disabled miss the opportunity of receiving the professional rehabilitation and have the lifelong trouble with the increasing opportunity cost. In the daily life, the disabled are treated unfairly and suffer from the social discrimination in the medical treatment, employment and education. In a transformational society, they are excluded from the system for their disability, and turn out to be an underprivileged group. It will be the duty of the family with the disabled, of the society and of the government to improve their living condition and alleviate their pressure and pain.

2 Introduction to Community Care for the Disabled

How to improve the living condition of the disabled The inertial answer will be family care. Undoubtedly, as the social basis and the structural pattern of mutual assistance of human survival, reproduction and development, family is the ultimate guarantee for its members. As a result, in the traditional family-oriented structure, the family assumes the major responsibility of taking care of the disabled. The society and even the country only play marginal roles in caring for them. However, since the beginning of the 1980s, the transformation of the family structure and the social economic structure and the changing ideology of social members keep striking the traditional family structure. The family care entails a high human and material cost. People’s pursuit of wealth and all kinds of temptations shake its foundation. There is an expanding mental gap between the disabled, especially the severely

disabled, and their family members. Usually, they feel anxious, lonely, and deprived. It is clear that either materially or mentally, the traditional family care is too vulnerable to catch up with the social development.

As the family care is going downhill, the institutional care is playing a more and more prominent role. The current welfare institutions include professional rehabilitation institutions, professional fostering service institutions and special educational institutions. They have many advantages. Firstly, their service is professional. Basically, the disabled can receive the professional life care and the medical treatment in welfare institutions. Moreover, the institutional care plays an important role in reducing the burden of the family, and alleviating the loneliness of the disabled, especially the senior disabled. However, the institutional care also has some drawbacks. Firstly, the institutional care breaches the traditional family ethics, and a majority of the disabled can not accept this caring mode. Secondly, there are too many institutions for the disabled, which are operating independently, with high caring cost and certain economic risks. Thirdly, the development of the institutional care, especially the welfare system is very slow. There is a gap between the limited number of institutions for the disabled and the expanding demand for service.

In order to make up the gap, the current mode must be discarded for a new one. As a result, the concept of the community care is introduced, which originates in the community care for the seniors in the west.^[1] The advantage of the community care for the disabled is that they can live at home, and receive a social service. It is family-oriented, based on the community and centers on the rehabilitation, education, fostering, culture leisure, rights protection, and disability prevention. It is mainly in the form of the door-to-door service and daily care in the community. In this way, the disabled receive the care at home and the necessary service from social institutions, such as the social worker organization and the disabled organization.

Until now, it is clear that the major way of the disabled service is the professional and organized community care. The discussion about the government and social organizations which are the major supporters of the community care can never be neglected.

3 Government, Social Organization and Community Care for the Disabled

The discussion about the relation between government and the society can never be separated from the theoretical paradigm of the state and the society. The relation between the state and society is a heated topic in the discussion of political theories. The power of the state and the society represents the level of democratization of a society. A powerful state means that the society is subordinated to the state or the political authority. Although it may not be able to provide freedom, it can establish a strong government to maintain the national stability and prosperity. A powerful society means that the state is subordinated to the society. The state (government) withdraws from the society, economy, culture and non-government activities. The core functions of the government are “economic regulation, market supervision, social management and public service”, in order to optimize government functions.^[3] China is in a period of transformation, and the establishment of a service-oriented government and of a development mode of “small government, big society” will be the trend of the civil society in the future. Among the new development modes, the social organization in the social system is selected to illuminate its relation with the community care for the disabled.

The family care burdens the family heavily and entails the support of humans and materials, which increases the opportunity cost. As a result, the family care is in an urgent need of the support from the society and the state.

3.1 Service-oriented government: new mode of national governance

In his discussion about the political order in the developing countries, Huntington points out that the Communist Party of China (CPC) can make use of its advantages to establish the political authority in order to maintain the political stability. Its ideology provides evidences to the validity of the government. Its party organizations provide the system of the power organ to win support and carry out policies.^[2] The stability of the political order is the prerequisite for the national development. The state (government) maintains its absolute control of the society by dynamic governance modes, which include hard strike, document politics, group politics and mass activities.^[4] Undoubtedly, these government modes make the most of the political authority of CPC to fully mobilize the social forces, in order to accomplish seemingly impossible “political missions” one after another with concerted efforts. In this process, the collectivity (here referring to the state) is enlarged, and individual differences are reduced. As a result, comparative fairness and justice are realized in the state.

However, with the social transformation and the major social and economic reforms, the previous dynamic governance modes can not adapt to the practical changes and development. The modes of the social mobilization also need to be transformed, or they will be discarded. State-owned businesses and collective enterprises start restructuring, or they will go bankrupt. Laid-off workers, urban proletarians and the disabled turn into social members from institutional members. The institutional welfare turns to the social and public welfare. Before the establishment of a welfare system in the state in a general sense, they are excluded from the social system. They are eager to be included in the system. However, because of the lack of knowledge and skills, they are reduced to grass-root classes in the society, of which the disabled are the most underprivileged. The lack of the social welfare system, the aggravation of the family burden and the discrimination in the society make them under great survival and mental stress. If the pressure is not released, its potential tension will accumulate, expand, and evolve to the dissatisfaction about the government and the society. They will even form a new social group. If the members are not mobilized to get involved in politics, they will rise to overthrow the existing political order of injustice and unfairness, which will threaten the governance of the authority. If the previous dynamic governance mode is observed, the temporary assistance and the imperfect social security policy will intensify the contradiction. The maintenance of the political order and stability entails the integration of their interests in order to achieve peace in competition.

The integration of their interests entails the establishment of a service-oriented government, the transformation of its governing idea, the people-oriented practice, and the gradually released control of the society, in order to make social forces integrated into the system of the public service, and to fully mobilize them to provide the security service to the disabled. For this, the country has made a great deal of valuable exploration, including the establishment of China Disabled Persons Federation in Beijing in 1988, the setting-up of nationwide disabled persons unions according to the setting pattern of the government, the promulgation of the Disabled Rights Protection Law of the People's Republic of China (PRC), and the nationwide sampling survey of the disabled in 1987 and 2006. The report of the Eighteenth Party Congress of the Communist Party of China (CPC) declared to establish a perfect social security and service system for the disabled, and to safeguard the rights and interests of the disabled. The Twelfth Five-year Plan pointed out that the establishment of a perfect social security and service system for the disabled will provide a stable institutional guarantee for their life and development. The state keeps upgrading the establishment of two systems for the disabled by the implementation of various laws and regulations. According to the requirements of establishing a social management pattern of the leadership of party committees, the responsibility of the government, the social coordination and the public participation, the state strengthens the construction of the social management law, system and ability, in order to do well the management and service of the disabled.

3.2 Social organization: important practitioner of community care for the disabled

The transformation of the state governance mode, the establishment of the service-oriented government, the released control of the society and the flooding emergence of policies favoring the society promote the persistent springing up of social organizations. The state needs to integrate interests of the disabled to set up nationwide Disabled Persons Union (DPU for short). However, in China they develop into an integrated variant (the government organization in the category of the nation, the mass organization in the category of the party, and NGOs in the category of the UN). Other social organizations of the service for the disabled also spring up, which included the social organizations, foundations and private non-enterprise organizations which register with the civil administration department. They can be divided into the organizations funded by the government, the social organizations established by enterprises and the grass-root non-enterprise organizations (private organizations). They gradually become the third department, apart from the government and the market.^[5] Owing to their commonweal, non-profit and voluntary, the social organizations can always gain more extensive social information and resources, and provide more professional and efficient social services.

Social organizations are based on the profession rehabilitation, the psychological comfort, the medical treatment and the educational service of the community for the disabled, in order to help them to overcome their mental block and to get integrated into the society in a short time. The core construction of the social organization is the service staff. That is to say, only the direct person-to-person contact and assistance can become the service. Its directness works in concert with the indirectness of the government management and decision-making. The government sectors are only the managers of the social service, rather than the direct executor. They will hire off-staff social workers to do the specific service. These organizations are official, into which the government funds can be quickly invested. Another organization is the mass-run enterprise which forms spontaneously in the society, such as the

private nursing institutions and specialized education institutions, which employ professional workers (such as social workers) from the society to provide the systematic and professional community care. They are diverse and called "Grass-root NGO". Their large amount and great diversity bring convenience to the daily care of the disabled.

Official and non-official social organizations constitute the community care system for the disabled, which work in concert with the state-run social welfare institutions and society-run welfare institutions explored by the state. They are both the reasonable modes. However, in a background of "Small Government, Large Society", state-run (public) welfare institutions should introduce the market competition mechanism, like the reform of the economic system, rather than compressing excessively the living space of society-run (civilian-run) welfare institutions. Only in this way, can the service quality and level be improved to promote the further development of the affairs of the disabled.

3.3 Organization dilemma: contradiction between service-oriented government and social organization

The current organization dilemma lies in the economic transformation of the state. The service for the disabled is expected to be pushed into the market. However, the national policy funds only go to the people included in the system. For the people excluded from the system, the social service entails the government's purchase of the service of social organizations. However, the purchase has not developed as a long-term mechanism. As a result, many social organizations are declining. The practical dilemma is the way of investing national funds into the society, the economization of administrative resources, the growth of the administrative efficiency and the mobilization of the social participation in the community care for the disabled.

In order to illuminate the dilemma, we take CDPF as an example. As has been mentioned, this organization is an NGO in the United Nations. However, in the government management system in China, it is a government management department. CDPF has three functions of representation, service and management: representing the common interests of the disabled, and safeguarding the legitimate interest of the disabled; unifying and educating the disabled, as well as serving them; performing the legitimate responsibilities, undertaking the tasks of the government commission, and managing and developing the affairs of the disabled. The contradiction results in the important role of CDPF in the affairs of the disabled. As an official organization, it integrates the duties of management and service. Apart from the management responsibility, the service responsibility should not be commissioned to an NGO. With the policy funds, the government-controlled social institutions imitate the organizations mode of the government system. They are so stable that they lack innovation. The members work with low efficiency because of the subtle heterogeneity. In addition, it is difficult for these institutions to prevail in the community to provide direct service to the disabled. As a result, the social organizations rendering direct service come into emergence to meet the expanding demand of the community care for the disabled. They are the organic joiners of the government-run social organization, which have been tested and proven effective in the community care for the senior abroad. As a result, China begins to introduce this mode of the community care. Many cities have explored it in practice over a long time, such as Shanghai and Shenzhen.

Social organizations play such important roles that they are highly valued by the state. However, their development is restricted by many factors, such as the lack of funds, imperfect social policies, and scarce professional talents. It is critical to solve this problem, to establish sound social security policies, and to maintain social justice and fairness. However, there is a long way to go before its realization. At present, we can only seek a way of rendering good service to the disabled in the short time, which means giving social organizations (especially the ones for the disabled) enough room for development, and making the funds go out of the system to benefit more people. Purchase of services contracting is an effective policy approach.

4 Purchase of Service Contracting: Only Road to Community Care for the Disabled

With the economic development and improvement of living standards in China, the public begins to require more effective and diverse public services. In order to meet the demand of development, the Chinese government puts forward the reform idea of the transformation of government functions. By the government purchasing service, the public service previously provided by the government is commissioned to the more efficient social organizations. Here, the Purchase of Service Contracting, (POSC for short) refers to the government's responsibility of serving the public, by funding all kinds of

qualified social service institutions through the government finance, in order to purchase all or part of the public services within the categories and quality defined by it, which is provided by contracting. It is a provision of purchasing service of “government funding, directional purchasing, contracting management, evaluation redemption”^[6] In essence, it is a mode of the public service of contracting commission, with the production and supply of private profit organizations or non-profit organizations. Namely, the service previously provided by the formally ordered linkage structure within the public sector is transferred outside the organization through the purchasing task executed in the mass taxing by the government.^[7]

Honestly, POSC originates in the west, because of the welfare state crisis including the crisis of western government finance, and the consequent government reform, public service marketization and privatization flooding and new public management proposals. However, it is alienated in China, because, influenced by administration and bureaucracy, the social service can only be provided directly by government sectors or developed by government-run social organizations (such as the subordinate social organizations of the CDPF) and neighborhood committees^[8], which has been discussed. Because of its drawbacks, it is not easy to realize the comprehensive service for the disabled in a new way, which can be traced from the classics of Marxism. Marx advocated the social revolution ignited by the working class, the overthrow of the governance of the ruling of bourgeoisie, and the establishment of a communist Utopia.^[9] However, as a part of the capitalist society, the working class is intrinsically affiliated to the bourgeoisie, and can accomplish the socialist revolution as a new social organization or social stratum differentiated from the social revolution (such as Bolshevik in Soviet Union, and CPC) rather than as an independent force. Similarly, as for the community care for the disabled, government-run social organizations can not be free from the restriction of the current system. The future trend is the transformation to POSC, and the emergence of newly established private social organizations.

The prerequisites for their emergence also lie in the transformation of government functions. The service-oriented government should contract more responsibility to the professional service institutions for the disabled, in order to maintain the reasonable operation of the institution, to establish a prefect public policy system and to strengthen POSC, the most important of which is the determination of the government, namely, whether the government and officials (management staff) at all levels can really serve the people and whether they are in line with the public to support the development of the affairs of the disabled in China. In addition, the market mechanism needs to be introduced to the policy of POSC, in order to engage more social organizations (NGOs for the disabled) in the service for the disabled. The discussion here focuses on the second point, that is to say, the discussion of the policy implementation of POSC in the community care for the disabled, of which the executors are mainly civil social organizations in the community. The operation is funded by POSC of the government.

4.1 Operation mechanism of POSC

As a new provision mode of the public service, POSC has the operation mechanism of policy making, government purchasing, contracting management and project evaluation.

Policy Making The government needs to make the social policy of POSC scientifically, which is in line with the macro and other related development planning of the government. The development of the POSC should be based on the needs of the public and the social and economic development, with the model of the gradual institutional reform.

Government Purchasing After making a plan of POSC, the government also needs to distribute and set specific applicable project implementation according to it. The government also needs to strengthen the training and guidance of social service organizations, in order to improve their professional ability and level. The public service purchased by the government should be quasi-public goods. From the experience, it is shown clearly that the financial resources and the management level of the government determine the quality and quantity of the service. There are four kinds of the government investment: wage system, payment for project, payment for labors, and mixed payment system.^[10]

Contracting Management It is the contracting management in a broad sense. Either by contracting, subsidy or voucher, on the one hand POSC renders diverse choices to the public service. On the other hand, it brings about new requirements and challenges to the management ability, especially the contracting management ability of the government. It is because in the operation of POSC, the government only changes the role of producers. However, as the arranger and provider, the government assumes the new management responsibility, rather than reducing its management responsibility. The regulation of the operation procedures of POSC, such as the service application (or bidding), approval

(or signing a contract), provision, evaluation and settlement, all need to be standardized.^[11]

Project Evaluation In the implementation of the project, the assessment and supervision is needed to be strengthened. The quality and effect of the social service project should be guaranteed to win the trust of the people. Moreover, in terms of the evaluation of techniques, the design of an evaluation method which can balance universality and specialty practically, in order to establish a disinterested social service evaluation acceptance index system, also needs to be constantly explored and perfected in practice.^[12]

4.2 Future development of POSC

As an “import”, POSC works in concert with the notion of the service-oriented government of “small government, and large society”, which is consistent with the rapid economy growth, as well as the need of a transformational civil society. A large number of the disabled people are in need of comprehensive cares. The state should establish perfect social security and service systems for the disabled. In terms of micro-society, the mode of the community care for the disabled can be adopted in order to set up charitable service organizations for the disabled, and to guide their healthy and ordered development by increasing the financial investment through POSC. Ultimately, the policies of the service-oriented government should be specifically implemented in the community, the family with the disabled, and the disabled themselves, in order to put into full play its expected function, to be people-oriented and to integrate the interest of the group, in order to maintain the political stability and peace of the state.

5 Conclusion

As a newly-emerged sector, POSC also has some problems, such as the insufficient power for the policy of the government purchasing, the lack of the local financial support or the low level of the economic development, the inadaptability of social organizations to the need of POSC and the grey zone in POSC.^[13] The key to the solution of these problems is the determination of the government, which should have the notion of benefiting the people and perfect all the social security systems, lead the development of social organizations properly, set up a professional talent team for the social service and pay more attention to social workers, transform the public concept about the disabled, safeguard their rights and freedom as citizens, care about their physical and mental health, and maintain the social justice and fairness.

As for the future research, the discussion about the institutional improvement of POSC is critical to its systemization and perfection, and the establishment of a long-term mechanism of the financial investment. In the discussion about social organizations, the government should take into consideration the ways of integrating, mobilizing and controlling them. For example, there is much room for the promotion of the party construction in social organizations.

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Tourists' Attitude Towards Service Marketing Mixes: An Empirical Study on Cox's Bazar Sea Beach in Bangladesh

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Abstract: The core objective of this study is to know the tourists' attitude towards service marketing mixes. For that purpose data were collected by verified structured questionnaire from sample of 214. Sample respondents were divided into three groups. First group consists of 100 students, second group consists of 100 service holder and third group consists of 14 Businessmen. All of the students were taken from three different universities of Bangladesh. Service holder respondents were taken from different banks and company and the entire businessmen respondents taken from Dhaka and Comilla business centre. Target respondents were visited Cox's Bazar sea beach. Data were analyzed by using software SPSS-17 version by adopting the statistical techniques, correlation and regression. The findings of the study showed that six out of seven marketing mixes were positively related to tourists' attitude but service distribution system (Place) practiced by the authority is not satisfactory to the visitors'. Besides, some of the facilities and services did not meet tourists' expectation. Therefore, some recommendations have been given for policy makers for sustainable tourism development in Cox's Bazar.

Key words: Marketing mixes; Tourism; Tourists' attitude.

1 Introduction

Today in globalized world tourism industry is recognized as the single largest industry and this sector also become a major thrust area of economic and business activities in most of the countries. Travel is the basic trait in human nature. Millions of people are travelling each year from one part to another part of this world (Hasan, 1985). People now want to gather experiences about new places, new pleasure and know multi cultures through visiting destinations. As a destination Bangladesh is trying to develop bundle of tourism products-especially, Cox's bazar- world's largest unbroken sea beach. Cox's Bazar is about 150 km from Chittagong and is connected to the port city by bus, air and steamer services. It is a district town and is also the headquarters of the Cox's Bazar forest division. The town and surrounding places have many colorful pagodas and Buddhist temples and are inhabited by, among others, many tribal people who have their own distinct customs and traditions. This sea beach is the most attractive tourist resort of the country located on a low range of sand hills between the rivers Bakhali and the Bay of Bengal with a long open beach towards the sea. In addition to the long sea-beach with its silvery waves breaking at the foot of hills and sea-bathing, the attractions of Cox's Bazar include a drive along the beach, the view of the sun setting on the rolling sea-waves, the moonlit night, and the exciting interior of the bazar and its people.

2 Literature Review

A few number of researches conducted to know the tourists attitudes and perceptions towards marketing mixes of different tourist places in this world. As a developing country like Bangladesh we found few significant researches in this context. Hossain, Md. Afjal (2002) using five point scale examined foreign tourists' attitude towards marketing mix elements of the tourism industry in Bangladesh. He found that marketing mix elements of the tourism industry in Bangladesh relatively better to the foreign tourists. Hamidreza rastegar (2010) using five point likert scale assessed the attitude and perception of local residents toward tourism industry development in Iran. The samples were 320 local residents. The result shown that local people have positive attitude towards tourism development but they are not fully satisfied with tourism management in the area. Dr. Ayed Al Muala and Dr. Majed Al Qurneh (2012) shown the relationship between three key variables, namely marketing mix, satisfaction and loyalty in curative tourism industry in Jordan. Their study results were as follows: H1 has shown that product and place were significant on destination loyalty. While, price, personnel and process not significant on destination loyalty, and for H2 has shown that product, place, price, personnel and process significant impact on tourist satisfaction. In addition, H3 has shown that the tourist satisfaction mediates the relationship between Marketing Mix and loyalty. Hossain Sarker, Mohammad

Amzad; Wang Aimin; Begum, Sumayya (2012) examined the impact of marketing mix elements on tourists' satisfaction. Their findings shown that six out of seven marketing mix elements were positively related to tourists' satisfaction but price imposed by the authority is not satisfactory to the visitors'. Owomoyela S K, Ola, Olasunkanmi .S and iree Oyeniya K.O (2013) investigated the effect of marketing mix elements on consumer loyalty with special reference to Nigerian breweries Plc. They found that marketing mix elements have significant effect on consumer loyalty. Ljiljana Stanković and Suzana Đukić (2009) examined tourist destination management and found that innovative and well co-coordinated tourism products is exceedingly important for tourism regions. Kannan Srinivasan (2009) investigated that Kerala is one of the important destinations for the international tourists with its unique nature beauty with backwaters, mountains and beaches. Leo Huang, Kaung-Hwa Chen and Ying-Wei Wu (2009) identified the variety of marketing channel efficiencies for marketing activities and sets up an optimal marketing distribution mix for different wholesaler travel agencies. They found that Taiwan's wholesaler travel agencies adopt the retailer travel agency as their highest priority of channel selection, while travel agency websites hold it as their second priority. In other study, Douglas G. Pearce (2008) tried to develop a stronger conceptual basis for the study of tourism distribution by presenting a generalized model emphasizing the needs of tourists and the functions required to meet them. Musa and Adamu (2011) found that transportation is a significant determinant of tourism development. Other factors like recreational and social facilities and security also play positive role to develop this industry. Yu Wang (2006) examined some Chinese four- and five star hotels' training and development (T&D) practices from a Western human resource development (HRD) perspective and compares the results between the Chinese state ownership and Sino-foreign joint ventures using multiple case studies. Result shown that the western way of training and development may not necessarily lead to superior training effects in the Chinese context than those used by state-owned hotels. Kannan, Srinivasan (2009) the process in tourism includes, (a) trip planning and anticipation, (b) travel to the site/area, (c) recollection, (d) trip planning packages. The trip planning packages include, maps, attractions en route and on site, information regarding lodging, food, quality souvenirs and mementoes. In another study, Kannan, Srinivasan (2009) shown that in Tourism the physical evidence is basically depends on travel experience, stay, and comfort.

3 Methodology

3.1 Objectives

The main objective of this study is to know the tourists attitude towards service marketing mixes in case of Cox's Bazar. Other objectives are:

- (1) To explore the marketing mix which most significantly attracts visitors to visit Cox's Bazar.
- (2) To give some recommendations for policy makers for sustainable development.

3.2 Conceptual model and hypotheses

The model for this study is:

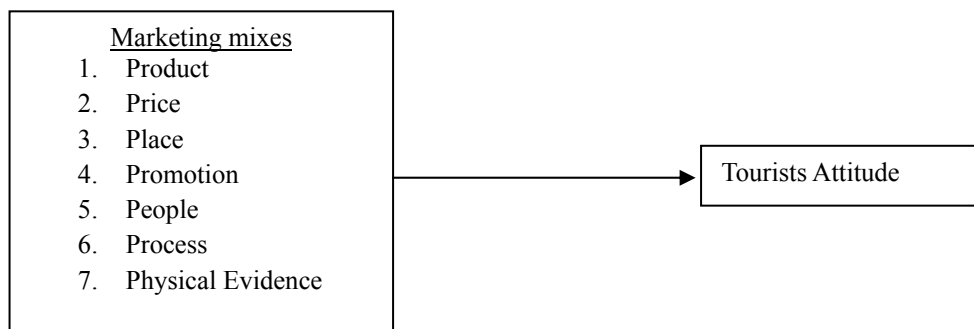


Figure 1 Conceptual Framework

The general form of the model was as follows:

$$TA = \alpha + \beta_1X_1 + \beta_2X_2+ \beta_3X_3+ \beta_4X_4+ \beta_5X_5+ \beta_6X_6+ \beta_6X_7+ e$$

Where, TA = Tourists' Attitude

X1 = Product

- X2 = Price
- X3 = Place
- X4 = Promotion
- X5 = People
- X6 = Process
- X7 = Physical Evidence

And α is constant and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ and β_7 are coefficient to estimate, and e is the error term.

3.3 Hypotheses

- H1: Tourists' attitude is positive towards Cox's bazar sea beach (Product).*
- H2: Tourists' attitude is positive towards s travel cost of visiting Cox's bazar sea beach (Price).*
- H3: Tourists' has positive attitude towards service distribution system at Cox's bazar sea beach (place).*
- H4: Tourists' attitude is positive towards promotion program to attract tourists' for visiting Cox's bazar sea beach (Promotion).*
- H5: Tourists' has positive attitude towards tourist service staff available at Cox's bazar sea beach (people).*
- H6: Service providing process at Cox's bazar sea beach and tourists' attitude are positively related to each other (Process).*
- H7: Tourists' attitude is positive towards the environments of Cox's bazar sea beach (Physical evidence).*

2 o by tourism and travel services

3.4 Sample size and sampling technique

To fulfill the objectives of this study, total 214 respondent (N= 214) were chosen by convenience sampling technique. The condition was that all of the respondents were visited Cox's Bazar sea beach. They were divided into three groups. First group consists of 100 students, second group consists of 100 service holder and third group consists of 14 Businessmen. All of the students were taken from Comilla University, Southeast University and Bangladesh Islami University. All of the service holder respondents were taken from different bank and company and the entire businessmen respondent taken from Dhaka and Comilla business centre.

3.5 Research instrument

The main methodology chosen for this study is the questionnaire survey method. The survey was conducted from October 2012 to January 2013. Primary data were obtained through a structured survey questionnaire. Total twenty four questions under the head of seven marketing mix elements (Product, Price, Place, Promotion, People, Process and Physical Evidence) and three questions for tourists' attitude are included in the survey questionnaire.

3.6 Measurement of dependent and independent variables

For the purpose of the study, respondents were asked to give tick marks on right side of different statements. Dependent and all of the independent variables were measured on five point Likert scale. The response scales for each statement in the survey questionnaire were as: 1= Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree.

4 Data Analysis

Data were analyzed by using software SPSS- 17 version. The following statistical techniques were applied to analyze the data:

- Cronbach's alpha (Reliability test table 1)
- Descriptive statistics and correlation (Table 2)
- Linear regression (Table 3)

Table 1 Reliability Test

MME &TA* c	Product	Price	PPlace	pPromotion	People	Process	Physical Evidence	Tourists' Attitude
CA**	0.807	0.714	0.700	0.733	0.737	0.714	0.785	0.857

Source: Calculated, *Service marketing mixes and Tourists' attitude
 **Cronbach's alpha (α)

Table 2 Descriptive statistics and Correlation

	M	SD	1	2	3	4	5	6	7	8
Product	4.36	.688	1							
Price	3.89	.726	.339**	1						
Place	3.43	.782	.210**	.218**	1					
Promotion	3.57	1.039	.124	.168*	.173*	1				
People	3.53	.791	.167*	.141*	.213*	.307**	1			
Process	3.51	.813	.175*	.065	.364**	.353**	.272**	1		
Physical Evidence	3.72	.699	.350**	.419**	.245**	.289**	.308**	.300**	1	
Tourists Attitude	4.07	.667	.473**	.301**	.075	.165*	.189**	.263**	.219**	1

*Correlation is significant at the 0.01 level (2-tailed), * Correlaton is significant at the 0.05 level (2-tailed)

Table 3 Regression Analysis

Variable	R	t-value	coefficient	F-value	P-value
1. Product	.473	7.807	.473(.458*)	60.947	.000
2. Price	.301	4.595	.301(.276*)	21.110	.000
3. Place	.075	1.102	.075(.064*)	1.215	.272
4. Promotion	.165	2.432	.165(.106*)	5.913	.016
5. People	.189	2.805	.189(.159)	7.869	.005
6. Process	.263	3.974	.263(.216*)	15.795	.000
7. Physical Evidence	.219	3.262	.219(.208*)	10.642	.001

Source: Calculated, * Unstandardized Beta Coefficient in parenthesis

3.1 Cronbach's alpha

By using Cronbach's alpha Internal reliability of the questionnaire was tested. According to Nunnally, J. (1978) Cronbach's α with larger α values (greater than 0.70) indicating higher internal consistency in the measured dimension and hence greater reliability. In our study the entire variables Cronbach's alpha is greater than 0.70 (Table- 1). So, it is clear that the questionnaire used in this study had strong internal reliability and it could be used with confidence for the application of next statistical analysis and interpretation.

3.2 Descriptive statistics and Correlation analysis

Table 2 represents descriptive statistics and correlation between each variable. If the mean scores of independent variables are observed then it we found that product has higher mean value 4.36 then the rest of the order is as follows: Price (3.89), Physical evidence (3.72), Promotion (3.57), People (3.53), Process (3.51) and Place (3.43). The mean score of the tourists' attitude is 4.07 means most of the tourists' attitude is positive. Range of correlation among variables is from .075 to .473. Therefore, all the variables are positively related to each other (Table 2).

3.3 Regression analysis

In order to know the affect of each independent variables on dependent variable and linear regression analysis was applied to test the hypothesis developed. Results of linear regression analysis are shown in Table 3.

3.3.1 Hypothesis 1 expresses that product quality has significant affect on tourists' attitude.

H₁: Tourists' attitude is positive towards Cox's bazar sea beach (Product).

47.3% variance in tourists' attitude is explained by product, which is evident by the value of R = 0.473, F = 60.947 at P = 0.000 explains the model's goodness of fit. The value of t = 7.807 is the evident of significant positive relationship between independent and dependent variable. Therefore, on the basis of these results it can be inferred with confidence that H₁ is accepted.

3.3.2 Hypothesis 2 expresses that the total cost (price) has significant affect on tourists' attitude.

H₂: Tourists' attitude is positive towards travel cost of visiting Cox's bazar sea beach (Price).

30.1% variance in tourists' attitude is explained by price, which is evident by the value of R = 0.301, F = 21.110 at P = 0.000 explains the model's goodness of fit. The value of t = 4.595 is the evident

of significant relationship between independent and dependent variable. Therefore, on the basis of these results it can be inferred with confidence that H₂ is accepted.

3.3.3 Hypothesis 3 expresses that service distribution system (place) of Cox's bazar sea beach has significant affect on tourists' attitude.

H₃: Tourists' has positive attitude towards service distribution system at Cox's bazar sea beach (place).

7.5% variance in tourists' attitude is explained by place, which is evident by the value of $R = 0.075$, $F = 1.215$ at $P = 0.272$ explains the model's goodness of fit which has slight positive affect on tourists' attitude. The value of $t = 1.102$ is the evident of insignificant relationship between independent and dependent variable. Therefore, on the basis of these results it can be inferred with confidence that H₃ is not accepted.

3.3.4 Hypothesis 4 expresses that promotion strategies has significant affect on tourists' attitude.

H₄: Tourists' attitude is positive towards promotion program to attract tourists' for visiting Cox's bazar sea beach (Promotion).

16.5% variance in tourists' attitude is explained by promotion, which is evident by the value of $R = 0.165$, $F = 5.913$ at $P = 0.016$ explains the model's goodness of fit. The value of $t = 2.432$ is the evident of significant positive relationship between independent and dependent variable. Therefore, on the basis of these results it can be inferred with confidence that H₄ is accepted.

3.3.5 Hypothesis 5 expresses that employees' cordial behavior has significant affect on tourists' attitude.

H₅: Tourists' has positive attitude towards tourist service staff available at Cox's bazar sea beach (people).

18.9% variance in tourists' attitude is explained by people, which is evident by the value of $R = 0.189$, $F = 7.869$ at $P = 0.005$ explains the model's goodness of fit. The value of $t = 2.805$ is the evident of significant positive relationship between independent and dependent variable. Therefore, on the basis of these results we accept H₅.

3.3.6 Hypothesis 6 expresses that service delivery process has significant affect on tourists' attitude.

H₆: Service providing process at Cox's bazar sea beach and tourists' attitude are positively related to each other (Process).

26.3% variance in tourists' attitude is explained by process, which is evident by the value of $R = 0.263$, $F = 15.795$ at $P = 0.010$ explains the model's goodness of fit. The value of $t = 3.974$ is the evident of significant positive relationship between independent and dependent variable. Therefore, on the basis of these results it can be inferred with confidence that H₆ is accepted.

3.3.7 Hypothesis 7 expresses that good travel experience, stay, and comfort has significant affect on tourists' attitude.

H₇: Tourists' attitude is positive towards the environments of Cox's bazar sea beach (Physical evidence).

21.9% variance in tourists' attitude is explained by physical evidence, which is evident by the value of $R = 0.219$, $F = 10.642$ at $P = 0.001$ explains the model's goodness of fit. The value of $t = 3.262$ is the evident of significant positive relationship between independent and dependent variable. Therefore, on the basis of these results we accept H₇.

4 Discussion

If we analyzed the mean scores of the marketing mixes as independent variables we found that the lowest mean score is place (3.43). In our study we also found that the distribution system taken by the authority is not satisfactory by the tourists'. Therefore, place has no significant positive relationship with tourists' attitude. While, on the other hand, except place, remaining six elements, namely, product, price, promotion, people, process and physical evidence have significant relationships with tourists' attitude. The findings also prove that 'Product (sea beach)' has the most significant relationship with tourists' attitude. 'Price' is the second most significant element that this study reveals. The third most influencing variable is 'Physical evidence' which have significant relationship with tourists' attitude. The fourth most influencing variable is 'Promotion' which have significant relationship with tourists' attitude. The fifth most influencing variable is 'People' which have significant relationship with tourists' attitude. The last variable that has positive relationship with tourists' attitude is 'Process'. Finally, the mean score of the tourists' attitude is explained overall positive impression of the tourist's though the tourists' have dissatisfaction toward place.

5 Conclusion and Recommendations

5.1 Conclusion

As a developing country tourism industry can play important role to boost up the economy of Bangladesh. On the basis of our study we concluded that except place (distribution system) all of the variables have significant affect on tourists' attitude. Therefore, Bangladesh has lot of opportunities to gain profit by offering this sea beach to local and foreign tourists'.

5.2 Recommendations

In Bangladesh, most of the visitors' in different scenic spots are young boys and girls, especially students are visiting places during their vacations. Besides, they have lot of leisure time to visit tourist spot. Most visitors received information from other visitors who visited the tourist spot. Through advertisement in TV channel, newspaper, magazines and websites authority can marketing their attractions for increasing visitors' volume. Since, some service holder and Businessmen visited Cox's Bazar with their family, it may therefore adopt incentives for family members and offer special discount for students. The study concluded that some of the facilities and services did not meet visitor's expectation. Therefore the following recommendations for Cox's Bazar requiring improvement: (1) Authority should establish more hotels and motels for facing peak period demand. (2) They should establish sufficient toilet facilities at the sea. (3) Through police administration authority should ensure security of the visitors, especially at night. For that purpose special legal authorities should prevail in beach area for around the year. (4) There must be enough life guard people for rescue the visitors from sea and need to build net around the sea for visitors' protection. (5) Need to increase the facilities for changing dress and keep materials at the beach. As a result, conservative women and young girls can keep their privacy. (6) Need to arrange amusement like bar club, disco club etc. for tourists', especially foreign tourists'. (7) Need to proper training for the employees of the hotels and motels. (8) Entry and exit control mechanism should exist. (9) No shopping facilities to remain on the sea beach. (10) Make good environment around the beach, need to employed sufficient cleaners to clean dust in the beach area. (11) Authority should fix up the unique rent of hotels and motels around the year because most of tourists' have negative attitude toward price. They can also offer discounts for family visitors' and students. In offseason like summer they can offer discount price for attract more visitors'. (12) Government should take initiative to build railway direct communication from Dhaka to Cox's bazar and provide government bus service. (13) Local authority should take initiative to stop unplanned establishment in sea sight, like to build hotels, motels, private apartments etc. Because present situation tells us that these establishments destroy the beauties of beach and environment also.

In our study we also found that cost of the tourist (especially student) performed as a sensitive element toward their attitude and intention to revisit. So, price sensitivity for the cost of transportation, accommodation, quality food, coffee or tea, beverages and tour related cost can be determined as competitive factors for the tourist operators.

6 Limitations and Future Research

Despite the importance of the contribution of this study to know the tourists' attitude towards service marketing mixes and its valuable implication, it has some limitations. First limitation of this study is the use of self evaluation criteria of investigating the tourists' attitude, which may be biased. Second limitation is that sample size could be higher to make it more representative. Third limitation is some respondents have shown reluctant to give their opinion due to their time limitations. Fourth limitation is number of businessmen; it could be more representative if we took more businessmen as sample. Finally, it was expensive. Our budget was limited which actually made difficulties to craft the research successful in all respect.

In this research we only want to know the tourists' attitude towards service marketing mixes. But there are several potential research areas. For example; Tourists' psychological factors may impact on visiting or revisiting to Cox's Bazar and also their attitudes. Other study can be done with other influential factors like demographic, behavioral, and cultural. The results of this study were carried on by using the regression analysis. The relationship of the variables could be modified and can be done other advanced statistical techniques.

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A DEA-based Efficiency Study of Service Industries in 19 Central Cities in China

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Abstract: This paper uses the DEA approach (Data Envelopment Analysis) to construct the input-output model to analyze efficiency of service industries in 19 central cities of China in 2009. The results show that the input-output efficiency of these cities is not high, and also that the efficiency differences are significant. The trend shows higher efficiencies in southern and eastern cities than in middle and western areas. The input-output efficiency of Shenyang, Guangzhou, Xiamen, Shenzhen are relatively high. The input-output efficiency of Wuhan, Harbin, and Changchun are comparatively low. This paper suggests some measures to improve the input-output efficiency of modern service industry in central cities.

Key words: Modern Service Industry; Data Envelopment Analysis; Central Cities; Input-Output Efficiency

1 Introduction

Service is derived from the concept of the third industry. In 1957, Clark added the third industry (service industry) to national economic structure, which is divided into agriculture department, industry department, services department (including building industry), transportation industry, telecommunications industry, commerce industry, finance, professional services and personal services, etc. Scott^[1](1988) firstly proposed the concept of "service industry cluster". Riddle^[2] suggested that in the process of economic development, the role of service industry is even more important than its share in GDP. Ye Ying and Fan Bingquan^[3](2008) comprehensively analyzed the four development modes regional service industry, mainly including integrated mode, outsourcing mode, investment promotion mode, and houses' intensive mode. They showed the Baoshan district in Shanghai as an example to carry on empirical research. Liu Chong^[4](2005) discussed the theoretical connotation of modern service industry, presented the concept of relative dynamic. He thought that modern service industry is an industry body which upgrades after the extension of the third industry. Yang Cuilan^[5](2005) argued that modern service industry is mainly productive service, which provides various services to daily production, business activities, and government management. Gu Naihua^[6](2007) thought that modern service industries are those who have strong spillover effect and is a combined service sector which is beneficial to the promotion of overall economic competitiveness from the perspective of industry Relevancy. There are also some scholars who make evaluations of modern service industries. Authors such as Qu Chao^[7], Lu Ling^[8] evaluate the information service industry, travel services industry, and production services industry. They mainly evaluate the service industry development level and service industry competitiveness from the perspective of evaluation content.

This paper selects appropriate input and output indicators, uses DEA method to analyze the input-output efficiency of modern service industry of central cities in China.

2 Sample Selections

We selected China's service industry in 19 central cities as research sample. With rapid development of information technology and acceleration of economic globalization, large changes have taken place in the global industrial structure. Since the 1960s, the service industry has become a main impetus for economic growth. The global industrial structure is trending away from an industrial economy towards service economy (the proportion of service industry in the economy is now more than 60%). During the "Eleventh Five - Year" period, China's service industry has made rapid development, with steady economic growth and contribution to employment. In 2010, service industries added RMB 17.1 trillion to the GNP, an increase of 28.9 percent over 2005, and an annual growth rates 11.9 percent, higher than GDP growth rate. Value added from service sector increased from 40.5% of GDP in 2005 to 43% in 2010. Service industry employment increased from 31.3% in 2005 to 34.8% in 2010. The total amount of consumable retail increased from 6.7 trillion yuan in 2005 to 15.7 trillion in 2010, up 134.3 percent or 18.1 percent annually. The consumption market has entered a rapid development period. Beijing,

Shanghai, Guangzhou and other cities have become service dominated, and the growth rate of the modern service industry is the highest of all domestic industries. These central cities, as "leaders" of national economy, must show that the development of service industry conforms to the trend of economic development of global industry. Research and analysis of the input-output efficiency of modern service industry in central cities provides references for industrial adjustment and regional economical development plans, and promotes the balanced development of modern service industry in the central cities.

3 Data and Methodology

3.1 Method on DEA model

Data envelopment analysis (DEA) is a mathematical tool that uses available data to evaluate validity of decision making units (DMUs). It is a method of system analysis, developed by the famous American operations researchers A. Charnes, W.W. Cooper, et. al., and is based on "concept of opposite efficiency evaluation". The first DEA model was proposed by A.Charnes, W.W. Cooper, and E. Rhodes in 1978, called the C²R4, A model [9]. In 1988, Wei Quanling, a Chinese scholar, introduced DEA method into China [10], getting the attention of domestic scholars. Based on the axiom assumptions of convexity, cone, uselessness and minimum, it has the production possibility set:

$$T = \left\{ (X, Y) \mid \sum_{j=1}^n X_j \lambda_j \leq X, \sum_{j=1}^n Y_j \lambda_j \geq Y, \lambda_j \geq 0, j=1,2,\dots,n \right\} \quad (1)$$

We can make the following result: that is DEA model (M1):

$$\begin{aligned} & \min [\theta - \varepsilon (\sum_{i=1}^m S_i^- + \sum_{r=1}^s S_r^+)] \\ & \text{s.t.} \begin{cases} \sum_{j=1}^n x_{ij} \lambda_j + S_i^- = \theta x_{ij}, i=1,\dots,m \\ \sum_{j=1}^n y_{rj} \lambda_j - S_r^+ = y_{rj}, r=1,\dots,s \\ \theta, \lambda_j, S_i^-, S_r^+ \geq 0, j=1,\dots,n \end{cases} \end{aligned} \quad (2)$$

Where n is the number of DMUs and m and s are the numbers of input and output respectively; x_{ij} and y_{rj} denote the input i and the output r of the DMU _{j} respectively; S_r^+ and S_i^- are the slack variables, ε denotes Non-Archimedean infinitely small quantity. It is small enough in counting, such as it equals to 10^{-7} , this model is mainly used for the scale and the technical evaluation of the effectiveness of DMU. When the optimal solution is:

(a) $\theta^0=1, s^{-0}=0, s^{+0}=0$, then j is an effective decision making units (DMUs).

(b) $\theta^0 < 1$ or $s^{-0} \neq 0, s^{+0} \neq 0$, then j is an ineffective decision making units (DMUs).

(c) $\lambda_j^* (j=1,2,\dots,m)$ make the equation: $\sum_{j=1}^n \lambda_j^* = 1$ true, then DMU _{j} scale will remain the same. If there is

no λ_j^* to make the equation: $\sum_{j=1}^n \lambda_j^* = 1$ true, then $\sum_{j=1}^n \lambda_j^* < 1 \Leftrightarrow \text{DMU}_j$, It means that it is increasing benefit

of scale, if there is no λ_j^* to make the equation: $\sum_{j=1}^n \lambda_j^* = 1$ true, then $\sum_{j=1}^n \lambda_j^* < 1 \Leftrightarrow \text{DMU}_j$, it means that it is

decreasing benefit of scale.

This paper uses C²R model, which is the most effective DMUs constitute of effective production front sides. Its efficiency is defined as 1, while the DMU within the production front bound is will be void comparatively. The efficiency value is defined between 0 and 1, and assumes that returns to scale is constant.

DEA model which is met with constant returns to scale (CRS for short): when there is n DMU, m input factors (X), s output (Y), can be expressed as follows:

$$\begin{aligned}
 Max h_j &= \frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \\
 s.t \ h_j &= \frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1
 \end{aligned} \tag{3}$$

Where $u_r, v_i \geq 0$, u_r, v_i denote the weights of output r and the input i respectively, (3) expressed the relative efficiency of the DMU_{*j*} maximum. To solve the equation, it should be translated: unit j inputs is constant, its output is maximum, the expression is:

$$\begin{aligned}
 Max \ h_j &= \sum_{r=1}^s u_r y_{rj} \\
 s.t \ \begin{cases} \sum_{i=1}^m v_i x_{ij} = 1 \\ \sum_{r=1}^s u_r y_{rj} - \sum_{i=1}^m v_i x_{ij} \leq 0, u_r, v_i \geq 0 \end{cases}
 \end{aligned} \tag{4}$$

The first constraint conditions denotes the sum of inputs weights is 1, the second constraint conditions is to correspond to Equation (3). Convert the Equation (4) and the constraint conditions to its dual mode to make sure the converted dual mode have an unique solution, as follows:

$$\begin{aligned}
 Min \ \theta & \\
 s.t \ \sum_{j=1}^n \lambda_j y_{ij} &\leq x_{ij} \sum_{j=1}^n \lambda_j \quad \theta \geq 0, \lambda_j \geq 0
 \end{aligned} \tag{5}$$

Where θ denotes the relative efficiency of the DMU_{*j*}, λ_j is the weight of output r and input i . Using software Deap2.1, input the input, output data and the corresponding parameters to calculate the relative efficiency of each DMUs .

3.2 Data sources and empirical analysis

3.2.1 Data sources

The data source of the paper is: Statistical Yearbook 2011, which is published independently by 19 central cities in China and the province Statistical Yearbook 2011, and the NBS, China Statistical Yearbook 2011. This paper selects data of 2010. As input indicators, we selected a number of employees at the end of year and fixed assets investment in modern service industry of 19 center cities. Outputs included industrial added value of modern service industry, the proportion of industrial added value accounted for GDP, and the per capita value . The following tables shows these input/output values:

Table 1 Input-Output Indicators of Modern Service Industry In 19 Central Cities

DMU _{<i>j</i>}	Output y_{rj}			Input x_{ij}	
	Industrial added value of modern service industry (billion yuan)	Per capita output value of modern service industry(yuan)	The proportion of industrial added value accounted for GDP	Number of employees at the end of year(thousands people)	Fixed assets investment (billion yuan)
Beijing	1060.08	54052.62	75.1	7675	492.23
Shanghai	983.351	42705	57.3	6099.3	386.59
Tianjin	423.865	32622.82	46	3525.2	347.006
Chongqing	288.108	9987.73	36.4	5794.6	424.69
Shenyang	224.22	27660.31	44.69	633	297.61
Changchun	135.64	17668.13	40.7	1417	153.9
Harbin	186.86	17568.63	50.9	2307	171.95
Jinan	205.79	30182.01	52.6	1768.4	124.208

Nanjing	254.25	31751.09	50.7	2316.6	167.175
Hangzhou	289.669	33276.16	48.69	2643.7	196.01
Guangzhou	655.745	51594.46	61.01	3977.3	265.858
Wuhan	286.307	29258.59	51.44	2442.7	276.09
Xian	169.491	20001.06	52.2	2088.2	250.17
Chengdu	278.534	19827.87	50.2	3500.5	288.779
Dalian	216.75	32397.17	42	145	301.09
Qingdao	263.058	30170.66	46.4	2113.3	170.995
Ningbo	207.318	27239.26	40.16	1778.8	148.435
Xiamen	101.25	28672.16	48.9	960.2	71.727
Shenzhen	505.167	48704.88	52.72	3417.5	146.383

3.2.2 Calculation of DEA Efficiency

Using Deap2.1 software to calculate the DEA efficiency value of modern service industry of 19 central cities in China, as table 2 shows:

Table 2 Input-Output Efficiency of Modern Service Industry in Central Cites

EFFICIENCY SUMMARY:				
firm	crste	vrste	scale	
1	0.848	1.000	0.848	drs
2	0.993	1.000	0.993	drs
3	0.669	0.680	0.984	irs
4	0.309	0.331	0.935	irs
5	1.000	1.000	1.000	-
6	0.664	0.709	0.937	irs
7	0.611	0.628	0.973	drs
8	0.873	1.000	0.873	drs
9	0.760	0.761	0.999	-
10	0.722	0.725	0.995	irs
11	1.000	1.000	1.000	-
12	0.688	0.716	0.960	drs
13	0.549	0.805	0.682	drs
14	0.517	0.518	1.000	-
15	0.728	0.870	0.836	drs
16	0.810	0.822	0.984	irs
17	0.769	0.815	0.945	irs
18	1.000	1.000	1.000	-
19	1.000	1.000	1.000	-
mean	0.764	0.809	0.944	

Description: firm: represents 19 center cities, crste: technical efficiency, also called comprehensive efficiency, vrste: pure technical efficiency, scale: scale efficiency (drs: decreasing returns to scale; constant returns to scale; irs: increasing returns to scale). $crste = vrste * scale$.

4 Results

From the comprehensive efficiency in table 2, we can obtain the input-output comprehensive efficiency values of modern service industry in 19 center cities, as showed in table 3:

Table 3 Comprehensive Efficiency Values of Modern Service Industry and Rankings

cites	$\theta = crste = vrste * scale$	Rankings
Beijing	0.848	3
Shanghai	0.993	2
Tianjin	0.669	11
Chongqing	0.309	16
Shenyang	1.000	1
Changchun	0.664	12
Harbin	0.611	13
Jinan	0.873	4
Nanjing	0.760	7
Hangzhou	0.722	9
Guangzhou	1.000	1
Wuhan	0.688	10
Xian	0.549	14
Chengdu	0.517	15
Dalian	0.728	8
Qingdao	0.810	5
Ningbo	0.769	6
Xiamen	1.000	1
Shenzhen	1.000	1

According to ranking data of table 3, the following two conclusions can be made:

(1) Generally speaking, input-output efficiency of modern service industry of 19 Central City in China is not high, the cities vary considerably, but input-output efficiency of modern service industry in east and south areas are obviously higher than the middle and west areas. The cause lies in the fact that center cites in eastern and southern region ,located in the coastal areas, are in developed areas, the development and opening of these cities is earlier, closely following the development trend of the developed countries. Modern service industry in central city which are highly concentrated, exuding a strong radiation effect, can promote service industry development of the whole economic zone.

(2)In the table2, the efficiency values of modern service industry show that input-output efficiencies in Shenyang, Guangzhou, Xiamen, Shenzhen and other regions are most effective. Compared to these cites, central cites which input and output efficiency is high are: Beijing, Jinan, Shanghai, Nanjing, Qingdao, Ningbo. The relative efficiency value is between 0.75 and 0.99, and the reason is because that Shanghai is the financial center in China. It has a favorable geographical environment and human resources, highlighting the modern service industry cluster phenomenon. Jinan, Nanjing, Ningbo which are affected by proximity to Shanghai, at the same time, have developed strategic alliance in technology and talents. Ningbo city has been developing positively financial, shipping and other industries in recent years, to speed up the integration into construction trend of Shanghai international financial services center and international shipping service center, the proportion of service industry is significantly improved. Since awareness of developing modern service industry in middle and western regions is not clear and modern service industry investment is less. As a result, the input and output efficiency value of modern service industry in these central cites is lower.

5 Conclusion

On the whole, Modern service industry is an important symbol to measure modernization level, comprehensive competitiveness and sustainable development ability of a region. Hence, modern service industry in eastern and southern cites of China needs to keep pace with the international development, increase the talent and technology investment, and optimize industrial structure of modern service industry. The service industry needs to expand its regional economic range, drive the rapid development of modern service industry in surrounding cities. The development of modern service industry in west

center cities must be based on the local advantage industry as the foundation, adhering to the basic direction of "suit one's measures to local conditions". On this basis, they should continue to expand new areas, upgrade the development level of service industry to promote the development of the whole industry. They also should persevere in "cluster innovation" industrial policy to create a good environment for industrial in midwest cities, through close industry association, sharing resources, abundant social capital, and effective competition mechanisms. This will promote the formation and development of service industry cluster. The midwest should make full use of cooperative development network of the "Bohai bay", "Yangtze River Delta", "Pearl River Delta", to form an interactive development economic network of modern service industry in midwest.

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Study on the Regional System Vulnerability Evaluation: Taking China's Hebei Province City Group as Example*

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Abstract: This paper presents an unprecedented survey of Brazilian firms mapping their eco-innovative patterns. This paper draws special attention to the group of firms that have achieved the stage of “eco-advantage”, in order to find out what drives radical innovation and what are the main characteristics of this group. The results show that the main innovation determinant influencing radical outcomes regards market-driven factors, specially the purpose of creating new market segments. Moreover, this result corroborates with theoretical observations suggesting that spurring green innovation can be seized as opportunities, instead of mere constraints to economic activity. These opportunities are both to fulfill the existing demands of consumers for environmentally friendly products (and services), as well as to emulate preferences while creating new market segments.

Key words: Eco-innovative patterns; Eco-advantage; Radical innovation; Market-driven factors; Market segments

Abstract: Vulnerability is the kind of degree to measure the relative levels, trends and possibilities for the sustainable development of regional system. It's the inherent attribute of the regional system manifested when encountered unfavorable internal and external disturbances, which is positively correlated with sensitivity, negatively correlated with the response-recovery ability. Entropy method and set pair analysis are used to evaluate and analyze the system vulnerability of eight cities in Hebei Province City Group of China in 2007 and 2010 during the 11th Five-Year Plan. The results show that the gap among the eight cities of Hebei Province is narrowing; their nature, economy and society are developing towards the direction of the stable and secure, and sustainable development ability and level is constantly strengthening. Among the eight cities, Cangzhou has always ranked top three, the vulnerability of Tangshan and Shijiazhuang improves significantly. Baoding is in middle level, Qinhuangdao, Chengde and Langfang step backward obviously; Zhangjiakou has always failed behind others on the list. The evaluation results also confirm the positive correlation between vulnerability and sensitivity, and the negative correlation between vulnerability and response-recovery capabilities. The influence of sensitivity on vulnerability is enhancing, and it is highly significant to change vulnerability by reducing sensitivity of the regional system at the present stage.

Key words: Vulnerability; Regional system; Entropy method; Set pair analysis method; China's Hebei Province City Group

1 Introduction

The vulnerability research was considered beginning from natural disaster research in the late 1960s, then the theory and methods of vulnerability are widely applied to the natural, cultural, social, economic and many other fields. Bibliometric analysis indicates that vulnerability research results have rapidly increased since the 1990s, and has become the frontier and hot issue in many different fields^[1-2]. Under the background of global change, vulnerability research is gradually developing into a sustainable research method^[3], and its application range is becoming wider and wider. For this reason, this paper evaluates the whole nature-economy-society sustainable development situation of the 8 cities in Hebei Province in Beijing-Tianjin-Hebei metropolis circle based on the theoretical paradigm of vulnerability.

2 The Vulnerability of the Regional System and Its Evaluation

2.1 Regional system

All the activities of human society are closely related to specific geographical space, the combination of human society activity and specific geographical space produces the regional system. According to the definition of Qian Xuesen, “the system is an organic whole with specific function, which composed of interacting and interdependent parts”^[4], the author defines regional system as a

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complex system with a certain function of structure and can do some kinds of material, information, technology, personnel and energy exchange, which is composed of some functions, such as resource, environmental, social within the scope by interaction, mutual influence, mutual dependence and mutual restriction. Regional system not only has the characteristics of the complex system, such as complexity, openness, space structure, organization and dynamic evolution and so on, but also is an open complex giant system with a lot of variable, the mechanism of complex and uncertainty significant factors^[5].

2.2 Vulnerability of the regional system

As academic concept, vulnerability appears in many fields; therefore its meaning is continuously developing and changing, and gradually becomes a set concept^[6]. Referring to related research results, the authors think, vulnerability is the kind of degree to measure the relative levels, trends and possibilities for the sustainable development of regional system, and the inherent attribute of the regional system manifested when the system encountered unfavorable internal and external disturbances. During development process, if regional system is sensitive to internal and external disturbance, and lacks of response-recovery ability to the disturbance, then the stability mechanism of regional system will be destroyed, sustainable development will be affected by the negative effect; once this negative effect is cumulated to exceed a certain critical threshold, the regional system will shock, or even collapse. So vulnerability and sensitivity are positive correlation, vulnerability and response-recovery capability are negative correlation.

2.3 Evaluation on the vulnerability of region system

Evaluation on the vulnerability of region system is to discuss about the structure and function of a system itself, and to predict the potential impact of external stress on the system, as well as to evaluate the system's resistance to external stress and the ability for the system recover from adverse effects. The purpose of evaluation is to maintain the sustainable development of the system, reduce the negative impact of the external stress to the system and provide decision basis for the degradation system's comprehensive improvement^[7].

2.3.1 Establishment of index system

As mentioned before, vulnerability of regional system is related to sensitivity and response-recovery capabilities. Thus, under the hard constraint of data availability, the authors construct the evaluation index system for vulnerability evaluation as shown in table 1.

Table 1 Evaluation Index System for the Vulnerability of Regional System

Target layer	Subsystem	Criteria layer	Index layer
vulnerability of regional system	Natural subsystem	Sensibility	Emission intensity of industrial wastewater ($10^4t/km^2$)
			Emission intensity of industrial SO ₂ (t/km^2)
			Emission intensity of industrial soot (t/km^2)
			(Municipal district) Per capita annual water supply ($m^3/person$)
			Per capita arable resources ($mu/person$)
		Response-recovery capability	Standard-reaching rate of industrial wastewater discharge (%)
			Standard-reaching rate of industrial solid waste (%)
			Treatment rate of domestic sewage (%)
			Harmless treatment rate of domestic waste (%)
			(Municipal district) Green coverage rate of built up area (%)
	Economic subsystem	Sensibility	The ratio between added value of primary industry and GDP (%)
			Energy Intensity GDP (tons of standard coal/ten thousand RMB)
			The ratio between actual amount of foreign capital and GDP (%)
			GDP per capita (RMB)
		Response-recovery capability	Diversification index of industrial structure <i>H</i>
			The ratio between added value of tertiary industry and GDP (%)
			Density of investment in fixed assets ($ten\ thousand/km^2$)
			Growth rate of GDP
	Social subsystem	Sensibility	Population density ($people / km^2$)
			Natural growth rate of population(‰)
			Registered unemployment rate in town (%)

			Per capita consumption expenditure of urban residents (RMB)
			Per capita consumption expenditure of rural residents (RMB)
			Engel coefficient of urban residents (%)
		Response-recovery capability	Per capita disposable income of urban residents (RMB)
			Per capita net income of rural residents (RMB)
			The proportion of tertiary industry employment (%)
			The ratio between educational expenditure and fiscal expenditure (%)
			The ratio between fiscal expenditure and GDP (%)
			The number of hospital/health centers bed per ten thousand people (doctors/ten thousand people)
			The number of doctor per ten thousand people (doctors/ten thousand people)
			The number of internet users of per ten thousand people(users/ten thousand people)

In order to avoid human bias of subjective weighting method and to explore the self-law of regional system development much better, the authors use the Entropy Method to determine index weight. The essence of Entropy Method is to determine the weights according to the disorder (entropy value) of information contained in the indexes: the smaller the entropy value, the more useful information can be provided by indexes, then the greater the weight; on the other hand, the smaller the weight. Calculation steps of Entropy Method can be found in the literature [8], not repeat them.

2.3.2 Set Pair Analysis Method

With the application range is extended, the method of vulnerability evaluation has developed from the qualitative to the semi-quantitative and quantitative, such as the comprehensive index method, the method based on GIS technology, fuzzy matter-element evaluation method, and figure overlay method and so on. The authors try to use Set Pair Analysis Method to evaluate the vulnerability of regional system.

Set Pair Analysis (SPA), put forward by Zhao Keqin, is a quantitative method is suitable for uncertainty analysis of complex systems. Its basic idea is: considering set *A* and set *B*, which have certain relation, as a set pair *H*; under the background of problem *Q*, certainty is divided into two situation “identity” and “opposition” according to one characteristics of the set pair, and uncertainty is considered as “difference”; then connection degree can be established from “identity”, “difference” and “opposition” to analyze and solve problems. Suppose set pair *H* has *N* characteristics, among which *S* characteristics are identity for set *A* and set *B*, *P* characteristics are opposition, and the rest *F = N - S - P* characteristics are not opposite or identity, are uncertain. The connection degree μ of the two sets can be defined as [9]:

$$\mu(Q) = \frac{S}{N} + \frac{F}{N}i + \frac{P}{N}j = a + bi + cj \tag{1}$$

Among formula (1): *a*, *b*, *c* denote respectively identity degree, difference degree and opposition degree of set *A* and set *B* under the background of question *Q*, and satisfy *a + b + c = 1*; *i* is the markers sum coefficient of the difference degree, *i* ∈ [-1,1]; *j* is the markers sum coefficient of opposition degree, *j* ≡ -1. Thus, the relationship between set *A* and set *B* can be analyzed according to the connection degree determined by formula (1).

According to the basic idea of Set Pair Analysis, suppose that *Q* = (*Y, E, W, D*) represents the question of vulnerability evaluation, the vector *Y* = {*y*₁, *y*₂, ..., *y*_{*n*}} represents evaluation scheme, and *n* is the number of evaluation objects; Vector *E* = {*e*₁, *e*₂, ..., *e*_{*m*}} represents that each scheme has *m* evaluation indexes; Vector *W* = {*w*₁, *w*₂, ..., *w*_{*m*}} represents the indexes weight; Matrix *D* = (*d*_{*kp*})_{*m* × *n*} represents the evaluation index value of each scheme.

In order to compare the evaluation objects within the same space, the optimal and the worst evaluation index value among the evaluation schemes can be elected to compose the optimal solution set *U* = {*u*₁, *u*₂, ..., *u*_{*m*}} and the worst solution set *V* = {*v*₁, *v*₂, ..., *v*_{*m*}}. According to set {*v*_{*p*}, *u*_{*p*}}, identity degree *a*_{*kp*} and opposition degree *c*_{*kp*} of *d*_{*kp*} in numerical matrix *D* can be calculated as follows [10]:

When *d*_{*kp*} is a positive indicator:

$$\begin{cases} a_{kp} = \frac{d_{kp}}{u_p + v_p} \\ c_{kp} = \frac{u_p v_p}{d_{kp}(u_p + v_p)} \end{cases} \quad (2)$$

When d_{kp} is a negative indicator:

$$\begin{cases} a_{kp} = \frac{u_p v_p}{d_{kp}(u_p + v_p)} \\ c_{kp} = \frac{d_{kp}}{u_p + v_p} \end{cases} \quad (3)$$

Then, the connection degree μ of set $\{Y_k, U\}$ in interval $[V, U]$ can be represented as:

$$\begin{cases} \mu(S_k, U) = a_k + b_k i + c_k j \\ a_k = \sum w_p a_{kp} \\ c_k = \sum w_p c_{kp} \end{cases} \quad (4)$$

So, the relative closeness r_k between the scheme Y_k and optimal solution can be defined as:

$$r_k = \frac{a_k}{a_k + c_k} \quad (5)$$

The r_k in formula (5) actually reflects correlation degree between scheme Y_k and the optimal solution. The bigger value r_k , the closer between evaluation objects and the optimal scheme, and the results will be better.

When using Set Pair Analysis Method to evaluate vulnerability of region system, different evaluation objects' data, which are collected according to the evaluation index system shown in table 1, can be combined together to form the data set $\{Y_k\}$, then an object's relative closeness to the optimal solution will reflect its vulnerability degree. Therefore the evaluation objects' vulnerability relationship can be analyzed through comparing r_k . According to the same ideas, regional system's sensitivity and response-recovery ability can also be evaluated and analyzed.

3 Evaluation on the Vulnerability of China's Hebei Province City Group

3.1 Hebei Province City Group

According to the *Regional Development Plan for Beijing-Tianjin-Hebei Metropolis Circle*, that the China's National Development and Reform Commission is working on, China's Beijing-Tianjin-Hebei metropolis circle is the region, which centers on Beijing and Tianjin, also includes Shijiazhuang, Langfang, Baoding, Zhangjiakou, Tangshan, Qinhuangdao, Chengde and Cangzhou in Hebei Province. According to the dividing mode of "2 + 8", this area locates in the hinterland of the People's Republic of China, mountains and rivers are linked together, belongs to the Haihe River basin, and has the political center, cultural center of China and economic center in the north. This area belonged to Zhili Province during Ming Dynasty and Qing Dynasty. After the administrative division of Beijing-Tianjin-Hebei changing many times during the Republic of China to the People's Republic of China, the administrative subordination relations today formed. Developmental gap among China's Beijing, Tianjin and Hebei is visible, what kind of situation in 8 cities of Hebei Province is?

3.2 Results of vulnerability evaluation

According to the index system shown in table 1, the authors evaluate vulnerability of natural, economic and social overall development in 8 cities of Hebei Province during the 11th "Five-Year" Plan by using the Entropy Method and Set Pair Analysis Method. Due to the limitation of data availability, the authors finally chose 2007 and 2010 to evaluate. The relevant data are collected from *China City Statistical Yearbook*, *China Statistical Yearbook*, *Hebei Economic Statistical Yearbook* and *China Environment Statistical Yearbook*. The evaluation results are shown in table 2.

Table 2 Evaluation Results on the Vulnerability of Regional System in 8 cities of China's Hebei Province

city	2007			2010		
	Sensibility	Response-recovery capability	Vulnerability	Sensibility	Response-recovery capability	Vulnerability
Shijiazhuang	0.5277 ③	0.5244 ④	0.5004 ⑥	0.4228 ②	0.5980 ④	0.4084 ③

Tangshan	0.5262 ⑦	0.5157 ⑥	0.5040 ⑦	0.3846 ①	0.5958 ⑥	0.3943 ①
Qinhuangdao	0.5080 ⑤	0.5235 ⑤	0.4909 ④	0.4635 ⑦	0.5763 ⑧	0.4429 ⑧
Baoding	0.4968 ②	0.5016 ⑦	0.4972 ⑤	0.4486 ④	0.6206 ②	0.4115 ④
Zhangjiakou	0.5208 ⑥	0.4944 ⑧	0.5132 ⑧	0.4788 ⑧	0.6177 ③	0.4273 ⑦
Chengde	0.5014 ③	0.5328 ③	0.4778 ③	0.4598 ⑥	0.5950 ⑦	0.4261 ⑥
Cangzhou	0.4875 ①	0.5409 ②	0.4722 ①	0.4436 ③	0.6387 ①	0.3961 ②
Langfang	0.5031 ④	0.5527 ①	0.4764 ②	0.4541 ⑤	0.5976 ⑤	0.4251 ⑤

[Note] The serial number in the table is one city's rank about related evaluation value in 8 cities. In accordance with the principles regional system's sustainable development, the vulnerability and sensitivity rank from low to high, response-recovery capability rank from high to low.

3.3 The analysis of evaluation results

First of all, the vulnerability evaluation gap between the minimum and maximum is narrowing from 2007 to 2010. According to the basic principle of Set Pair Analysis Method, it means that the relative closeness of evaluation objects to the optimal value is becoming smaller. On the whole, it shows that nature-economy-society system of the 8 cities in Hebei Province of China is developing to the direction of the stable and coordinating, and the gap among the cities is narrowing.

Second, among the 8 cities in Hebei Province of China, Cangzhou has always ranked top three, it is better than the other cities; the vulnerability of Tangshan and Shijiazhuang improves significantly and their ranking are promoting; Baoding is in middle level, Zhangjiakou falls behind others on the list; Chengde and Langfang step backward obviously.

Third, the evaluation results confirm the correlation of the vulnerability, sensitivity and response-recovery capability. From the evaluation results in 2007, due to the low sensitivity and strong response-recovery ability in Cangzhou, Langfang and Chengde, they have low vulnerability. In contrast, sensitivity of Tangshan and Zhangjiakou is higher, response-recovery ability is weak, and therefore they have high vulnerability. Although Baoding's sensitivity is low, because its response-recovery ability is relatively weak, it has high vulnerability. Shijiazhuang's high sensitivity is due to its high vulnerability. From the evaluation results of 2010, the low vulnerability of Tangshan, Shijiazhuang and Cangzhou is due to low sensitivity, and high vulnerability of Zhangjiakou is caused by the high sensitivity. The high vulnerability of Qinhuangdao and Chengde is the double effects of high sensitivity and low response-recovery ability.

Fourth, the sensitivity's influence to vulnerability has the trend of aggrandizement. In 2007 only Shijiazhuang's high vulnerability is caused by high sensitivity; but in 2010, the change of sensitivity directly affects Shijiazhuang, Tangshan, Baoding and Zhangjiakou's vulnerability ranking. It shows that the sensitivity reduction of regional system has significant meaning to vulnerability changing.

4 Conclusions

Vulnerability is the kind of degree to measure the relative levels, trends and possibilities for the sustainable development of regional system. It's the inherent attribute of the regional system manifested when encountered unfavorable internal and external disturbances, which is positively correlated with sensitivity, negatively correlated with the response-recovery ability. This paper constructs the evaluation index system for the evaluation on region system's vulnerability from the aspects of sensitivity and response-recovery capability, uses Entropy Method and Set Pair Analysis to evaluate and analyze the vulnerability of 8 cities in Hebei Province of China, which belong to Beijing-Tianjin-Hebei metropolitan circle, in the years of 2007 and 2010 during the 11th Five-Year Plan. The results show:

(1) The gap among the 8 cities in Hebei Province is narrowing, their nature, economy and society are developing towards the direction of the stable and secure, and their sustainable development ability and level are constantly strengthening.

(2) Among the 8 cities, Cangzhou has always ranked top three, the vulnerability of Tangshan and Shijiazhuang improves significantly; Baoding is in middle level; Qinhuangdao, Chengde and Langfang step backward obviously; Zhangjiakou has always failed behind others on the list.

(3) The evaluation results also confirm the positive correlation between vulnerability and sensitivity, and the negative correlation between vulnerability and response and recovery capability.

(4) The influence of sensitivity on vulnerability is enhancing, it is highly significant to change vulnerability by reducing sensitivity of the regional system at the present stage.

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Assessment on Wuhan's Industrial Sustainable Development Capacity under Ecological Environmental Constraints*

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Abstract: In recent years, the industry in Wuhan has grown with the characteristic of high resources consumption and pollutant emission, which leads to serious environment deterioration. Based on analyzing current condition of industrial environmental pollution in Wuhan, this paper makes a comparative study on the industrial sustainable development capacity among 15 sub-provincial cities in China under ecological environmental constraints by applying principal component analysis with SPSS software. According to the empirical study, Wuhan ranks the top 11 among these cities, which means that Wuhan doesn't perform well in promoting industrial sustainable development on the whole. Finally, the paper puts forward policy suggestions on promoting industrial sustainable development in Wuhan, the suggestions including to improve the regulation and technology of the "three wastes" such as industrial wastewater, waste gases and residues, to strengthen the urban greening, to impose tax for environmental protection, and to promote industrial transformation.

Key words: Industrial sustainable development; Ecological environment; Principal component analysis; Three wastes

1 Introduction

Since China's reform and opening-up to the world, Wuhan, a large industrial city in central China, has achieved rapid development in industry, while the problem of urban environmental pollution has been becoming worse and worse. Due to the long-term traditional extensive development model of high resources consumption and high pollutant emission in Wuhan, the ecological environmental bearing capacity is continually weakened, which then results in non-sustainable development of industry. The serious deterioration of the ecological environment has been a major impediment for Wuhan to step forward on the road of strong industrial city for the moment.

Currently, environmental constraints on industrial sustainable development have attracted numerous researchers' attention in China. Under the background that financial crisis highlights the importance of the real economy and the demand of the time for the industry re-feeding agriculture, Chen Shiyi (2009) analyzes the sustainable development of China's industry, which is characterized by high energy consumption and high carbon emissions^[1]. An Meimei and Gong Xinshu (2010) conducts systematic analysis on sustainable development of Xinjiang industry with multi-objective linear weighted function model by means of establishing an evaluation index system on industrial sustainable development ability under environmental and resource restriction, and they propose suggestions and countermeasures for the sustainable development of Xinjiang industry^[2]. Based on the predecessors' relevant researches, this paper designates Wuhan's industry as the study object, and aims at defining the actual level of its sustainable development capacity under ecological environmental constraints. To achieve the comprehensive performance ranking of industrial sustainable development capacity in Wuhan, this paper chooses 15 sub-provincial cities in China as horizontal comparison objects and sets four original evaluation indicators of ecological environment supportability to conduct positioning analysis on the 15 cities' industrial sustainable development capacities by applying SPSS software to analyze statistical data of the established indicators in 2010. The result of the study will be helpful to guide the practice of industry development in Wuhan.

2 The Current Condition of Industrial Environmental Pollution in Wuhan

Since the economic reform and opening-up to the world from the year of 1978 on, Wuhan has gradually formed four key industries, including steel, automobile and machinery equipment manufacturing, electronic information and petrochemical industries, which results in the high pollutant

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emission and seriously pollutes the soil, water source and air. The time series trends of standardized volume of “three wastes” discharged from 2000 to 2010 in Wuhan are shown in the Figure 1, which show that the industrial waste water has declined year by year, but industrial waste gas emission presents an increasing tendency and industrial solid wastes have always been unstable among the eleven years. On the whole, Wuhan’s industry has achieved a certain effect on controlling pollutant discharge in the process of constant adjustment, but Wuhan is still facing high pressure of pollution abatement.

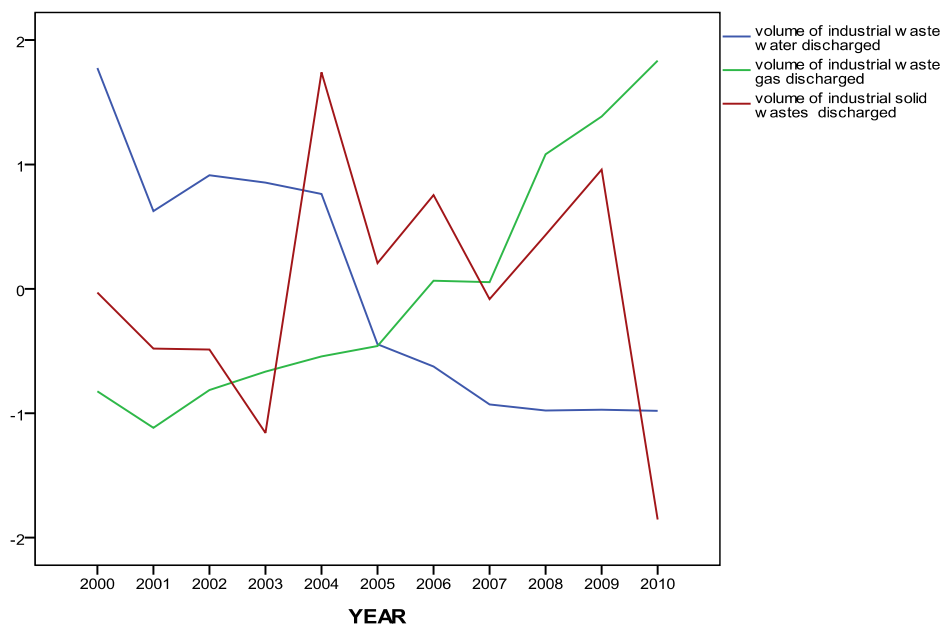


Figure 1 Trends of Total Volume of Industrial “Three Wastes” Discharged in Wuhan

Industrial sustainable development capacity refers to the regional ability to promote coordinated sustainable development of industry in accordance with its goals and requirements. For the moment, the ecological environment pollution has seriously weakened the industrial sustainable development capacity in Wuhan.

3 Positioning Analysis on Industrial Sustainable Development Capacity in Wuhan

3.1 Idea and tool of conducting positioning analysis

Since industrial sustainable development capacity varies among the cities, the development in these cities focuses and directions are different from each other under different abilities and stages of development. Based on its strengths and weaknesses, each city ought to take targeted measures and make corresponding strategies for industrial sustainable development according to its conditions of industry and environmental protection. The ranking of Wuhan’s industrial sustainable development capacity obtained in this paper will objectively reflect the city’s real situation of promoting industrial sustainable development, which has an important guiding significance in practice.

To make comparative study on industrial sustainable development capacities among the 15 cities from the perspective of ecological environment, it is necessary to set reasonable multiple evaluation indicators of ecological environment supportability to conduct a comprehensive analysis. According to the composing of urban industrial sustainable development capacity under ecological environmental restriction, this paper designs four indicators such as comprehensive utilization of industrial solid wastes, attainment rate of industrial waste water, rate of good atmospheric quality and urban green coverage rate, which can reflect urban industrial sustainable development capacity from four different angles—prevention and control level of environmental pollution by solid wastes, prevention level of environmental pollution by waste water, abatement level of air pollution and construction level of urban greening. The analysis expands upon these cities’ statistical data of the established indicators in 2010.

Taking the relatively large number of ecological environment sustainability evaluation indicators into consideration, principal component analysis method (Hervé Abdi, Lynne J. Williams, 2010) [3] is adopted here with the idea of dimensionality reduction to integrate many correlated indexes into less

uncorrelated indexes. In other words, this paper intends to represent the original four indicators as a set of new orthogonal variables called principal components on the premise of keeping the important information carried by them. By means of endowing the acquired principal components with rational weights, they can serve as the composite indicators to get each city's synthesis score value for the ranking with the principal components analysis synthesis estimate model.

3.2 Process of the positioning analysis

Firstly, statistical data of the four indicators are obtained from Statistical Yearbooks 2011 of the 15 cities. Then SPSS software is used here for the data standardization (Banimostafa A, Papadokonstantakis S, Hungerbühler K, 2012)^[4]. Next, the paper calculates the correlation coefficient matrix of indicators based on the standardized data by SPSS with the result shown in table 1. The standardized four indicators, including standardized comprehensive utilization of industrial solid wastes, standardized attainment rate of industrial waste water, standardized rate of good atmospheric quality and standardized urban green coverage rate, are respectively denoted by ZX1, ZX2, ZX3 and ZX4. It can be seen from Table 1 that the correlation coefficient between the rate of good atmospheric quality and urban green coverage rate is 0.681, which means that there is relatively large amount of overlapped information between the two indicators because of the strong correlation between them. Moreover, there are also certain correlations between other indicators in an indication that information carried by the four indicators overlap each other to different extents. Therefore, it is difficult to make a comprehensive evaluation on each city's performance according to these indicators. To simplify the process of positioning analysis, principal component analysis method is adopted here.

Table 1 Correlation Coefficient Matrix of Indicators

	ZX1	ZX2	ZX3	ZX4
ZX1	1.000	0.160	-0.108	0.307
ZX2	0.160	1.000	-0.211	-0.039
ZX3	-0.108	-0.211	1.000	0.681
ZX4	0.307	-0.039	0.681	1.000

Table 2 shows the variance contribution ratio of each component obtained by SPSS. Components are extracted as principal components according to the principle that the corresponding eigenvalues are greater than 1.

Table 2 Principal Component Extraction Table

Component	Initial Eigenvalues		
	Summation	Variance contribution ratio	Accumulative variance contribution ratio
1	1.738	43.452	43.452
2	1.256	31.395	74.847
3	0.801	20.031	94.878
4	0.205	5.122	100.000

The number of extracted principal components is denoted by m. It can be seen from the principal component extraction table that m is equal to 2 with the meaning of extracting two principal components. Since the accumulative variance contribution ratio of extracted principal components is 74.847% in an indication that they are able to explain most of the information carried by the original indicators, it is reasonable to replace the four original indicators with the two new ones. The next step is to calculate principal components load matrix by SPSS with the result shown in Table 3, which can reflect the correlation between each original indicator and principal component.

Table 3 Principal Components Load Matrix

Standardized indicator	Principal component 1	Principal component 2
ZX1	0.195	0.824
ZX2	-0.260	0.675
ZX3	0.891	-0.240
ZX4	0.916	0.250

The greater the absolute value of indicator's weight on one principal component is, the higher the correlation between them is. It can be seen from Table 3 that ZX1 and ZX2 have relatively greater loads on the second principal component in an indication that information carried by the two indicators is basically included in the second principal component, while ZX3 and ZX4 have relatively greater loads on the first principal component with a meaning that the first principal component can remain the main information carried by the two indicators.

The coefficients of original indicators in each principal component are achieved by means of dividing their weights on principal component by the square root of corresponding eigenvalue. And then, the two principal components' expressions can be shown as follows:

$$F_1 = 0.148ZX_1 - 0.197ZX_2 + 0.676ZX_3 + 0.695ZX_4 \tag{1}$$

$$F_2 = 0.735ZX_1 + 0.602ZX_2 - 0.214ZX_3 + 0.223ZX_4 \tag{2}$$

The percentage of eigenvalue corresponding to each principal component in total eigenvalues of the two acquired principal components is used as the weight of each principal component in the principal components analysis synthesis estimate model, which means the model is got according to the formula

$$F = \frac{\lambda_1}{\lambda_1 + \lambda_2} F_1 + \frac{\lambda_2}{\lambda_1 + \lambda_2} F_2, \text{ where, } \lambda_1 = 1.738, \lambda_2 = 1.256.$$

Then, principal component comprehensive model is as follows:

$$F = 0.5805F_1 + 0.4195F_2$$

The model can be used to calculate each city's synthesis score value. Then, the rank of industrial sustainable development capacities of the 15 cities can be got according to the value. The ranking result is shown in Table 4.

Table 4 Synthesis Score Value and Ranking of Each City

City	Principal component 1	Principal component 2	Synthesis score value	Ranking
Guangzhou	0.879	-1.260	-0.018	8
Shenyang	0.679	-0.095	0.354	6
Nanjing	-2.413	-2.062	-2.266	15
Wuhan	-1.719	1.553	-0.346	11
Chengdu	-0.470	1.763	0.467	4
Xian	-0.766	0.088	-0.408	12
Dalian	2.319	-0.524	1.126	2
Changchun	0.496	0.201	0.372	5
Ha Erbin	-0.851	-0.530	-0.716	14
Jinan	-1.225	1.353	-0.143	9
Qingdao	0.883	1.081	0.966	3
Hangzhou	-0.260	-0.121	-0.202	10
Ningbo	-0.177	-1.370	-0.677	13
Xiamen	0.486	-0.624	0.021	7
Shenzhen	2.138	0.547	1.471	1

3.3 Result of the positioning analysis

It can be seen from the empirical study that the top three cities in terms of industrial sustainable development capacity among the 15 sub-provincial cities in China are Shenzhen, Dalian and Qingdao in order, while the last three ones are Ningbo, Ha Erbin and Nanjing. Wuhan ranks the 11th among these cities. Wuhan's first principal component gets a score of -1.719 with rank of the 14th, and the second principal component gets a score of 1.553 with rank of the second. The different ranking results of the two principal components show that Wuhan has reached a high level of prevention and control of environmental pollution by solid wastes and waste water, while it still has a long way to go to abate air pollution and to improve urban greening compared with other cities. On the whole, the present condition of Wuhan's industry cannot meet the requirements of industrial sustainable development. Therefore, based on keeping the disposing level of industrial solid wastes and waste water, Wuhan ought to step up

its efforts in air pollution control and devote itself to the greening construction through learning from well-performed cities like Dalian and Shenzhen, which can contribute to the overall improvement of sustainable development capacity of Wuhan's industry.

4 Policy Suggestions

With the introduction of the concept of building a harmonious society and promoting sustainable development, environmental protection has been an important part for the industrial development pattern reform and rapidly sustainable development of national economy in China. China's former chairman Hu Jintao pointed out in the Report of 18th National Party Congress of China that the issue of unsustainable development with China's economy remains prominent and restrictions by resources and environment become increasingly tiger, which requests for the quick establishment of ecological civilization system in order to promote the new pattern of harmonious development between human and nature. For the moment, Wuhan's industry is in an important period of strategic opportunities for its target with the variety of domestic and international environment so that it is necessary to explore the countermeasures to realize Wuhan's industrial sustainable development under the new situation. According to above empirical analysis, this paper proposes some policy suggestions for the sustainable development of Wuhan's industry as follows.

1) The regulation force and technology for industrial "three wastes" treatment should be improved. In order to abate the industrial "three wastes", it is necessary to take the government-leading development strategy to promote the three transformations of industrial pollution control method, such as the transformations from terminal control to entire process control, from decentralized control to the combination of centralized control and decentralized control and from consistency control to the combination of quantity control and consistency control. In addition, the government ought to increase investment in the construction of environmental protection infrastructure and focus the investment on the treatment of water pollution, air pollution and waste materials. For example, the government should put emphasis on the technology development like resource recovery of urban industrial solid wastes, treatment of industrial high-concentrated wastewater, equipment of coal-fired flue gas desulphurization and high-efficiency catalysis and conversion of automobile exhaust.

2) It is urgent to improve urban greening for Wuhan. Urban greening has important ecological function, which can absorb harmful gas such as carbon dioxide, which is emitted by the burning of industrial fuel, and improve urban air quality. It can be seen from the empirical analysis that Wuhan's industry doesn't perform well in terms of urban greening, so Wuhan should devote itself to the greening construction to promote the industrial sustainable development. It is necessary for the government to strengthen relative management and invest enough funds in the urban greening, such as giving financial support in terms of fertilizer, equipments, protection of plants and so on. Moreover, the government needs to strengthen the related legislation on urban greening and encourage the citizens to join in the greening work.

3) It is useful to impose tax for environmental protection. It is suggested to levy taxes for destruction of environment by enterprises with high resources consumption and high pollutants emissions, such as carbon tax, waste disposal tax, surface water pollution tax and so on. On the one hand, imposing environmental protection tax can aggravate high-polluting enterprises' tax burden, which consequently can suppress their destruction and pollution to environment. On the other hand, the imposed taxes can be used as a special fund to support environmental protection. What's more, it is suggested to develop special environmental tax law to make environmental tax a powerful tool for the government to protect environment and to implement the strategy of sustainable development.

4) Wuhan's industry ought to promote industrial transformation. With the new round of technology change resulting from global financial crisis, Wuhan's industry is faced with greater pressure of transformation because of its high proportion of traditional industry and the lack of capacity for independent innovation. It is suggested that Wuhan's industry should stick to the principle of combining the improvement of its key industries with the development of new industries in the process of transformation. Wuhan's industry can enhance its competitiveness by means of improving the quality and widening the selection of its key industries' products with technology innovation. In addition, it should try to break through the technology restriction on industrial transformation and upgrading and

actively develop strategic emerging industries in the field of new materials, new energy resources, energy conservation and environment protection and so on.

5 Conclusions

Due to the long-term traditional extensive industrial development model with high resources consumption and high pollutants emissions, Wuhan is faced with a serious impediment in the process of developing into a strong industrial city with the sharp deterioration of the ecological environment for the moment. According to the result of principal component analysis, Wuhan takes the 11th place among the 15 sub-provincial cities in China, which means Wuhan doesn't perform well in terms of promoting industrial sustainable development on the whole. In particular, Wuhan has performed well in terms of prevention and control of environmental pollution by solid wastes and waste water, while it has a long way to go in abatement of air pollution and urban greening. In order to promote the sustainable development of Wuhan's industry, this paper has proposed some policy suggestions, including improving the regulation force and technology for industrial "three wastes" treatment, to strengthen the construction of urban greening, to impose tax for environmental protection and promoting industrial transformation. It is believed that Wuhan's industry must be able to realize the sustainable development by its efforts in promoting the harmony between human and nature.

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Inserting the Topic of Sustainability in the Business Strategy of 20 Model Companies in Brazil

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Abstract: This paper explores the issue of inserting the theme of sustainability in the core of corporate business strategies, since this insertion is based not only in punctual improvements in production processes, certifications, awards or adaptations of products and services, but also in the effective thinking about the needs of human beings that this product or service is tending to. From several benchmarks, including a few market surveys, the paper highlights and compares data from 20 model companies featured on the 2011 *Guia Exame de Sustentabilidade* with the concept of the five corporate development stages, by Nidumolu, Prahalad and Rangaswami (2009) that support the discussion and strengthen the need to align products and services with strategies, in order to have sustainability in business. The conclusion is that few companies are in the most advanced stages and there is the need for greater corporate empowerment on the topic and for further research with similar topics.

Key words: Strategic alignment, Sustainable development; Sustainability in business; Corporate sustainability

1 Introduction

The sustainability topic can be seen everywhere: in television, newspapers, advertising, cartoons, movies, social networks, T-shirts, company brands, and many other places. In newspapers, one reads about environment catastrophes like Katrina or the earthquake in Haiti or the tsunami in Japan. TV news broadcast the slowness in global leader meetings, named with acronyms like COP or Rio+20, to emit less carbon to the atmosphere. In movies, there are extraterrestrial beings, such as in *Avatar* or *Star Trek*, defending the nature and base of their planet against insatiable, power-hungry men. In cartoons, there are several humanized animals, walking on two feet and talking, who try to selectively sort waste, something the “evolved” *Homo sapiens* cannot do. In social media and networks, many Twitter and Facebook posts feature animals suffering and social themes from around the world. It is also noticed that Brazilian banks are becoming greener, a considerable part of cosmetics companies are assessing their vendors, the automobile and logistics industry are considering the emission of CO₂, electric and electronic industries are developing recycling practices, ore and natural byproduct extracting companies are studying their legacy in regions – to sum up, several actions are being conducted aiming at a greater, common goal.

With this concept stamped every day on the news, there is the issue of the theme’s complexity and how companies include sustainability in their activities. In this line, the main purpose of this document is to conduct an analysis on the issue of including the sustainability in the strategy and business of Brazilian companies.

A considerable part of our feeling of powerlessness when facing financial dynamics comes from the fact that we simply do not have the instruments to know what the contribution of different activities to our well being is. The nearly hysterical appeal from the media for a few additional percent points in GDP growth acts on the generalized distress of unemployment and deviates our focus from the main goal, which is quality of life in the society, leaving people confused and uniformed. Poorly informed people, naturally, do not participate. (DOWBOR, 2008, p. 33)

The frantic pursuit of GDP growth by governments and of increased profit by companies leaves aside the real pursuit of activities and products for the well-being of people around the world. More than that – to achieve this utopian well-being for everyone, non-renewable resources are being consumed in an unplanned manner.

We have come to a critical point where the future of the spaceship named Earth, from its passengers to its crew, is no longer certain as it used to be. There are technical conditions to devastate the biosphere, rendering the human adventure impossible. This is the new radical way of being that makes all other issues relative in the sense of diminishing them and making them relative. The true question one must ponder is, therefore, how can the survival on Earth be guaranteed, with its ecosystems,

and how can the conditions of life and development of the species *Homo sapiens etdemens* (BOFF, 2001) be preserved.

Despite of all these arguments and demonstrations of the emerging need for a real change of culture and systemic and holistic thinking, and of the challenges and difficulties faced by the planet, most employees, managers, executives and board members in companies, according to Wilhelm (2009), continue to make the same remarks:

“I have to worry with the first bottom line” (according to the concept of triple bottom line, this would be the financial one).

“We cannot invest in this now!”

“It will cost more.”

“I don’t handle environmental issues.”

“I am waiting for each quarter’s productivity, and with everything that’s going on, climate issues are not priority.”

“Even if we do the best we can, there will still be gaps as far as environmentalists are concerned, so what do you want?”

But how can we change this reality, this model in force? Senge, Jaworski, Scharmer and Flower (2007) state that seeing in a new way starts when the usual way of thinking and perceiving is interrupted. They quote the cognition scientist Francisco Varela, who explains that, in order to develop this capacity, there must be “suspension, distancing from the usual flow (of thinking).” To Varela, suspension was the first basic “gesture” to enhance perception. Making a pause does not entail destroying or ignoring the mental templates we have of reality – that would be impossible, even if we tried. It does entail what the famous physicist David Bohm calls “hanging our assumptions in front of us.” Thus, we start identifying thoughts and mental models as products of our own mind. When we become aware of our thoughts, their influence on what we see diminishes. Making a pause allows us to “see our way of seeing.”

Before interrupting our usual way of thinking and perceiving, we must understand the existing mental models in the issues of sustainability, strategy, trend and reality, and then start thinking about the future.

In the future, the unlikely happens instead of what is likely. Can our immaturity be overcome? It is possible, yet unlikely. However, major movements start small. Christianity and Islamism, for example, started with a prophet, and both have become gigantic phenomena. This shows that we must wait for the unlikely. Young people come to me saying they have no cause to fight for, like we did when I was young. I say to them: yes, you do have, the most gigantic cause: your destiny. We need to consider the future with the possibility of hope. (MORIN, 2008)

The WBCSD – World Business Council for Sustainable Development, represented in Brazil by CEBDS – Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável (or Brazilian Business Council for Sustainable Development), through its document *Vision 2050*, aims at viewing the possibilities for the future of the planet with companies. The document addresses three questions: How would a sustainable world be? How can we make it happen? What role can companies perform to ensure quicker progress toward this world?

For this thinking, it is crucial to know the main concepts, ideas and examples on the topic of sustainability, sustainable development and its direct relationship with companies, as well as the main concepts on sustainable products and services, and what must be the core of every company, the reason for existence of an organization that aims at profitability as the reason for its pursuit.

2 Data and Methodology

2.1 Method

For this research, we used vast theoretical bibliographic references, due to the need of understanding the existing relationship between corporate strategies, the theme of sustainability, and sustainable development.

2.1.1 Discussion on the Method

The investigation explored corporate strategy themes, articulated by definitions, strategies, strategic planning and typologies. Thus, we understand that it is possible to gain more clarity in the alignment of fundamental theoretical concepts of strategy, the base of a company concerning sustainability issues, an urgent topic on present times.

To measure sustainability issues against corporate strategies, a qualitative analysis was conducted based on the 2011 *Guia Exame de Sustentabilidade* (Exame magazine’s Sustainability Guide). This

analysis was based on the Guide's data when compared with the five corporate evolution stages model, by Nidumolu, Prahalad and Rangaswami (2009).

Guia Exame de Sustentabilidade is an annual publication by Grupo Abril, highlighting companies that are benchmarks in social corporate responsibility – it is the biggest and most respected inquiry on the topic conducted in Brazil, now on its 12th edition. Any companies, whether state-owned or private, open or closed-capital, major, medium and small, can participate in it. The Sustainability Studies Center from Fundação Getúlio Vargas (GVCes), an institution considered the benchmark in this topic in Brazil, prepares the questionnaire and is responsible for the analysis of information. The questionnaire is divided into four parts, with an approximate total of 140 questions. The first part addresses issues on commitment, transparency and corporate governance. The other parts address the economic-financial, social and environmental dimensions. After being completed, the answers are analyzed statistically, in order to exclude companies with the worst performances in any dimension in the questionnaire. Based on this analysis, a group of nearly 40 companies is selected and submitted to the decision by a deliberative council – comprised of experts – that selects the 20 model companies. In the case of these model companies, there is no ranking, and they are featured in the publication in alphabetical order. In 2011, 158 companies that answered to all questions participated on the survey.

A thorough bibliographic research was conducted to select, understand and analyze data and secondary information, originated from existing market surveys on the topic, stressing the relevance and urgency of this discussion, aiming at presenting the theme by interconnecting the concepts of sustainability with business strategies from the companies selected by this prestigious Brazilian annual business publication.

The research suggests that, when one wants to head towards product and service sustainability, there must be strong alignment with corporate strategies. Reviewing product and service cycles not linked to business strategies can generate costs much higher than the ones forecasted by business managers and investors.

2.1.2 Main sustainability concepts

Issues on the non-sustainability of life and, consequently, business have been discussed more frequently over the past decade. Several meetings have occurred aiming at more awareness between nations and partners to reduce the high negative impacts from several industrialized countries that have severe repercussions for the planet, generating catastrophes of environmental, social, economic, cultural, organizational, psychological, human natures, among others.

The term 'sustainability' was the center of discussions during the Earth Summit (United Nations Conference on Environment and Development), held in Rio de Janeiro in 1992. Sustainability was initially defined by the Brundtland Commission in 1987, as "a development that meets the needs of current generations without compromising the ability of future generations to meet their own needs" (or, according to a recent variation, "allowing future generations to do the same").

The 178 nations gathered in 1992 for the Earth Summit listed the main phases towards sustainable development on a founding document, which forms a kind of common program for the 21st century: Agenda 21. In June 2012, Rio+20 was a conference held in Rio de Janeiro with the purpose of discussion again the environment, green economy, eradication of poverty and international governance for sustainable development. However, one of the concerns was that the event was a mere balance, because it had no deliberative character, not representing considerable advances in the pursuit of sustainability in the planet.

In addition to these debates, Rio+20 assessed practical results from important documents generated from the aforementioned ECO 92, such as Agenda 21, Conventions on Climate Change and Biological Diversity, Declaration of Principles on Forests, Fight Against Desertification, among others that were prepared afterwards, such as the Earth Charter, in 2000.

2.1.3 Sustainability in companies

According to Laville (2009), the pre-historical time of corporate social responsibility (CSR 0.0) was marked by a philanthropic, patronage posture, developed especially from the 1980s to mid-1990s: at that time, different social and environmental imperatives started being acknowledged by financial instances, and companies started realizing that they could not thrive in declining social or natural environments. Thus, they started engaging in the easiest route: implemented and developed foundations or patronage actions, through which they redistributed part of their profits to organizations for environment protection, human rights defense or fight against exclusion – but without changing one bit of their financial model, strategy or offer.

The second era, marking the creation of the concept of CSR per se (which the author calls CSR 1.0),

extended from mid-1990s to mid-2000s: it was characterized by an enrichment of the previous approach, with a more active posture of defense of eco-efficiency and prevention of risks, especially the ones with greater effect on reputations. By opening to outside and to social and environmental issues, companies were confronted with internal and external questions concerning the impact of their own institutional practices in areas such as production, personnel, procurement, among others, over certain issues.

According to the author's reflections, the third era (CSR 2.0), in which we have been for quite some time, corresponds to a revolution that has just begun – but that may have an important impact on sustainable development policies from major groups. Such revolution is fed by several factors combined: the publication of the Stern report, which demonstrated that it is cheaper to fight against climate changes than suffering its consequences; the shock effect from the documentary by Al Gore and the Nobel prize he won; the growing visibility of these topics in the media; the multiplication of headlines about “green growth”; the arrival of “alter-consumers” with strong power of purchase, who incorporate social and environmental criteria to their buying decisions and represent a growing part of the population in developed countries (France, Japan, USA, etc.) (LAVILLE, 2009).

MeloNeto (2004) separates into decades the evolution of the concept of sustainability. Initially, in the 1960s, sustainability emerged as a concept directly associated to environment preservation. Sustainable projects were seen as a set of actions that minimized environmental risks. The idea of preserving natural resources was predominant. Then, in the 1970s, sustainability evolved to the full scope of environmental actions, especially the ones to prevent risks and damages caused to the environment. However, it was in the 1980s that the binomial sustainability/corporate responsibility emerged. He continues by talking about the 1990s with social responsibility practices and, in the 2000s, with social environmental certification practices. It is noticed that the moment requires from companies not only respect with the environment and the use of environmental management practices, but especially the minimization of social risks and the pursuit of solutions for social problems existing in communities.

From this perception has arisen the importance of social as a sustainability factor for any project and/or business. This is the current model – sustainability as a social-environmental management practice focused on formal, legal and institutional instruments for social and environmental certification. (MELO NETO, 2004)

Sustainability as a strategy for companies has currently been seen only as an improvement on a more eco-efficient process or in product changes, making it fully or partially recyclable. In many companies, the topic has not been inserted when it comes to tracing their strategies to generate value. There is an attempt to insert sustainability in a fragmented manner into the product or service, but this insertion is not analyzed in a broad, holistic way. Drucker (2010) ponders that social responsibilities from a business may arise in two areas: they can emerge from social impacts of the institution or from issues in society. The first one addresses what an institution generates to society, and the second, what an institution can generate to society. The modern organization exists to provide a specific service to provide a specific service to an audience in the society and, with this, it needs to be committed to this group considering its insertion through making business in a social scenario, not only financial, a standard in the capitalist paradigm. The exploratory idea of making business is now pressured to a review, and this pressure has also been made by nature itself, which is rebelling against the impact on its lands, waters, climate, biodiversity, among others.

Drucker (2010) states that the purpose of an iron ore plant is not to make noise or release harmful fumes – it is to manufacture high-performance metals to serve its clients. However, in order to do that, it generates noise, heat and fumes. These impacts are incidental to the purpose of the organization, but are largely inescapable products.

Understanding what the impacts the company causes in the society are, including the environment, is crucial so that it can achieve its market and financial goals. And the organization can go beyond; as Drucker (2010) says, it is always necessary to try to turn the elimination of an impact into a business opportunity, but this is not possible in many cases. Most of the times, eliminating an impact means increasing costs. What was an “externality” for which the general public paid becomes a business cost. Therefore, it becomes a competitive disadvantage, unless every player in the industry accepts the same rule. Most of the times, this can only be done via regulation – that is, by some form of public action. Whenever an impact cannot be eliminated without increasing costs, it is up to the management to step forward and elaborate the regulation most likely to solve the problem with the lowest possible cost and greatest benefit both to the public and the business, and then work so that the right regulation is established.

As mentioned on strategies, Porter (2004) states that one of the generic strategies is precisely the leadership in costs, but if the impact of the product, service or business is not measured, this deviation can put this generic strategy in extreme jeopardy, making the organization lose its market share.

Drucker (2010) declares that the social problems are dysfunctions in the society and, at least potentially, degenerative diseases in the political organism. The corporate task is to turn change into innovation, that is, into new business. History shows that social change and innovation have been as important as technology, a fact to alert investors who excessively value technologies and reserve meager amounts to social and human issues.

Porter and Kramer (2010) follow the same topic that companies are in the society, and their interdependence can be analyzed with the same tools used to analyze the competitive position and development strategy. Thus, the company can focus its Corporate Social Responsibility activities on better effect. More than mere good-intentioned actions leveraged by or reacting to external pressure, the organization can develop an affirmative Corporate Social Responsibility agenda that produces the maximum social benefit and business gain. To any company, the strategy must go beyond good practices. This is choosing an unique position – doing things differently than competitors in order to reduce costs or better meet the needs of a particular group of consumers. These principles apply to the relationship between companies and society, as well as with its clients and competitors. Many opportunities for pioneer innovations to benefit the society as well as the company competitiveness may arise from the product offer and the value chain.

Nidumolu, Prahalad and Rangaswami (2009) emphasized that sustainability is a rich niche of organizational and technological innovations capable of generating revenue and profit. An environmentally correct company has lower costs, an important strategy according to the several authors aforementioned, because it uses fewer inputs. Also, the process generates additional revenue – thanks to better products or for allowing the company to create new business. The authors also highlight that, since these are the corporate innovation goals, smart companies are handling sustainability as the new innovation frontier. The study by Nidumolu, Prahalad and Rangaswami (2009) shows that companies that have already started this journey go through five different stages of change.

Table 1 Five Stages for Sustainability

STAGES	MAIN CHALLENGE	NECESSARY COMPETENCES	OPPORTUNITIES FOR INNOVATION
1 ST STAGE Face as an opportunity in relation to rules	Ensure that compliance with rules becomes an opportunity for innovation.	Ability to foresee and influence regulations. Ability to work with other companies, including competitors, to implement creative solutions.	Use the compliance to lead companies and partners to test sustainable technologies, materials and processes.
2 ND STAGE Make the value chain sustainable	Increase the efficiency throughout the value chain.	Proficiency in techniques such as carbon management and lifecycle assessment. Ability to reformulate operations to use less energy and water, contaminate less and generate less waste. Ability to make sure that vendors and retailers also become eco-friendly.	Develop sustainable sources of raw materials and components. Increase the use of clean energy sources, such as sunlight and wind. Find innovative uses to disposed products.
3 RD STAGE Create sustainable products and services	Create sustainable products and services or reformulate the existing line to not harm the environment.	Ability to understand which products and services are more harmful to the environment. Ability to gain real public support with sustainable products (in contrast with skin-deep ecology). Managerial know-how to increase the scale of supply of green raw materials and product manufacturing.	Use techniques such as biomimetics in product development. Create compact and environment-friendly packages.
4 TH STAGE Create new business models	Find new ways to generate and obtain value, changing the base of competition with this.	Ability to understand what the consumer wants and find different ways to meet those needs. Ability to understand how a partner can increase the value of the product or service.	Create new supply technologies to considerably change relationships in the value chain. Create monetary gain models based on services, not on products. Create business models that combine digital and physical infrastructure.
5 TH STAGE Create “next practice” platforms	Question, through the sustainability bias, the current dominating logics in corporate activity.	Ability to understand how renewable and non-renewable resources affect the ecosystem in companies and industries. Confidence to synthesize business models, technologies and regulation in different segments.	Create business platforms that enable clients and vendors to manage energy in a radically different manner. Create products that do not use water in categories where its use is normal, such as in cleaning products. Invent technologies that allow the industry to use energy generated by byproducts.

Source: Nidumolu, Prahalad and Rangaswami (2009)

To boost and effectively include sustainability in corporate strategy, Nidumolu, Prahalad and Rangaswami (2009) state that smart companies pursuing sustainability must follow very simple rules:

- Do not start with the present: if the starting point is the current approach, the vision of future will be an optimistic extrapolation. The best is to start with the future. When there is consensus on the shape the future will take, the company management can bring this future to the present.
- Before investing, learn: the board's interest in sustainability sometimes leads the company to invest in projects before knowing how to execute them. A smart company starts gradually, learns fast and expands the project scale.
- Adjust tactics, but never forget the goal: a smart executive knows he will have to make many tactical adjustments along the way. A route with five different stages, lasting one decade or longer, cannot be concluded without correcting paths and making considerable changes. Although the company shall not forget the greater goal, tactical flexibility is crucial.
- Create collaboration resources: nowadays, it is very difficult to produce innovation – whether to comply with rules, whether to create a new product line – without partnering with other companies, NGOs or the public power. Oftentimes success depends on the executive's ability to create new mechanisms for developing and distributing products and sharing revenue.
- Use the global presence to experiment: an advantage of having a multinational company is to be able to experiment in your own country and abroad. Currently, governments of many developing countries are concerned with environmental issues and encourage companies to launch sustainable products and processes, especially for the population in the pyramid base. For the multinational company, it is easier to innovate in emerging markets. This is where there are less systems established – and traditional ways of thinking – to overcome.

Nidumolu, Prahalad and Rangaswami (2009) state that two major initiatives help the company become sustainable: the first one is when top management decides to strongly focus on the issue by accelerating change, and the second is the importance of hiring and retaining the right type of people. Leadership and talents are critical to the creation of a lower-carbon economy. The existing financial system puts a huge pressure on the planet, but only considers the needs of a quarter of the people that inhabit it. Over the next decades, however, the world will absorb the double of it in terms of new consumers and producers. Traditional approaches to corporate activities will crumble and the companies will have to pursue innovative solutions, a fact that will require quick understanding from leaderships, joining sustainability with innovation.

Due to the difficulty companies face when incorporating sustainability into the business strategy, this paper presents a few qualitative and quantitative research studies to reinforce the discussion.

The research “Communication and Sustainability: What does your organization think and do in this area?,” conducted with the 25 major companies members of CEBDS (Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável, or Corporate Council for Sustainable Development), in October 2008, revealed important data and information on the topic. The prominent information for this paper is that 90% of the respondents commented that sustainability is incorporated in the business strategy, and 10% answered that it is not.

In another research by IBOPE, named IBOPE Environmental Research, from September 2011, with 400 interviews with medium and major Brazilian and multinational companies operating in Brazil, 52% stated having their sustainability area structured, focused exclusively on activities concerning this topic. From the total, 48% have sustainability policies with goals and planned actions. Additionally, in companies that practice sustainable actions, 8 in 10 have a strategic sustainability plan. The research also shows that the share of resources targeted at sustainable prices by companies, regardless of having a structured sustainability area or not, is virtually the same (4% and 3%, respectively), indicating that the investment in isolated sustainability actions has no major highlight, but at the same time it is not known how to calculate/identify how much the sustainability component is inserted in other investments conducted. In other words, this research offers the important information that the theme is not being addressed in companies organically, with the creation of departments, plans, goals and sustainable actions, and a percentage (even if small) of the sales forwarded to this topic. However, as it can be noticed, the research leaves a gap to check how much the topic of sustainability is inserted into other corporate strategies.

Another Brazilian research conducted by Sebrae, named “What micro and small businesses think about sustainability,” launched in 2011, had the purpose of assessing the level of perception of owners of micro and small businesses in Brazil concerning the topics of sustainability and environment.

3,058 businessmen from micro and small-size segments were interviewed. As a result, it was verified that most of these businessmen (58%) state that they don't have knowledge on the topics of sustainability and environment. Despite it, 72% understand that micro and small businesses shall give great importance to the environment and 79% believe that companies that adopt actions to preserve the environment can attract more clients. For 47% of the businessmen interviewed, the environment issue represents opportunities of gain for their companies, 40% do not see gains nor expenses, and 13% believe that the environment issue represents costs and expenses.

Globally, the MIT Sloan Management Review and the Boston Consulting Group conducted a research, released in the winter of 2012, showing that companies are starting to give more highlight to the sustainability issue. From the companies that participated in the survey, 70% have this theme permanently in their management agenda, and 31% believe that sustainability contributes to company profits. The third issue of the yearbook was released with more than 2,800 leaders from major global companies in 113 countries, in different segments of operation. The study also shows that 66% of the companies believe in sustainability as a crucial competitive factor in the current market – in 2010, 55% believed in it. Investments in the area of sustainability have also increased, according to the research.

Another global research released by Accenture and the United Nations Global Compact (2010) shows that most CEOs – 93% – say that sustainability will be crucial for the future success of their companies. Additionally, the CEOs believe that, within a decade, an inflection point can be achieved, there sustainability is related to the core business – in their capabilities, processes and systems, and the entire global supply chain and branches. These are some of the main conclusions from a survey with 766 CEOs worldwide – the biggest studied ever conducted on the topic of sustainability. In addition to an online research, the study included in-depth interviews with 50 of the world's top CEOs. The CEOs mentioned several barriers to achieve their sustainability goals, including:

- The complexity in implementing the strategy in all company areas (mentioned by 49 per cent)
- Competitive strategic priorities (48 per cent)
- Lack of recognition from financial markets (34 per cent)

The CEOs also believe that some conditions must be met before sustainability is completely integrated to the core business, and that companies need to take a leadership role concerning this topic. The action by companies will be necessary in five key areas:

- Configure the consumers' taste, in order to build a strong market for sustainable products.
- Train the management, employees and next generation of leaders to handle sustainability issues.
- Communicate with investors to create better understanding on the impact of sustainability.
- Measure the performance in sustainability – and explain the value of companies in the society.
- Work with governments to define a clear regulation and create fair conditions for competition.

There is also the international ranking of the greenest companies, by the American magazine *Newsweek*. With each company's Green Score, *Newsweek* sums the score related to Environment Impact with two other factors: Environmental Governance and Environmental Transparency. The list, from October 2011, places the giant Munich Re as the greenest company in the planet, with a Green Score of 83.6, where the maximum would be 100. Then, come IBM, with 82.5, and the National Australia Bank, with 82.2. Brazilian bank Bradesco, also with 82.2 points, is ranked in fourth, being the best-rated Brazilian company. Other Brazilian companies featured in the ranking are: Santander (17), Banco do Brasil (50), Itaú (54), Eletrobrás (214), Grupo Pao de Açúcar (248), Vale (312), Petrobrás (364), Ambev (412), and Gerdau (463). Since they don't have industrial facilities, financial companies take an advantage according to the criteria by *Newsweek*. Governance concerns policies, actions, programs and goals each company has to handle the management of natural resources and the impacts of their activities. The score for transparency is assigned to companies that disclose to the public data on their environmental footprint and inventories on greenhouse gas (GHG) emissions. According to *Newsweek*, if governments hesitate to embrace the low-carbon economy, the same cannot be said about private initiative. Corporate sustainability is currently one of the most relevant topics in the business world, and virtually all major companies have long-term plans and are making their activities cleaner and more efficient each year. The 500 companies assessed by the ranking are responsible for the emission of more than 6 billion tons of GHG, which corresponds to the emission by the United States.

Another famous global ranking is the one developed by Interbrand, which assessed in 2011 the performance and perception from 50 global companies in 10 countries – USA, Japan, China, Brazil, Germany, France, Great Britain, Italy, India and Spain. Considering social-environmental data from

more than 3,000 corporations available in the platform ASSET4, research partner Deloitte developed a corporate environmental performance methodology named The Green Performance Score, including the pillars of governance, engagement from stakeholders, operations, supply chain, transports and logistics, products and services. On the other side, Interbrand checked the opinion of 10,000 consumers concerning the brands based on criteria of authenticity, relevance, differentiation, consistency, presence and understanding. Among the main results, stand out the importance of transparency, the difference in opinions depending on the country and the research segment, and the considerable gap between performance and perception. Despite it, the stronger green brands are actually in the intersection between these two items. In 2011, the top 10 companies in the survey are, from the highest score: Toyota, 3M, Siemens, Johnson&Johnson, HP, Volkswagen, Honda, Dell, Cisco and Panasonic.

As it can be noticed, there are many rankings, surveys and ratings on sustainable companies or that are heading towards sustainable development or concerning the topic. On a global vision, there are more accurate data informing that sustainability is slowly becoming part of companies' strategic agenda (which does not occur in Brazilian micro and small businesses). It is believed that these companies answer correctly and are audited in these questionnaires, indicators and benchmarks. However, we question if these companies effectively have sustainability in their business strategy. What may be happening is a couple of actions, plans and programs that are only part of their processes and procedures to become greener, inclusive and responsible. The differences in concepts and interpretations may interfere with the answers to the questionnaires and questionings. We highlight that these practices are highly valuable in a sustainable development process, but are not sufficient, because the complexity of the world and of business has demonstrated that it is necessary to go beyond the existing indicators and programs created by the companies. In Brazil, when a company prepares its articles of incorporation and later defines the methods for sales and profitability, it will necessarily define the products and/or services generated to the society. Thus, generating products and services requires taking care of the processes for production, distribution, sale, collection (take back and recycling), and these process points can adjust to a few rules, standards, legislations, ISOs, etc. The studies by Nidumolu, Prahalad and Rangaswami (2009) have stated that companies will need to achieve the 3rd Stage to create sustainable products and services and then, on the two following stages, develop new business models and platform for the next practices.

Inserting sustainability in the business strategy would happen from the 3rd Stage on, but not only with a few products in the portfolio or a small margin of sale from these products or new markets, but representing most of the company's sales, which would be ideal. For developing these products or services, it is not enough to have a few eco-friendly features, but also closed cycle, transparency, create value in the chain and, complementing with Almeida (2009), with the internalization of social and environmental costs, which favors the durability of assets to be designed to be repaired and updated. We end this discussion in this paper, without exhausting the theme, with Bonilla (2007), who highlights the actual needs, and the created needs, for necessary and unnecessary products.

3 Results

A qualitative research was conducted with comparative secondary data among 21 companies that are benchmarks in corporate social responsibility in Brazil by the 2011 *Guia Exame de Sustentabilidade*. It was noticed which evidence these companies have in the 1st, 2nd, 3rd, 4th and 5th Stages according to Nidumolu, Prahalad and Rangaswami (2009), that is, it was analyzed if the companies effectively started a process of including sustainability in business strategies, understanding strategy as stated by Costa (2009) as the base over which plans are made, priorities are established and modified, external and internal communication is structured, risks are managed and the company path is changed, facing new facts, that is, the tangible cause for the company to exist in the society.

In this research, 99% of the companies declare, via top management, that the company is formally committed with sustainable development and that this commitment is manifested. 40% of these companies demonstrate the commitment through their Vision and Mission; 91% via strategic planning; and 51% through a public document with long-term goals and objectives.

Based on data provided by the magazine, especially the ones concerned the performance of indicators from the 2011 *Guia Exame de Sustentabilidade* about the company and the content of the highlighted article, the table below supports in the following analysis, from such secondary data, if these 21 companies have in their performance any item related to the 1st, 2nd, 3rd, 4th and 5th stages. It is considered in the analysis only what *Exame* magazine mentioned as items in which the company was

above the average from the universe surveyed and the topics described in the article. With this, there is a base for qualitative analysis on the inclusion of sustainability in business strategy, according to Nidumolu, Prahalad and Rangaswami (2009).

Table 2 Evidence on 21 Model Companies Featured on the 2011 *Guia Exame de Sustentabilidade* against the 1st, 2nd, 3rd, 4th and 5th stages

COMPANIES	1 ST STAGE Faces as an opportunity in relation to rules	2 ND STAGE Makes the value chain sustainable	3 RD STAGE Creates sustainable products and services	4 TH STAGE Creates new business models	5 TH STAGE Creates “next practices” platforms
SABIN / SMB	x				
ALCOA	x	x			
ANGLO AMERICAN	x	x			
APERAM	x	x			
BUNGE	x	x			
FLEURY	x	x			
MASISA	x	x			
SUZANO	x	x			
ELEKTRO	x	x	X		
EMBRACO	x	x	X		
ITAÚ UNIBANCO	x	x	X		
KIMBERLY-CLARK	x	x	X		
NATURA	x	x	X		
PHILIPS	x	x	X		
Unilever	x	x	X		
BRASKEM	x	x	X	x	
DOW	x	x	X	x	
EDP	x	x	X	x	
FIBRIA	x	x	X	x	
MEXICHEM (AMANCO)	x	x	X	x	
PROMON	x	x	X	x	

Source: Adapted from Nidumolu, Prahalad and Rangaswami (2009)

It is noticed that most companies present evidence that they are on the 2nd stage, where the process of making the value chain more sustainable, is, thus increasing the efficiency of the entire value chain. From the 21 companies, 13 are aiming at creating sustainable products and services or reformulating the existing line to not harm the environment. And 6 of them are trying to find new ways to generate and obtain value, changing, with this, the competition base. A good example of company aiming at creating sustainable products and services is Braskem, which opened a green polyethylene plant in Rio Grande do Sul and has a new project in the area of renewable plastics. The project, which consumed 500 million reais and launched the company into the position of the world's biggest manufacturer of green polyethylene, used to make bags, film and packages for companies. The ethanol-derived ethene plant is in the city of Triunfo, Rio Grande do Sul. In addition to this new product vision, Braskem achieves the 4th Stage, according to Nidumolu, Prahalad and Rangaswami (2009), with the green polypropylene plant, a resin highly applicable to flexible and hard packages, in the automobile industry and in the agricultural industry. This is a new way to generate and obtain value, changing, with this, the competition base.

Another example of the 4th Stage is the company Fibria, which wants to provide food safety income while not being responsible for a “green desert”, due to the high use of land with single-culture crops. One of its operation fronts is apiculture. Throughout Brazil, 585 beekeepers produce honey in

eucalyptus forests from Fibria. For example, in the unit of Jacareí, in the State of Sao Paulo, 46,000 kilos of honey were obtained this year alone with the seal from IBD, which guarantees the product's organic origin. In another 4,000 hectares, 230 families cultivate foods such as corn, bean and fruit along with eucalyptus. In this case, there is an ability to understand how a partner can increase the value of the product or service.

For another example of the 3rd Stage, there is ItaúUnibanco, which put into practice a series of initiatives with the purpose of maintaining a sustainable relationship with its more than 60 million clients. According to its CEO, Roberto Setubal, this implies a change in the way of selling products.

Life insurance redesign is an example, because now it is only offered to those actually interested in it. According to the CEO, this made sales decrease 20%, but the cancellation rates and their costs were reduced by 40%. Another example was the change in the way of analyzing financing approval for the corporate area. In addition to the feasibility of payment and business growth, the bank teams try to analyze the project's impacts on the environment. If they are above what is considered acceptable, financing will not be granted. In other words, the bank does not sell, because it awards credits with sustainability values. This is literally the reformulation of existing lines to not harm the environment.

This study was focused on the perception existing in the 2011 *Guia Exame de Sustentabilidade*, highlighting the main items in which companies were above the average.

4 Conclusion

The paper brings sustainability concepts, recalls international awareness events when several discussions and concepts were created and debated, but with few commitments taken and executed among the nations involved, such as the recently held Rio +20. It dialogues with authors strengthening the point that many companies have sustainable speeches, but still few concrete practices on what is actually necessary, giving attention to recycling or taking care of product and service residues, but unattached to the macro business vision (strategies, value chain, product cycle, mass production, etc.).

It highlights the relevance of including social issues in business strategies to gain competitiveness in the present world. It values data and information from market surveys that enriched and strengthened the discussion of sustainability in company strategies, along with the concepts and theories presented.

The theme is still very little disseminated to the majority of the corporate population, as the survey by Sebrae with 3,085 businessmen from Brazilian micro and small businesses demonstrated, where nearly 60% stated they don't have knowledge about the topic – they represent most Brazilian companies. However, the topic has gained visibility thanks to the higher consumer awareness.

Major market leader or transnational companies in Brazil end up including the theme in their management thanks to movements like the ones from Instituto Ethos, CEBDS, Instituto Akatu and GIFE. These organizations, plus a few international ones, have helped place Brazil as a benchmark of progress in corporate sustainability worldwide. The implementation of indicators mentioned in the text was also a considerable driver of sustainable practices and actions from leader companies in this theme. Indicators and ISO certificates enabled many companies to measure sustainability in their everyday life and, more than that, compare with other companies, establish goals and further improve their processes.

On the research "Communication and Sustainability: What does your organization think and do in this area?," conducted with the 25 major companies members of CEBDS (Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável), 90% of the respondents commented that sustainability is incorporated in the business strategy. Additionally, the survey disclosed by Accenture and the United Nations Global Compact demonstrated that 93% of 776 CEOs interviewed believe that sustainability will be crucial for the future of companies. It was also verified that sustainable development goes beyond simply taking care of the product or service innovation, because every process shall be considered, including strategic business discussions, which must insert sustainability in a macro manner, in synergy with its products and services. When companies in Brazil prepare their articles of incorporation and later define the methods for sales and profitability, this will necessarily go through a product or service to the society. Whatever this product or service is, subsequently there will be its mass production, distribution, sale, and collection (take back and recycling), and these process points can be adjusted to a few rules, standards, legislations, ISOs, etc.

We have noticed that including sustainability in a company's strategy and business has been widely discussed and is somehow being implemented by a few Brazilian corporations, but not in most and not organically. This fact is concerning when considering the topic in small and medium businesses. We also notice that the more sustainable products and services, added with processes, practices, actions,

indicators and plans, must be closely related to corporate strategies. To make this change and transformation, it is necessary to make a major investment in education and awareness about the topic in and out of the organizations, as well as there is the need of mobilizing and engaging the company's different internal and external audiences so that they can turn policies and plans related to strategy into actions, projects and activities.

This research achieves its purpose and may become a base for future researchers. We leave two suggestions for research: one about an in-depth study on the sales figures of sustainable products and services in leading companies, and another about investigating the issue of which sustainable business strategies are benchmarks in Brazil.

We hope that this work effectively cooperates with the construction of new business models, included in sustainable financial, social and environmental development.

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The Status and Problems of Resource-Based Industries in Inner Mongolia in China

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Abstract: This paper expounds the meanings of resources and resource-based industries, the status and existing problems of resource-based industries growth in Inner Mongolia. The results show that Inner Mongolia is rich in mineral resources and renewable energy, but there still exist many problems especially regarding the low value-added and high energy consumption. Although energy consumption per unit of GDP in Inner Mongolia gradually decline from 2004 to 2011, it continues to hold the high. Furthermore, the imbalance of regional economic development and the environmental pressure still exist in Inner Mongolia. So Inner Mongolia is supposed to independently innovate, which is useful for achieving transformation and upgrading of resource-based industries.

Key words: Inner Mongolia of China; Resource-based industries; Energy consumption per unit of GDP; Independent innovation

1 Introduction

With the increasing overall demand capacity of technological innovation, resources consumption and ecological environment and other aspects, energy saving has become a long-term approach to develop China's national economy. Inner Mongolia Autonomous Region is located in the northern frontier of China, rich in natural resources such as minerals and land. Constructing the resource-based industries such as energy, agriculture and animal husbandry has obvious advantages and huge development potential. Therefore, understanding the growth status and problems of resource-based industries in Inner Mongolia have important practical significance. The remainder of this article is organized as follows: The second part is the definition of resource and resource-based industries, and the third part analyzes the growth status of resource-based industries in Inner Mongolia by using statistical data, the fourth part is the existing problems, and the last is the conclusions.

2 The Connotation of Resources and Resource-Based Industries

The resources usually refer to the source of production and means of subsistence, however, different research area and scholars have different understanding. Resources have broad and narrow sense, broad resources are all matter and energy of the nature and human society, both including all human natural objects such as sunlight, air, water, minerals, soil, plants and animals, and all useful material in the form of products of human labor, such as a variety of housing, equipment, and other consumer and production goods. Moreover, it also includes intangible assets such as information, knowledge and technology, and human physical and mental. Resources in narrow sense refer only to natural resources, the United Nations Environment Programme (UNEP) define resources as: "Natural resources are defined as the sum of natural environment and conditions that can produce economic value and improve the welfare of human at current or in the future under some conditions of time and location". Academic researchers interpret resources differently from different angles, Li Jinchang (1995) argues that resources equal to natural resources, referring to all useful tangible and intangible elements for mankind under certain technical conditions. Randall (1989) thinks that resources are useful and valuable substances found by the people, and he shows resource is a dynamic concept. In fact, the concept of resources also continues to expand with the economic and social developments. The number of types of natural resources and areas are all expanded due to the improvement of cognitive level and scientific and technological progress. So we can make resources as both a historical category and a product of society, the connotation and denotation continue to expand and deepen with the improvement of technology economy (Chen Ying, 2012).

Resources in the resource-based industries generally refer to natural resources. Since a variety of research and analytical purposes, domestic scholars have different understandings for resource-based industries, such as resources development industry, natural resources industry, mineral resources industry, resource-based industries. At the same time there are different understanding and interpretation

for its definition and connotation. First, it refers specifically to the mining, taking extractive industries as a resource-based industries or resources development industry (Guan FengJun, 2004). Resource-based industries are mainly based on mineral resources, energy and raw materials. The second is taking the development of all natural resources, including agricultural resources, tourism resources, and mineral resources industry, as the resource-based industries. Zhang Fuming (2007) regards resource-based industries as the economic activity sectors whose object of labor are natural resources, such as agriculture, forestry, animal husbandry, fisheries and mining industry. Third, from a generalized perspective, resource-based industries include the development of human resources and natural resources. Fourth, from the perspective of industry-chain, resource-based industries refer to economic sectors which are in order to discover resources, mining, protection, regeneration and increasing the value of its assets including resources survey and evaluation industry, resource mining industry, resource conservation, and resource recycling industry in four levels (Li Shanmei and Li Yuyan, 2005). Finally, developments of energy and mineral industries can be taken as resource-based industries, including the mining and processing industries in manufacturing which are important part of heavy industry. In summary, the resource-based industries is based on the exploration, protection, development and update of the mineral, biological, climate, land and other natural resources, heavily relying on the exploitation and processing of resources.

3 The Growth Status of Resource-Based Industries in Inner Mongolia

Inner Mongolia is rich in resources, natural conditions, mineral and renewable energy, which provide favorable natural foundation and advantages for the development of resource-based industries.

(1) Natural conditions. Inner Mongolia is located in China's northern frontier which is a long and narrow shape. Straight-line distance from east to west is 2400 km, and straight-line distance from north to south is 1700 km. The region's total area is 1.183 million square kilometers, accounting for 12.3% of the country's land area and is the third largest province. Inner Mongolia has a vast territory, complete stratigraphic, magmatic activities, good mineralization conditions, rich in mineral resources. It can be divided into two Classes I of tectonic units according to north latitude 42°, the north of which are the Tianshan - Inner Mongolia - Larix geosynclinal area, and the south are the North China platform area. There exist two leading Class II metallogenic belt in Inner Mongolia, one is North China Craton, n-grade copper-polymetallic metallogenic belt, the other is Daxinganling Class II copper-polymetallic metallogenic belt.

Table 1 The Growth Status of Various Resource-Based Industries in Inner Mongolia

Item		2003	2006	2007	2008	2010	2011
Land Resources	Total Land Area(10 000 sq.km)	118.3	118.3	118.3	118.3	118.3	118.3
	Cultivated Land at the Year-end(10000 hectares)	686.3	748.0	713.3	714.9	714.9	714.9
	Composition of Cultivated Land in Total Land Area (%)	5.8	6.3	6.0	6.0	6.0	6.0
	Area of Afforested Land(10000 hectares)	4068.3	4068.3	4068.3	4068.3	4394.9	4394.9
Forests Resources	Forest Area(10 000 hectares)	2078.9	2078.9	2050.7	2050.7	2366.4	2366.4
	Forest-Coverage Rate (%)	17.6	17.6	17.6	17.6	20.0	20.0
	Stock Volume of the Forest(100 million cu.m)	12.9	12.9	12.9	12.9	13.6	13.6
Prairie Resources	Prairie Area(10000 hectares)	8666.7	8666.7	8666.7	8666.7	8666.7	8666.7
	Utilizable Area(10000 hectares)	6818.0	6818.0	6818.0	6818.0	6818.0	6818.0
Water Resources	Total Water Resources Volume(100 million cu.m)	—	411.3	295.9	412.1	388.5	419.0
	Surface Water Volume	—	294.3	183.0	274.8	253.4	298.2
	Ground Water Volume	—	213.6	206.9	235.2	227.7	231.4
Mineral Resources	Coal Ensured Reserves(100 million tons)	2239.1	2892.6	2981.5	3275.9	3577.5	3690.3
	Iron Ore Ensured Reserves(100 million tons)	23.6	26.1	28.0	33.4	37.1	39.6
	Phosphate Ore Ensured Reserves(100 million tons)	2.8	2.8	2.8	2.8	2.7	5.7
	Rare-earth Ensured Reserves(10000 tons)	8213.4	7893.2	7754.4	7647.7	15998	—
	Copper Ensured Reserves(10000 tons)	346.3	471.8	478.1	501.5	632.9	641.1
	Lead Ensured Reserves(10000 tons)	315.6	485.4	541.0	645.1	983.0	1008.1
	Zinc Ensured Reserves(10000 tons)	1071.7	1426.9	1517.4	1756.0	2047.2	2098.0
Salt Ensured Reserves(10000 tons)	15646.4	18181.0	17782.7	15166.9	15904.1	15904.1	

Note: Total Water Resources Volume is not equal to Surface Water Volume plus Ground Water Volume; there is Duplicated Measurement between Surface Water and Ground Water.

(2) Mineral resources. Inner Mongolia is rich in mineral resources and more than 136 kinds of minerals have been found, accounting for 80% of the country's discovery of minerals. Development and utilization of minerals are 112 species (accounting for 48% of the mineral species) among which 42 kinds of mineral reserves rank the top 10, 26 kinds rank the top 3 and 7 kinds rank the top one. Per capita of 20 kinds of mineral is more than twice of the country. Coal reserves is extremely rich and have been identified coal-bearing area of 100000 square kilometers, retaining proven reserves of 700 billion tons and prospective reserves of 12,000 tons; Furthermore, oil and gas reserves are also very substantial, now proven 13 oil and gas fields, forecasting total oil resources amount to 20-30 million tons, natural gas for 2700-10000 billion cubic meters; non-ferrous minerals proved reserves rank the top five minerals are zinc, lead, tin and bismuth. Ranking 7 to 10 is copper, Ma, Mo, alumina, nickel, and cobalt. The changes in all kinds of resources are shown in Table 1.

(3) Renewable energy. Northwest of Inner Mongolia is major wind resource zones in China. Under the control of westerlies, year-round's average wind power density is 200-300 W/m², greater than or equal to 3 m/s wind speed throughout the year are more than 5000 hours, greater than or equal to 6 m/s wind speed are more than 2000 hours, which is one of the largest wind resource zones in China. The area of wind energy-rich area is 460000 km², and the development and utilization of wind energy resources of 10 m height is 101 million kilowatts, accounting for 40% of the national wind energy resource. Western Inner Mongolia's monthly average temperature is 10 degrees Celsius, the numbers of more than 6 hours of high sunshine are more than 250-300 days, the total annual solar energy is 6.22 billion coke per square meter, which is solar energy resource-rich areas. Eastern Inner Mongolia's monthly average temperature is higher than 10 degrees Celsius, the number of days more than 6 hours of high sunshine is more than 200-300 days, and the total annual solar energy per square meter is 50-62 billion coke, which belongs to the area that solar energy resources are abundant. In addition to the abundant wind energy resources and solar energy resources, Inner Mongolia also has a feature of sparsely populated, low land costs, which has the great advantages of the development of renewable energy.

4 The Problems of Resource-based Industries Growth in Inner Mongolia

There also exist some shortcomings and defects in the development of resource-based industries in Inner Mongolia, which will limit and restrain the economic development in the future.

(1) Low value-added, high energy consumption. Most of the major industries in Inner Mongolia are the basis of the upstream products, industry-chain is short, capability of resource-intensive processing is not strong, and the ability to meet end-market demand is low. In the process of regional development, industries have the highest energy consumption and the most significant environmental pollution. Inner Mongolia is in a phase of rapid development of large-scale development of resources and processing and conversion, an important industry base of national energy and heavy chemical, and a production and export base of metallurgy, non-ferrous metals, building materials and other raw materials, which show the feature of industrialization heavy resistance. The results are high energy consumption and table 2 shows the energy consumption indicators in Inner Mongolia decreased slowly.

Table 2 Energy Consumption Per Unit of GDP in Inner Mongolia (2004-2011)

Year	Energy Consumption Per Unit of GDP (ton of SCE/10 000 yuan)	Energy Consumption Per Unit of Industrial Value-added (ton of SCE/10 000 yuan)	Electricity Consumption Per Unit of Industrial Value-added (kw/10 000 yuan)
2004	2.51	6.33	1761.20
2005	2.48	5.67	1710.44
2006	2.41	5.37	1903.29
2007	2.31	4.88	2092.81
2008	2.16	4.19	1868.65
2009	2.01	3.56	1686.72
2010	1.92	3.24	1701.38
2011	1.41	3.09	1775.90

Data Source: Inner Mongolia Statistical Yearbook 2012. Note: Energy Consumption Per Unit of GDP in 2011 calculated by constant prices in 2010.

Ranking all provinces and autonomous regions (Tibet data unavailable) by energy consumption per unit of GDP in 2011, Inner Mongolia has high energy consumption, ranked sixth in China, far higher

than most of other regions (see table 3). In short-term, heavy-duty industrial structure in Inner Mongolia, mainly including energy, chemicals, metallurgy, is difficult to fundamentally change. High energy consumption per unit not only affects the competitiveness of related products in Inner Mongolia, but also means lower production efficiency, larger resources waste and greater side-effects to environment, the pressure of energy saving is large. This is bound to affect the long-term development of the resource-based industries and a great obstacle for its further development.

Table 3 The Ranking of Energy Consumption Per Unit of GDP (2011)

Region	Energy Consumption per 10000 yuan of GRP	Rank	Region	Energy Consumption per 10000 yuan of GRP	Rank
Ningxia	2.279	1	Henan	0.895	16
Qinghai	2.081	2	Hunan	0.894	17
Shanxi	1.762	3	Shandong	0.855	18
Guizhou	1.714	4	Shaanxi	0.846	19
Xinjiang	1.631	5	Guangxi	0.800	20
Inner Mongolia	1.405	6	Anhui	0.754	21
Gansu	1.402	7	Tianjin	0.708	22
Hebei	1.300	8	Hainan	0.692	23
Yunnan	1.162	9	Jiangxi	0.651	24
Liaoning	1.096	10	Fujian	0.644	25
Heilongjiang	1.042	11	Shanghai	0.618	26
Sichuan	0.997	12	Jiangsu	0.600	27
Chongqing	0.953	13	Zhejiang	0.590	28
Jilin	0.923	14	Guangdong	0.563	29
Hubei	0.912	15	Beijing	0.459	30

Data Source: China Statistical Yearbook 2012.

(2) Regional development is extremely unbalanced. The development of resource-based industries is subjected to resources distribution. Resource-rich areas have a rapid development of resource-based industries which can drive regional economic growth, while resource-poor areas have slow development. Judging from resources distribution in Inner Mongolia, the western region has unique advantages, with a natural basis for the development of resource-based industries, while the eastern and central regions have poor resources distribution, resource-based industries has lagged behind (see table 4). From a policy perspective, Inner Mongolia has been operating a non-balanced development strategy since the 10th Five-Year Plan to promote resource-rich region to develop firstly, The unbalanced development of each region's resource-based industries is not conducive to the regional division of labor, also is not conducive to generate the industrial clusters efficiency and economies of scale, and especially exacerbates the imbalance of regional economic development resulting in serious social problems.

Table 4 Number of above Designated Size Industrial Enterprises and Their Gross Output Value by Region (2011)

Region	Enterprises above Designated Size	
	Number of Enterprises (Unit)	Gross Output Value (At Current Prices) ((10000 yuan))
Hohhot City	267	13659098
Baotou City	625	29990131
Hulunbeier City	384	10355582
Xingan League	147	2140465
Tongliao City	590	24161894
Chifeng City	526	15773267
Xilinguole League	340	7593563
Wulanchabu City	373	7868253
Erdos City	385	37437310
Bayannaer City	275	10169968
Wuhai City	155	7399002
Alashan League	106	6627421

Data Source: Inner Mongolia Statistical Yearbook 2012.

(3) Environmental and ecological pressure is large. Inner Mongolia's ecological environment is fragile, moderate ecological fragile region accounting for 62.5% of the land area, in which severe and very severe vulnerability accounting for 36.7%. Some grassland degradation, destruction of forests, rivers and lakes dry up, serious soil erosion and desertification, salinization exacerbated the desertification area accounted for 55.7% of the land area. Ecosystem's function weaken, and Hulun's storage capacity reduced by 60% in 8 years. The disasters such as drought, dust, storms often occur. Desertification and soil erosion is serious, about 2/3 of the arable land are in the area of soil erosion, water-poor in most areas, poor carrying capacity. Exploitation of resources brought to the ecological destruction and environmental pollution in Inner Mongolia. Water resources reserves in Inner Mongolia are small compared to its rich natural resources, and the distribution is extremely uneven. Water resources in the region in 2010 are 38.854 billion cubic meters, 1500 cubic meters per capita. According to international standards, 2000 cubic meters per capita is the edge of the severe water shortage, 1000 cubic meters per capita is a minimum, and we can see that Inner Mongolia is a serious water shortage edge. Inner Mongolia is not only lack water resource, but also deteriorates the quality of the water. A large number of enterprises, especially small businesses, have outdated facilities and low level of technology, which let the free discharge of industrial waste and result in industrial pollutions.

5 Conclusion

Inner Mongolia is a natural resource-rich region and its development is directly related to China's total economy. The analysis reveals that Inner Mongolia's mineral resources and renewable energy are more abundant, but there are still a lot of problems, especially regarding low value-added and high energy consumption. Although energy consumption per unit of GDP gradually decline from 2004 to 2011 in Inner Mongolia, still high in 2011 and ranking the sixth out of all provinces. Inner Mongolia's regional economic development is unbalanced, and environmental and ecological pressure is large. Therefore, Inner Mongolia should promote independent innovation, improve the venture capital and service system; further build a policy system, improve the business organization system, which are useful for achieving transformation and upgrading of Inner Mongolia's resource-based industries and ultimately promote sustainable economic development in Inner Mongolia of China.

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Study on the Multi-Objective Early Warning System of City Economic and Social Development

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Abstract: Guided by the scientific development concept, this paper studies the basic theory of early warning systems of city economic and social development, designs the early warning system structure of economic and social development of city, and establishes early warning index system and early warning models. Through the application of AHP and Fuzzy Decision Method and the investigation and analysis of experts, this paper obtains the importance of each index, and builds a scientific and rational multi-objective early warning system of city economic and social development providing a scientific method for the early warning management of city economic and social development.

Key words: Early warning system; Economic and social development; Multi-objective decision-making; Early warning model; Index system

1 Introduction

Early warning of regional economic and social development is a widely concerned research. Many scholars have conducted some researches. Zhu Ye, Ye Minqiang^[1] from the system point of view, studied the early warning systems and its structural design problems of regional sustainable development, and established the early warning simulation model. Yan Yaojun^[2] considered that we should learn from the approach raised by developed countries to establishing a “policy simulator” and focus on the development of social risks simulator to realize scientization of social early warning. Some foreign scholars^[3, 4] proposed early warning index for sustainable development and ecological city. Liying Sun, Jinren Ni and Alistair G. L. Borthwich^[5] developed a sustainable development index model based on development, coordination and sustainability among sub-systems.

These researches are mainly for early warning systems of sustainable development of a particular area, scholars have not yet established the corresponding multi-objective early warning system of city economic and social development. Guided by the scientific development concept, the paper studies the multi-target early warning system of city economic and social development.

2 The Basic Theory of Early Warning Systems of City Economic and Social Development

City economic and social development objective system is a complex system composed of many factors, and the monitoring and early warning of objective system compose an alarms and alarms absolving system. It is established in order to prevent the process of regional system operation from getting off track, crisis or serious conflict between the development of economic and social and environmental protection. As a signaling system which can reveal and forecast regional operation and development, it covers the whole regional development process of economic and social. The process includes discovery of the warning instance, analysis and identification of warning signs, seeking warning sources, judging warning degree and absolving the alarm.

Warning meaning, it refers to the early warning index system. According to our analysis, the early warning index system of economic and social development objective system is mainly composed of economy, society, science and education, quality of life, environmental protection and political civilization and so on, and each of them is a warning indexes group. Specific types of early warning indexes can select and determine representative indexes in the basis of different status levels of running and development of subsystems.

Warning instance, it is a phenomenon that including the development of economic and social development deviating from the path, development of a reduction or the operation and development blocked of a subsystem. It is generally described by the warning meaning, that is to say it can be reflected by the measured value of early warning indexes. Clearing warning instance is a prerequisite.

Warning signs, it is the harbinger before warning instance out breaking, also known as leading indexes. Warning signs are divided into economic boom warning signs and trends warning signs. The former directly reflects degree of the system operation and development or the warning instance. The

later reflects the changing direction of the warning instance, positive change or reverse change.

Warning degree, it is a measure of the severity of the warning instance, namely the size of the the warning instance. It is a measure or reference to determine the warning instance, the warning signs and whether the warning existing and it is the purpose of the early warning. It is usually divided into five levels that are no warning, warning light, medium warning, heavy warning and giant warning.

3 The Design of the Multi-Objective Early Warning Systems of City Economic and Social Development

3.1 Setup of early warning index system

Table 1 Multi-objective Early Warning Index System of City Economic and Social Development

Warning degree level Z	Warning instance level z_i	Warning signs level x_{ij}
The early warning of city economic and social comprehensive and coordinated development	1. Economic subsystem ($w_1 = 0.25$)	1. Per Capita GDP ($w_{11} = 0.20$)
		2. Local financial income per capita ($w_{12} = 0.15$)
		3. The proportion of the added value of the tertiary industry in the GDP ($w_{13} = 0.15$)
		4. The proportion of the added value of high-tech products in the GDP ($w_{14} = 0.2$)
		5. The actual use of foreign capital per capita ($w_{15} = 0.15$)
		6. Per capita investment in fixed assets ($w_{16} = 0.15$)
	2. Social subsystem ($w_2 = 0.15$)	1. The proportion of non-agricultural population in total population ($w_{21} = 0.25$)
		2. Gini coefficient ($w_{22} = 0.30$)
		3. The proportion of accessing the social security population in social workers ($w_{23} = 0.25$)
		4. Registered urban unemployment rate ($w_{24} = 0.20$)
	3. Scientific and educational subsystem ($w_3 = 0.20$)	1. The proportion of R&D expenditure in the GDP ($w_{31} = 0.30$)
		2. The amount of accepted patent per ten thousand person ($w_{32} = 0.20$)
		3. The proportion of Cultural, educational, health and scientific expenditure in the GDP ($w_{33} = 0.30$)
		4. The proportion of college population in the college-age population ($w_{34} = 0.20$)
	4. Quality of life subsystem ($w_4 = 0.20$)	1. The per capita disposable income of urban residents ($w_{41} = 0.20$)
		2. Per capita housing area ($w_{42} = 0.10$)
		3. Engel's coefficient ($w_{43} = 0.15$)
		4. Road area per citizen ($w_{44} = 0.15$)
		5. The average number of doctors per one thousand inhabitants. ($w_{45} = 0.10$)
		6. Internet users per one hundred people ($w_{46} = 0.20$)
		7. The natural population growth rate ($w_{47} = 0.10$)
	5. Ecological and environmental protection subsystem ($w_5 = 0.15$)	1. The per capita green area ($w_{51} = 0.2$)
		2. Comprehensive utilization of industrial solid waste ($w_{52} = 0.2$)
		3. The attainment rate of industrial waste water ($w_{53} = 0.2$)
4. Air pollution index ($w_{54} = 0.2$)		
5. energy consumption of output value per ten thousand ($w_{55} = 0.2$)		
6. Political and civilized subsystem ($w_6 = 0.05$)	1. The satisfaction for the work of party and government organs ($w_{61} = 0.5$)	
	2. The satisfaction for the work of anti-corruption ($w_{62} = 0.5$)	

Early warning system of economic and social comprehensive, coordinated and sustainable

development is a multi-warning instance and parallel system. The statistical indexes should follow the selection criteria containing the importance of development, the integrity of statistics, the regularity of volatility, the timeliness of monitoring and the sensitivity of early warning. Combining the analysis of city economic and social development objective system and PCA method, the paper designs the early warning index system (Table 1). Index system is divided into three grades, which are overall objective evaluation (warning degree level), subsystems objective evaluation (warning instance level), status index evaluation (warning signs index). Overall objective evaluation reflects the economic and social comprehensive, coordinated and sustainable development capacity of city, on behalf of the general trend and overall effectiveness of implementation of the strategy. Subsystem objective evaluation is divided into economic subsystem, social subsystem, scientific and educational subsystem, quality of life subsystem, ecological and environmental protection subsystem and political and civilized subsystem. Each subsystem is expressed by a number of status evaluation indexes according to their relationship to reflect the causes and motivation of their behavior, relationships, and changes. Subsystem evaluation is considered as unit in the indexes framework of early warning systems. The framework analyses the early warning situation on six sub-systems of the index system, and based that conducts a comprehensive evaluation. At last, analyzing the policy achieves the aim to warn the economic and social comprehensive, coordinated and sustainable development.

3.2 Early warning model

Using AHP and PCA, the paper clarifies the relationship of multi-level indexes, and selects several key indexes. Taking the comparison of the actual value and the objective value as the standard, and the final total score reflects the pathological degree of overall system caused by the deviation from each index.

First, calculate the contribution rate of the selected early warning indexes. That is to say, it is to determine the importance of each index. The paper uses AHP and Fuzzy Decision Method, and obtains the importance of each index (w_i, w_{ij}) through experts' investigation and analysis, as shown in Table 1.

Secondly, standardize the actual and target values of the indexes. Standardized method is to calculate the deviations of the actual value and the expected value. Deviations occur in two cases, but both the increase and decrease will affect the system. Such as GDP growing too fast or too will have a negative impact slow on the entire economic system. The formula is as follows.

$$y_{ij} = (x_{ij} / x'_{ij} - 1) \times 100\%; \text{ if } x_{ij} > x'_{ij} \tag{1}$$

$$y_{ij} = (x'_{ij} / x_{ij} - 1) \times 100\%; \text{ if } x'_{ij} > x_{ij} \tag{2}$$

In the formula x'_{ij} is the objective value of warning sign level index, and x_{ij} is the actual values. ($i = 1, 2, \dots, 6$)

According to the actual situation in city, we believe that the deviation of the actual value and the expected value is allowed within 10%, and this situation can be defined as no warning. If the deviation is more than 10% but no more than 25%, the index has an effect on the operation of the system, thus this situation is identified as warning light. When the situation deteriorates further and the deviation is less than 50%, it shows that the operational problem is larger than before and the deviation reaches a larger level, and this situation is identified as medium warning. When the deviation is more than 50% and less than 70%, the negative effect has reached a significant level, and this case is identified as heavy warning. If the deviation reaches more than 70%, it indicates that the situation is serious deviated from the objective and the indexes reflect the serious irregularities of the system, soothe situation is giant warning. Each index score can be calculated according to the following formula.

$$\begin{cases} z_{ij} = 0; & \text{if } y_{ij} \leq 10\%; \\ z_{ij} = 1; & \text{if } 10\% < y_{ij} \leq 25\%; \\ z_{ij} = 2; & \text{if } 25\% < y_{ij} \leq 50\%; \\ z_{ij} = 3; & \text{if } 50\% < y_{ij} \leq 70\%; \\ z_{ij} = 5; & \text{if } y_{ij} > 70\% \end{cases} \tag{3}$$

3.3 Early warning signal

Warning threshold is the "check value". Considering the check value as the boundary, the paper determines the "double red", "red light", "light red", "yellow" and "green" signals. When the index exceeds a certain check value, the corresponding signal will light. Meanwhile, each of the signal is

given different scores, such as “double red” is given five points, “red light” three points, “light red” two points, “yellow” one point, “green light” to 0. The score of each subsystem is calculated as follow.

$$z_i = \sum_{j=1}^k w_{ij} z_{ij} \quad (4)$$

In the formula w_{ij} is the importance of the j th index in the i th subsystem (Table 1), and k is the index number of warning signs level in each subsystem.

The formula that calculates the total score of early warning system is as follow.

$$Z = \sum_{i=1}^6 w_i z_i \quad (5)$$

If all indexes are double red, the overall score is up to the highest 5 points. If all are green, the overall score is the lowest zero. Through the overall score, we can judge the situation comprehensively and determine the warning signal.

3.4 The dispose of early warning results

“Green light” outputted in the system indicates that the system is coordinated, and factors and expectation values in the system is closer or is better than expectation values. “Yellow” indicates that the system is more coordinated, and it has the possibility of turning into in coordination or tending to coordination in the short term. If only a few subsystems has problems, we should take the appropriate measures. If the signal is from "red" to "yellow", it means that the system is gradually transformed from a lack of coordination to coordination, and further measures should be taken to make the system tends to be more coordinated. If the signal is from the "green light" to "yellow", it gives us a warning, and we should promptly adjust the control measures to reverse the tendency of the system. "Red" is showing serious warning and indicates the system is much uncoordinated; it is timely to take strong measures to promote a better to change for the system and to avoid the collapse of the entire system.

What we should pay attention to specially is that the economic and social development of city is a dynamic system. The changes in the macro-policy and development environment of our nation can affect its development objective, at the moment it should adjust the objective value correspondingly according to the fact.

4 Conclusion

City economic and social development has an important impact on the level of general development of regions. Establishing multi-objective warning system of city economic and social development provides a scientific method for the early warning management of city economic and social development. Establishing and improving the early warning system are very important measures initiatives to raise the government's ruling ability.

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A Study on Concepts of Product Design with Sustainable Development

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Abstract: About serious shortage of human resources and the worsening environment, the concept of sustainable product design provides a new way for industrial design. The author's endeavor in this paper is to explore the basic concepts of product design with sustainable development from the ideological level to providing design guidelines, and serve the action for sustainable product research and development. The paper presents the concepts of being Nature-oriented, meeting vulnerable groups' demand, and creating environmental friendly lifestyles.

Key words: Product design; Nature-oriented; Sustainable development

1 Introduction

As we all know, human survival and development depend on nature. We enjoy resources, space of the nature, and the service function of this sustainable system. At the same time, the emissions of waste are thrown to the environment, which affect the structure, function and evolution of natural process. In the past, we set us apart from the food chain of the nature, and even worse, we broke the balance of nature. Many species are slowly disappearing because of human destruction. In 1962, an American biologist Rachel Carson published the "SILENT SPRING", in which he vividly described the mass destruction caused by using a large amount of chemical fertilizer, pesticide, and insecticide with the shocking cases. Facing the current development situation, this paper tries to explain the features of product design from the idea of sustainable development, and further explores the basic concept of sustainable product design from the ideological level to serving as the guidelines of action for sustainable product research and development.

Ecological imbalances and environmental degradation aroused the academe's notice. In 2007, Salah EI-Haggag presented a series of measures and methods for the establishment of ecological industry and the implementation of the sustainable development in his works. The famous "7R" rules are taken by various countries and enterprises as the principles of sustainable development. Liu Xin clarified the misconception of "green" by using the case study in The Notion, Evolution and Practices of Sustainable Design, and he researched the role of designers in the social transformation era. Han Linfei described the principles and works of William McDonough in Cradle to Cradle: a New Phase of Sustainable Development Protocol. Great progress has been made in this field. Researchers only analyzed the aspects of definition, method and evaluation of sustainable product design. However, the core concepts of sustainable product design were rarely mentioned. Then, we shall focus on summing up the main ideas of sustainable product design based on the former researchers.

2 Concepts of Product Design with Sustainable Development

Sustainable product design is considered to be the efficient utilization of energy, the provision of alternative products and the resource conservation and recycling. So people make concerted efforts to promote the green consumption and green products. However, the traditional view maintains that the green product design of sustainable development is only to focus on product performance and cost saving, which is clearly not enough. And the products designed to promote sustainable development need to be redefined, or in simple words, it is an extension for today's environmental design principle. Sustainable product design should meet the safety needs of human spirit and survival security, in order to ensure long-term security and steadiness of social, spiritual, and intellectual development. Sustainable design is related to people's daily life and work, and to everyone's safety and health. Product design should abandon rigid shape and the gesture of conquering all, and then pay more attention to nature and the human way of life. Product design ideas should meet the requirements of sustainable development of society responsibility, making up the damage caused by human industrialization development, and affecting the development of the design industry with new ideas.

2.1 Being Nature-oriented

The nature evolution itself is a sustainable process from cradle to cradle. For example, the fallen

leaves return to the ground to ensure the plants get nutrients through the harsh winter. We know that a healthy sustainable system has a perfect food chain and a nutrition level. But in cities, we clean the leaves in a city park to make the city clean and tidy, which actually cuts off nature's closed loop system. So, following the laws of nature is the key of sustainable product design. However, in the current design community, "people-oriented" design is almost dominant. The "People-oriented" principle is originated from the ideas of western philosophy, especially since the dichotomy of subject-object of Descartes. It says that everything in nature is to serve the interests of people; people are the center of everything in the universe and nature, thus resulting in some "linear design" concept in western industrial civilization. The American William MacDonal and Germany Michael Bulangjiate are co-author of the book "from the cradle to cradle", in which they point out, the idea of modern industry design is from cradle to grave. The mode of thinking is linear, which only cares about the product and handing out to consumers, without considering other things. It is these ideas that make the artificial environment of modern civilization create confrontation of man with nature, with cold reason and possession pushing the humane into the most remote corners.

In the East, one of the important features of Chinese traditional culture is its emphasis on harmony and unity of human and nature. Ancient people believed that people live in nature, so human activities and emotion should be regarded as part of the nature, which determines the creation of human should follow the law of nature and have a stable relationship with nature and society, so as to achieve the harmony between man and nature. In "Kao Gong Ji", it proposed "right place, right time, beautiful material, exquisite handwork". The meaning is to conform to the nature of the universe which exists in all things, to imitate the universe order and regularity, and to conform to the characteristics of material itself. So the products can be excellent. Chinese traditional utensils pursue unification of function and form, material and technology, perceptual and rational standard and finally the harmony of the universe and the people. Laozi's philosophy of "imitation of nature", "Men are the integral part of the nature" and Dong Zhongshu's Chunqiu Fanlu" of "combination of heaven with man into one" show the profound theoretical basis. The design concept of harmony between man and nature is to emphasize the balance of natural environment and symbiosis. It demands that people should think from the overall perspective, from the view of sustainable development, so as to reach the harmony and unity of the act of creation of nature and people. At present, many designers creatively improve the product packaging, and use decomposed paper as packing material, which not only meet the functional requirements, but also make people feel visual and tactile warm. It is learning from the ancient people's wisdom. Nature-oriented design has a strong oriental characteristic. The sustainable development needs the recovering of one's original simplicity, thereby forming a new concept of design trend.

2.2 Meeting vulnerable groups' demand

Sustainable design also means paying attention to the vulnerable groups. The American designing theorist Victor Papanek proposed in his Design for the Real World, the designer's natural and social responsibility. The three major ethical problems of design are put forward in Papanek's works: first, it should be designed to serve the public, especially for the people of the third world. Second, the design should not only work for the ordinary people but also for the disabled people. Third, the design should pay attention to the limited resources. Sustainable design is the reflection of a designer's most noble occupation morality, which not only limited in product design, marketing as well as product satisfaction. With the development of the types of products, designers have made a corresponding scheme for different groups of people. Many products are designed for vulnerable groups. For example, Zhenwei You's B-Touch mobile phone is to let people with visual impairments use mobile phone communication easily. The conceptive B-Touch mobile phone uses a special touch screen with the new Braille technology. It can be text into Braille, which is very convenient to use for the blind. It includes speech recognition, navigation system, scanner, text reading and other functions. Blind people can use the mobile phone like ordinary people. This model can provide greater convenience and possibility for the blind's learning and reading. Due to physical aging, blurred vision, action

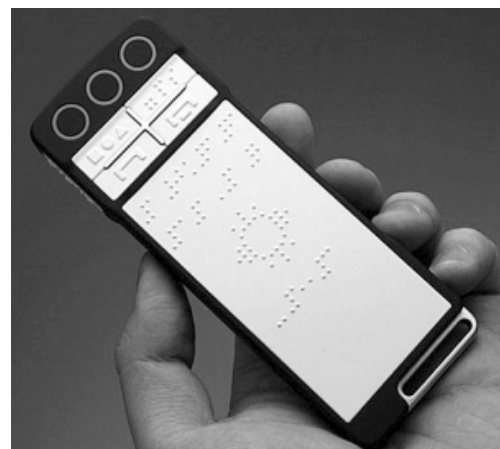


Figure 1 B-Touch mobile

inconvenience, hearing loss, memory deterioration, the design for the elderly is focused on these issues. The elderly mobile phone is with large font, large buttons and large volume, which help the elderly to accurately find the location and easier access to information. The designers not only designed for old people to use mobile phone, but also showed care to vulnerable groups. For example, the lighting lamp function provides convenience for the elderly to walk at night. In fact, this functionality is common in all intelligent mobile phone. Such as sending a text message for help, it can be the fastest and most effective rescue in emergency for the elderly.

In developing countries, especially in Africa, there are at least 1/3 people who can't obtain guarantee of safe drinking water, and their healths are greatly threatened. Every year, there are 4 billion of diarrhea cases, and 2.5 million people will finally die. Based on this serious environmental situation, designers make use of design of solar water disinfection to provide African people with the most economical and practical solution. One side of the solar kettle is transparent, so that the UV ray and infrared ray can enter; another side is of aluminous color, so as to enhance reflection and temperature. This low-cost kettle can contain 4L water with high-ratio thickness; its flat appearance is convenient for storage, and its handle can let people easily adjust the angle to obtain the maximum solar illumination area. Besides, the design as concise and practical as solar kettle is "Life Straw", which consists of a plastic pipe with a length of 25cm and a diameter of 29mm, with 7 kinds of filters contained. Firstly, two layers of mesh-made filters with a diameter of 6 μ m are used to filter the dirt, and then the iodinated resin is used to kill 99.3% of bacteria and virus, and finally the activated carbon is used to catch bacteria and virus residual on mesh, thus the impurity in water can be filtered and the water quality can be also guaranteed. It is of great significance for human being's sustainable development to pay attention to vulnerable group's survival and development; if the vulnerable group can't guarantee their own life, they will also be unable to be responsible to their descendant. We can solve the problems related to vulnerable group only through excellent and economical product design, and then can help society to realize overall sustainable development rather than few people's sustainable development.

2.3 Creating environmental friendly lifestyles

The unreasonable human life habits led to the rapid deterioration of the environment. It also allows people to depend on the living habits to make a greater range of pollution. Faced with this situation, designers must persuade the public to select a kind of sustainable behavior. The product designed by designers can improve the sales performance of enterprise they serve, and finally form enterprise culture with obvious characteristics and win consumers' affirmation and trust. The role what the designer plays in social sustainable development is not only limited to create "sustainable product", but also to encourage people to adopt wide sustainable life style through product design. Take the car as an example, firstly, someone invents and designs the car, and then someone starts to use car and gets used to it; finally, a series of serious problems, such as urban congestion, noise, exhaust pollution, energy depletion, and climate warming, appear. As for designers, those problems must be unforeseeable at the beginning of design; therefore, the sustainable design requires a life-cycle forecast evaluation on products.

To begin with, it is application of energy-saving and environmental-friendly materials; the new energy technology such as storage battery and fuel cell will make car thoroughly get rid of the dependence on petroleum; besides, the high-quality alternative fuel is also good for optimizing overall environmental performance of vehicle. The application of environment-friendly materials can provide more new means of transportation, such as small-size electric bus, and large-size bus driven by hybrid power or fuel cell. Besides, a set of complete and innovative smart vehicles with environmental-friendly power concept can realize the perfect combination of driving and environment protection through easy and excellent environmental-friendly power solution; the car body is made from light and high-toughness materials, thus it can be said the model of sustainable car design. In order to encourage consumers, MOTO company gives away free desk calendar with environmental protection knowledge and preferential card to purchase original accessories of MOTO to consumers who throw e-waste to appointed recovery point. After cultivating the consumer's habit in environmental protection and collecting those e-wastes, Fortune Group Nanjing Jinze Metallic Material Co., Ltd. will make use of high-tech means to carry out uniform decomposition processing and thoroughly realize harmlessness and recycling of resources. As for the used batteries-driven clock brought by Taiwan Bor-Ru Huang, the ruling on clock face is designed as 12 battery jars; the used AA batteries are put in the battery jars, and then the pointer can rotate through series connection of used batteries; therefore, the remaining power of used battery can be thoroughly consumed and the used battery of different colors can also make clock become lovely and interesting. The average amount of tooth-brush discarded every day in the world is more than 60 million, which results in serious environmental pollution and resource waste. The

environmental-protection tooth-brush designed by Cai Jinbo can be freely assembled and disassembled through handle and broom head of tooth-brush; if we use such tooth-brush, we needn't abandon whole tooth-brush due to change of broom head. The printer designed by designer Hoyoung Lee can make use of the used pencil stub as source of raw materials for ink printing; after the pencil stub is inserted into printer, the printer can automatically separate the wood from refill of pencil, and then adopt the refill as ink of printer. This concept creatively solves waste of printing paper and recycling of waste pencil; if it is widely accepted by people; more resources will be saved for the society. The sustainable design not only needs to re-design our living habit and manners, but also can arouse people's consciousness in the later sustainable development.

3 Conclusions

About serious shortage of human resources and the worsening environment, the concept of sustainable product design provides a new way for industrial design. People need to gradually change the past people-oriented design idea, and to turn it to the sustainable law in ancient China. The absorption of "harmony between man and nature" into ecological wisdom is used in modern design, to achieve harmony between man and nature. Serving the vulnerable groups is also the concept of sustainable product design. The vulnerable groups can be fully cared, which is also related to humans' sustainable development. Designers need to create a viable solution for vulnerable groups, to achieve common humanity's sustainable development; and sustainable product design is also providing more environmental friendly lifestyles for human, persuading people to develop energy-saving habits. The unreasonable human life habits led to the rapid deterioration of the environment. It also allows people to depend on the living habits to make a greater range of pollution. Designers are not only limited to the design of "sustainable" products. They must create more environmental friendly lifestyles for people. With outstanding product design, they can also encourage people to join the action in sustainable development.

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A Study on the Development and Reform of Sustainable Design

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Abstract: The paper based on the review of the development of sustainable design. It experienced from green design to ecological design, which described how contemporary environment and current design thought responded to the issues of sustainable development. And it aims at the central concepts for further interpretation and discussion. Sustainable design involved from a single solution to the life cycles of consideration, finally forming a breakthrough innovation. It transcends green design and ecological design, which balances the development of environment, social and economic three aspects. Sustainable design has been further developed and perfected. The innovative point of this article depends on the combination of concept discrimination and a large number of the latest foreign case analysis, also the analysis of sustainable development mode.

Key words: Green design; Ecological design; Sustainable design; Corporate social responsibility

1 Introduction

Sustainable development has become a topic of environment and humanism. While the “sustainable design” is no longer a new term, that becomes the focus of nation and design industry. Design as a vane guiding people’s living philosophy, which intervenes and promotes sustainable change. Because it has significant chain reaction of economic, environmental and social, thus it plays a key role in the process of solving all kinds of sustainable issues. Design accelerates product, processing, and service dematerialization. More importantly, design changes our attitudes and behavior. Therefore, the design is a key element to improve contemporary level of sustainable development. Currently, under the premise of advocating environmental protection and taking sustainable development as the goal of building a harmonious society, the green design, the ecological design, and the sustainable design are particularly important.

2 The Concept of Sustainable Development

2.1 The concept of sustainability

"Sustainability" refers to the ability of sustainable that persists with time. Its special meaning has been widely used and referred to the ecological life. The contemporary popular concept of sustainable development is “Brundtland definition”, which both meets the needs of contemporary people without compromising the ability of future generations to meet their needs. This means, sustainable development is no longer Utopian. We have the ability to maintain the economic growth and prosperity of modern way of life, as well as to protect earth and ecosystem. Therefore, the essence of sustainable development is creating environmental and social conditions for earth enduring system, so that can benefits mankind. It clearly indicates the absolute dependence of human on earth enduring system.

The document of 2005 UN World Summit pointed out three pillars of sustainable development that are human (social), earth (environment), profits (economic). It constitutes a sustainable development mode. (As shown in Figure 1) The pattern shows that economy is social sub-set, because all the components of human economy depend on the participation of people. However, society does not equate with economy, in turn it is a sub-set of environment. Because our needs (e.g. air, food and water), energy, raw materials of house, traffic and daily necessities are all from the biosphere.

This sustainable development mode admits the limitation of nature, society and the established system that we rely on. Economy depends on social health, and social health depends on the health of biosphere vice versa. This model emphasizes the status of three pillars are equally important, and need to be solved at the same time. Any one of them are being neglected will break the balance. The sustainable development is regarded as the leading myth of modern industrial society by Stewart Walker. He said the concept of sustainable development is our common cultural value remodeling, while it has been gradually forgotten by the rapid development of modern industrial society. So the concept of "sustainability" has the contemporary cultural value, which indicates the importance of our common concerns and views.

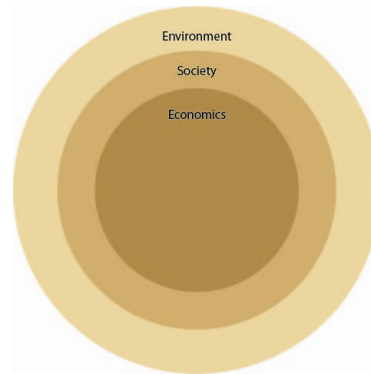


Figure 1 Sustainable Development Mode

2.2 The development of sustainable design

The concept of "Sustainable design" is very inclusive, and its essence is to carry out the concept of sustainable development by any means through design practice, design education and design research. On one hand, it has a close connection with the concepts of "green design" and "ecological design". On the other hand, it has its own characteristics. Specifically, sustainable design is different from simple material output design, which is through the integration of products and services to build sustainable solutions to meet consumer demand. Sustainable design reduces resource waste and environmental pollution by using "result" and "benefit" to replace the consumption of material goods, in order to change people' quality of life as the ultimate goal of a strategic design activities. In short, sustainable design is a kind of design strategy of constructing and developing sustainable solutions, which is a balanced consideration of economic, environmental, ethical and social issues. With rethinking design to guide and meet consumer demands, as well as continue to maintain the demands.

Therefore, sustainable design is not simply emphasizes environment protection, but also considers both needs of users, environmental benefits and the development strategy of enterprise. In this context, design as a service industry in the past and now has taken more and more social responsibilities and obligations. The fields which have been covered by design continue to spread.

The development of sustainable design (Or sustainability, sometimes it is abbreviated "DfS") experienced from green design to ecological design, which described how contemporary environment and current design thought responded to the issues of sustainable development. There are subtle differences between them and are often used interchangeably. It shows that about environmental and social design are more and more mature. Moreover, to perceive the relationship between design and sustainable it necessary to understand the development of sustainable design first. This will helps us to comprehend its connotation and spirit.

3 Green Designs

3.1 Green design: the solution of single problem

In early 1990s, the emergence of green design concept means the design began to focus on the single issue or some aspects of ecological effects, such as material and energy consumption. Green design emphasizes the use of materials and energy of low environmental impact. Include of the waste hierarchy management that we often refer to. It is called "3R" principle (reduce, recycle, reuse), reducing material and energy consumption, reclaiming products and components, recycling and reusing for future. The model effectively demonstrates that to deal with waste according to the priority order and using different strategies. Many designers take the approach that using recyclable materials to show the design consideration of environmental problems. They use recyclable polymer instead of raw materials, which tends to be the simplest and efficient approach to solve the environmental impact by design. Also it cannot affect or obviously change the performance and appearance of a product. "Green design" brings the environmental issues into design thinking as basic elements for the first time, which enormously improves the social value of design.

3.2 UK Remarkable Pencil Ltd

One example as UK Remarkable Pencil Ltd, they use recycled polystyrene vending-cups for their design and production. The company has continued to produce every kind of recyclable stationeries for consumers. Its products are almost manufactured in the UK that some of the materials are from UK's recycling waste, some are authorized by the forestry management committee, and some are from organic

materials. In short the method of green design is to use an existing material replace another kind of material.

4 Ecological Designs

4.1 Ecological design: life cycle considerations

Ecological design is not only considers ecological impact of product, but also considers the entire product life cycle from final result to each stage of process. So it can be regarded as the “process of intervention”. Ecological design puts environment considerations and design practice together. Considering the entire product life cycle can ensure designers’ awareness of connection between environment issues and design result. So that designers would try to minimize the overall negative influence of environment. If design results do not have much negative impact on environment, then designers need to consider the possible effects that the whole life cycle of product could have. This means that designers must consider how to deal the relationship with environment in the whole life cycle of product process. (e.g. material selection, production, manufacture, use, metabolism) Specifically, ecological design requires all stages of product development (from raw materials acquisition, production, use, to final disposal) to consider environmental factors. As well as transition time between these stages also should be taken into the consideration. As Philip Goggin said, ecological design emphasizes all stages of product development, at the same time, function, quality, appearance also have to reach the standard level.

4.2 LCA (Life Cycle Assessment)

The product life cycle evaluation LCA (Life Cycle Assessment) is an important measurement of ecological design. It uses the system method and quantitative index to guide and standardize the design process. Life cycle assessment tool makes the contrast of environmental effects of product life cycle between different stages are possible. LCA becomes a key element of national environmental policy. It is divided into “the complete life cycle assessment tool” and “simple life cycle assessment tool”. The complete LCA tool combines with users’ feedback that can provide valuable suggestions for designers, and increases the credibility of environmental protection products. For the simple LCA tool which designers can easily understand and identify the biggest environment impact of design. Especially it gives a rapid evaluation which helps product redesign.

4.3 “From the Cradle to Cradle”

In discussion of ecological design, our minds should be developed along with the development of environment and society. Design can be seen as the gradual transformation from ecological efficiency to ecological benefit. For example, “From the cradle to cradle” is the paradigm of design and production activities that complete the shift from ecological efficiency to ecological benefits. The scheme was first published in Michael Braungart and William McDonald's book “Cradle to Cradle: Remaking the Way We Make Things” 2002. This book provides a theoretical basis for materials cycle management, which distinguishes natural material (biological nutrients) and synthetic materials (artificial nutrition). It conduces to recovery and reuse of materials. “From the cradle to cradle” focuses on material cycling and pays more attention to environmental factors of design and production. Therefore this book has a far-reaching influence on many designers. Another example is Herman Miller Ltd which is a global manufacturer of office furniture. The company considers ergonomic and the concept of environmental protection that are perfectly merged into their design. It reflects the concept of material circulation of “From the cradle to cradle”, so its materials are always closed circulation. Maintaining the materials closed-loop system can both maximize the use of materials and avoid damage of ecological system. Their ergonomic chair design's 42% materials are renewable, and 95% materials are recyclable at end of its life. And if 24 hours uninterrupted use this chair's lifetime could be 12 years.

5 Sustainable Designs: Breakthrough Innovation

From single solutions of green design to environmental life cycle consideration of ecological design, and now to the sustainable design which adds the social impact of production and consumption. Our mode of thinking has been completed from sustainable development of product service system to the exploration of new way of life. In addition design intervention that guides citizen (not just consumers) to take a more sustainable development path. Sustainable design transcends green design and ecological design, which balances the development of environment, social and economic three aspects. The new content of sustainable design involves the sustainable development of local culture, also the respect for culture and species diversity, attention to vulnerable groups, and the promotion of

sustainable consumption patterns etc. Here, sustainable design has been further developed and perfected, that from a single commercial behavior around the material sphere to focus on social harmony, public spiritual and the development of emotional world by the impact of globalization. Sustainable design creates ecological, economic and cultural conditions for design, which brings infinite happiness to mankind.

6 Corporate Social Responsibilities and Sustainable Design

6.1 Corporate social responsibilities

The subject of sustainable development has been changed the roles and responsibilities of designers. Similarly, enterprises are also more and more concern about sustainable design. For large multinationals, sustainability has become guarantee of their future economic growth, as well as to ensure to build new market for their products. Such as the business leaders from DuPont, Johnson, Procter & Gamble and Toyota have been changed their convention of environmental responsibility from past. And they treat sustainability as the first element for growth, opportunities and influence of enterprise now. Corporations undertake corporate social responsibility management according to the sustainable principles that is regarded as rebuilding trust in business. Taking the corporate social responsibility management is not only pay attention to problems, but also to understand the relationship with staff, more extensive human rights, environmental protection, social responsibility and supplier, and take these as the core of enterprise value. Many companies begin to accept the principle of corporate social responsibility in order to upgrade their statues in market place. In these cases, design plays an important role that transforms corporate social responsibility into action. This means that only to consider the environmental and social influence of products, service and system are not enough. There are many problems enterprises have to solve, for example to solve social inclusion, health, education and crime problems by applying design thinking. Thus design can more equitably and efficiently deliver products, services, achievements and corporate values.

6.2 “Interface”

“Interface” is a global ground decoration and carpet manufacturer. Since the nineteen nineties, the company has been the leader of global sustainable development. And it sets up the goal of zero ecological footprints in 2020. The goal runs through every event and every department. To complete this target, “Interface” from seven directions towards sustainable development: towards zero waste endeavor; harmless emissions; use of renewable energy; to advocate the closed-loop recycling and transform waste into “food” by imitating nature; to ensure adequate resources; to create enterprise ecosystem with cooperative principle; accurate assessment of cost, and making the actual price. Moreover it has been the leader in commercial ceramic tile floor rental business, which carpet is as a service rather than a product for sale. The precondition of customers using Interface products is to guarantee the company’s ownership. This forms a new relationship between products distribution, payment system, and company with its customers. Lease model refers to the company investment of carpet technology innovation which makes carpet effectively recycling and remanufacturing at the end of life cycle. This kind of mode gives customers more flexibility and reduces the number of products which allows manufacturer have the ownership of products in its whole life cycle, thereby to optimize it. “Interface” leasing model is a typical example of product service system (PSS). Manufacturers reconsider the product marketing mode by using product service system. It breaks the usage that “the measure of a successful business usually see how many products have been sold”. The profit of Interface is to provide extra services instead of selling products. This indicates that sustainable design can reduce the negative environment impact at the same time to create economic value.

7 Conclusions

To sum up, sustainability is relate to survival and development of mankind, and it is an inevitable trend of development. We have to carry on the concept of sustainable development and using design to influence and change the irrational mode of existence, as well as to guide people' activities, thus to achieve sustainable development of people and the environment. "Sustainable design" is not only deal with single problem, but also actively advocates rational pattern of production and consumption. It seeks for approaches to create more suitable way of life for people. The creation takes account of a kind of economic development, environmental protection, social harmony, cultural heritage and sustainable way.

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Study on the Sustainable Development of Wudang Wushu Cultural Tourism*

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Abstract: Wushu, as one of the important carrier of Chinese traditional culture, which is a system integrating with body-building, entertainment, value of view, athletics, rich spiritual and cultural life and sentiment edification etc. In recent years, Wudang wushu, as the leader of new spots, has gradually received extensive attention from domestic and foreign tourists. By using the method of literature analysis, expert interview, on-the-spot inspection and mathematical statistics, this article makes relevant research on the theory and practice of the tourism development of Wudang Wushu. Combining with the theory of location, tourism bearing capacity theory and the view of sustainable development, the author constructs the overall goal and strategic steps of the tourism development of the Wudang Wushu, and then puts forward the development strategy according to the current study.

Key words: Wudang Wushu Culture; Wushu Cultural Tourism; Development Strategy

1 Introduction

With the rapid development of the economy and the improvement of people's living standards, people's consumption concepts and the life values are in dynamic changes. The traditional tourism products can not meet the ever-changing travel needs because people have been in pursuit of personalized special, interesting and good for health tourism consumption. With the deep exploitation of the tourism industry, urban residents have got the substantial development in the aspect of recreational sports. Fitness as the main purpose of the sports tourism also becomes the latest must-haves in the market, in particular, traveling with a strong Chinese cultural characteristic—wushu, which contributes to the healthy and rapid development of the Chinese wushu tourism industry. With the characteristics of green environmental protection, low energy consumption, high return and the sustainable development, wushu is favored by the domestic and foreign tourists. With the efforts of Chinese Wushu Association and Shiyan organizations at all levels and the scholars, the cultural excavation and arrangement work of Wudang wushu has made gratifying achievements. However, compared with the long history and the deep connotation of the wushu culture, it is still far beyond the aspects from exploitation, scientific research, development, protection and promotion etc. Therefore, the author tries to provide theoretical reference for wushu tourism industry, and at the same time, also hopes that it can make a contribution to the inheritance and development of the wushu culture.

2 The Connotation of Wudang Wushu Cultural Tourism

Chinese wushu has a long history and also a profundity for its variety, which is regarded as an important element of the intangible cultural legacy of the Chinese nation. It is the treasure and the quintessence of the traditional sports in our country. Wudang wushu culture refers to the traditional Chinese wushu culture and regional culture in the process of mutual reaction, centered within Wudang Mountain, represented by Zhang Sanfeng of the imperial Wudang boxers on exploring the way of Wudang wushu to create the material wealth and spiritual wealth. Wushu culture as one of the most national characteristics of Chinese traditional culture, the questions of its inheritance and development have been received great attention, and the effective ways of long-term unremitting exploration to solve these problems are undergoing. Wushu has found its own development and an effective way, namely to marriage with tourism, resulting in a sunrise industry—the wushu cultural tourism. Under the condition of cultural tourism in Wudang Mountain tourism, the Wudang wushu tourism is to experience China's Wudang wushu culture as the main content, and feel the Wudang Taoist cultural resources in natural

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landscapes, which is a kind of social-cultural activity embodying the characteristics of leisure, entertainment, health, knowledge, stimulation etc. Displaying of Wudang wushu cultural tourism has become a new luminescent spot of sports tourism, which has promoted the spread of Chinese wushu all over the world. From the following table, it can be seen that since 1995, the annual reception of Wudang Mountain visitors is around 300000, and other famous mountains of tourist reception is more than 1.5 million people on average, the total number of tourists and tourism revenue have a larger gap.

Table 1 The Annual Reception Of mountain Scenic Spots Visitors And Tourism Revenue

	1995	1996	1997	1998	1999	2000
Wudang Mountain	30.6/2.5	23/2.8	25/3.2	26/4	34.7/4.5	33/4.2
Mount Huangshan	269/8	320/10	400/11	4.9/12	465/14	430/12
Mount Emei	138/2.42	170/3.6	1.9/3.12	120/3.5	160/5	110/4
Taishan	380/14	378/15	350/15	400/16.8	428/17	449/19
Songshan	150/1.5	120/2	93.6/22	110/3	150/3.5	200/5
Mount Wutai	53/1.3	60/1.5	68/4.6	75/1.8	75/3.5	100/4
Laoshan	58/1.6	70/2.8	100/2.8	110/69	120/3	200/6.5

Unit: ten thousand/ billion yuan

3 Research on the Sustainable Development of Wudang Wushu Cultural Tourism

3.1 The general idea of Wudang wushu cultural tourism development

The development strategy of Wudang wushu cultural tourism is a multi-level and diversity system. The embodiment of the diversification, continuity, stability and long-term effect should be touched upon in its development planning. To fully tap the Wudang wushu cultural tourism resources to transform the development pattern from the resources oriented to the market oriented, that is the market—resources—products—market. Therefore, we must plan well when planning the strategic objectives. Firstly, adjust measures to local conditions and outburst features to ensure the novelty of wushu cultural tourism. Secondly, pay attention to the harmony between human and nature to highlight the integrity of wushu cultural tourism. Thirdly, plan as a whole, support facilities in place, and avoid a down-market to embody the hierarchy of wushu cultural tourism. Fourthly, make a good management of planning and development control to highlight the raw ingredient of wushu cultural tourism.

3.2 Study on the development mode of Wudang wushu cultural tourism

3.2.1 Project-oriented development mode

It is targeted at a specific kind of wushu products, and makes the wushu tourism resources to have a dominant position in attracting tourists. Hence the destination of the tourist is purely attracted by the tourism resources. Wudang Mountain with its rich resources of wushu, can try on this kind of development mode. The World Traditional Wushu Festival is the first traditional wushu competition in the world organized by the International Wushu Federation and the Chinese Wushu Association Organization. It is also one of the biggest wushu activities in the current wushu circles. The event is held completely out of administrative management mode under the planned economy system, through the market leading, which advocates the use of wushu's own cultural values to conduct a series of commercial operations. Both of the 3rd and the 4th World Traditional Wushu Festival were held in Wudang Mountain, among them, there were nearly 2000 athletes from 69 countries and regions during the 3rd World Traditional Wushu Festival. After the fierce competition, 307 gold medals were shared.

3.2.2 Multivariate combination development mode

The mode refers that the wushu tourism and other forms of tourism resources are relatively connected, through mutual integration, making wushu tourism resources do not have the dominant position so that it can achieve the cooperative development and a win-win situation. Wudang Mountain is one of the famous mountains in China, among the mountain scenic spots, Wudang Mountain is regarded as the top one of the five mountains. Wudang Mountain is famous at home and abroad for its spectacular natural scenery, ancient buildings and traditional Taoist culture. With the magnificent, precipice, peaceful peculiar and beautiful characteristics, it can be called the Spirit Mountain. Wudang Mountain has an area of eight hundred, including 72 peaks, 36 rocks, 24 streams, 8 holes, 3 lakes, 9 spring ponds and 10 hole stones, which form the gorgeous natural

landscape. Wudang Temple was built in Tang Dynasty, prospered in Ming Dynasty. During Emperor YongLe ruled in the Ming Dynasty, there are three thousand of craftsmen spending quantities of taxation collected from nine provinces, which lasted 13 years, built 33 ancient building groups with a area of 1600000 square meters, became the supreme “Royal Ancestral Temple” and the Taoist activities center. Wudang Temple was designed and made along with the Palace Museum, which showed the superb ancient architectural craftsmanship and the ingenious structural layout. It has been hailed as “Palace of Hanging on the Cliffs”, “Museum of Ancient Chinese Architectural Achievement”. In 1994, Wudang Mountain ancient building groups have been approved World Cultural Legacy by UNESCO.

3.2.3 Experience-oriented development mode

Experience-oriented development mode is that Wudang wushu tourism is in a subordinate position when traveling, which is different from the project-oriented development mode. When the tourists arrive at the destination, at the same time, they can be attached to wushu tourism. Wudang Mountain was listed in the first batch of National Key Scenic Spots in 1982 by the State Council. In 2000, it was awarded the “National Civilized Scenic Area”. In 2001, it was awarded the “4A Grade National Tourist Attraction” and “Demonstration Site of National Civilized Scenic Area”. Every year, there are more than 200 visitors coming to Wudang Mountain to enjoy the natural beauty and the leisure time. While traveling, they can be attached to the wushu tourism.

Table 2 Wudang Wushu Cultural Tourism Development Mode List

Development Mode	Dominant Ideology	Development Measures	Development Means
Project-oriented development mode	Highlight the features, and build the brand of tourism project.	Develop a series of tours which are available for participation, such as wushu festival, wushu competition, wushu museum, etc.	Given priority to the experience of wushu activities. Pay attention to visual effect, and attach great importance to the subjective feeling of tourists.
Multivariate combination development mode	Integrate resources, and develop coordinately.	Combine with the ecological tourism, cultural tourism and other tourism forms to develop a new kind of new wushu tourism products.	Sightseeing while participate in the activities of wushu.
Experience-oriented development mode	Make clear of the major and minor elements, and expand the scale of the scenic spot fully.	Enlarge the scale of scenic spots, and exploit the depth connection between sports and tourism.	Given priority to sightseeing, and the additional part is to participate in the activities of wushu, watch wushu performance, and have some knowledge about wushu.

3.3 Study on the design of Wudang wushu cultural tourism products

3.3.1 Sightseeing tourism product

The product is mainly refers to the tourists who are far away from the local, watching wushu activities, wushu culture relic buildings and wushu venues. Various wushu experiences processed with different characteristics can meet the appreciating demand of tourists such as watching wushu competition, performance of wushu by the masters, martial arts drama, etc. The 2010 Wudang International Wushu Festival was held in Wudang Mountain. Thousands of athletes of 62 teams from about a dozen countries and regions, including the United States, Russia, Philippines, Iran, Indonesia, and China gathered in Wudang. Apart from the players, there are a large number of visitors to Wudang Mountain to watch the game, and this kind of products belongs to the sightseeing tourism product.

3.3.2 Experiential tourism product

Experiential tourism product refers to the tourists in the process of tourism are the direct participants of wushu sports, and the tourists' experiences are strongly required in this product. For example, when the tourists come to visit Yongnian, they can participate in practicing Yongnian Taiji boxing to experience the loose, soft and the smoothness of Taiji. Also they can have a better understanding of the connotation of this kind of movement. The characteristics of Taiji boxing are

flexibility and slowness, softness with hardness hiding in. Such a movement is a natural and elegant, and can be felt by the rhythm of the music, philosophical connotation, beautiful shape, mood of the poem. In the higher level of enjoyment, it can eradicate disease, make physical and mental healthy. In addition, tourism factors like food, accommodation, traveling, shopping, entertainment, etc should be combined to wushu tourism activities.

3.3.3 Tourism product of commodity

Tourism product of commodity is mainly developed with the Wudang wushu, including a “Wudang”, “Taiji” word or pattern of clothing, wushu equipment, Wudang amulets, Wudang health pillows, Wudang swords, Wudang special stamps, Wudang crutches, Wudang cultural relic replicas (all kinds of Founder Gods made of coppers, Tai Shang Lao Jun, the God of Wealth, Guanyin, Patriarch of Sanfeng, etc.), treasure of home-guarding script and so on. With local characteristics, this kind of tourism products is not only benefit for the sightseeing but also avail to enable tourists to participate in production.

4 Sustainable Strategy of the Development of Wudang Wushu Cultural Tourism

4.1 Strengthen the area reasonably and establish the win-win mechanism

In today's competitive market conditions, win-win cooperation has become the common understanding of competitive parties. We should follow the trend to actively participate in the fair, active competition, and at the same time to strengthen equality, sincerity, with an open and confident attitude to face the competition and cooperation. Wuhan city and other Hubei local government should abandon the narrow regional development view and local protectionism, realizing that it is not realistic to try to entirely build a complete sports tourism industry system in a narrow region. Because some of the sports tourism enterprises (travel agency) have the characteristics of cross-regional cooperation, regional competitions also need cooperation to participate in the sports division of work and cooperation in the tourism value chain. Therefore, regional sports tourism management department (Tourism Administration and Sports Bureau) should set up the correct view of competition, recognizing whether to adopt the cooperative strategy or the competitive strategy are in order to obtain a broader range of competitive advantage.

4.2 Enhance the brand image and competitiveness of Wudang Mountain tourism products

Tourism brand image is to establish a permanent, stable brand for the tourist areas, which not only helps consumers build consumer preference, but also favors the effective implementation of tourism marketing tools, promoting the formation of tourism brand assets. Wudang Mountain must take the road of brand management, implement brand management strategy, create brand image, and establish its own brand personality with a clear brand positioning. Currently we must rely on the three characteristics of resources, that is Wudang wushu, Taoism culture, the ancient building groups, focusing on the construction and the development of a number of tourism projects with the outstanding brand image, the strong local characteristics, deep cultural connotation, high technology and high return, which can meet the various needs of the tourists from at home and abroad By enriching the types of Wudang Mountain tourism products and improving the quality and level of tourism products to seek individual development, constantly enhance the attractiveness and competitiveness of tourism products in Wudang Mountain.

4.3 Increase the publicity of Wudang wushu cultural tourism

Though Wudang wushu tourism has a good prospect, most tourists still have little knowledge about it. At present, the Wudang wushu tourism consumption market has a large number of potential tourists, whom don't know much about this kind of tourism products, they still have a wait-and-see attitude towards it. Therefore, various channels need to be carried out to publicize wushu to stimulate the demand, such as three-dimensional marketing activities, the use of sports media, entertainment media, tourism exhibitions, news, advertising, sports tourism websites etc. It can turn the potential tourists into the reality tourists, thus increasing tourism consumption.

5 Conclusion

Wushu tourism is a kind of cultural tourism project in the domestic emerging in recent years. Wudang wushu tourism resources are abundant, but the present development situation is not optimistic. The system of wushu tourism is still blank, and the development consciousness is lagging behind. Wushu tourism products are single, the cultural content is insufficient and the touring line is not clear. To break the bottleneck restricting the development of Wudang wushu

tourism, we need to rely on the tourism environment of “one river two mountain” in Hubei Province, accelerating the integration steps of Wudang wushu tourism resources. To create the public opinion environment, humane environment and policy environment which are of benefit to the development of the Wudang wushu tourism industry, meticulously build the brand image of Wudang wushu tourism products, broaden the market, innovate marketing push as soon as possible to establish network operation pattern, vigorously promote tourism informatization and industrialization, increase the innovation of tourism human resources development.

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Research on Low Carbon Performance and Enterprise Value*

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Abstract: In this paper, we apply empirical method to study the relationship between low carbon performance and enterprise value. Then, we put forward three hypotheses. Namely, the relationship between low carbon performance and enterprise value is positive correlation, negative correlation and no significant correlation. In the following, we construct the basic theory model of low carbon performance and enterprise value to deduce the three hypotheses. By choosing 14 classes large energy consumption industries in Shanghai A Share manufacturing industries during 2007-2010, we use 258 effective samples of relative data to verify the theory hypothesis. From the results we can show low carbon performance is the influence factor to enterprise value. What's more, the relationship between low carbon performance and enterprise value is positive correlation. Therefore, we must give full attentions to the environment factors in the development of enterprise.

Key words: Low Carbon Performance; Carbon Intensity; Enterprise Value; Tobin Q; Multiple linear regression model

1 Introduction

Global warming has been a serious threat to the earth ecology and human life. Related studies show that the greenhouse gas is the main factor which causes global warming, and the carbon dioxide emission is the main factor. With the rapid development of Chinese economy, the international energy agency (IEA) preliminary estimates that China has become the world's largest energy consumer and the second largest greenhouse gas emitter. Energy crisis and global warming make China face huge pressure to do energy saving and carbon emission reduction. Therefore, Chinese government made a promise that the carbon intensity of per unit output in 2020 will decrease by 40% ~ 45% compared to 2005. Under the international background of climate problem being a major concern, low carbon economic model which means "low energy consumption, low pollution, low emission and high efficiency" quickly catches the attention of all over the world. For China, the extensive economic growth mode will seriously affect Chinese industrialization process. Thus, the development of low carbon economy will become the inevitable strategic choice to keep a balance between industrialization and environmental energy requirements.

As the raising of people's awareness to the issue of climate change and the deepening of carbon emission reduction issues, the issue of low carbon performance has caused wide attentions of scholars and governments both at home and abroad, and some indicators used for evaluation of low carbon performance have already appeared. Otavio Mielnik and Jose Goldenberg (1999)^[1] proposed the carbonization index measurement, which made evaluation for the carbon emissions of developing countries. B.W Ang (1999)^[2] argued that energy intensity indicators were as important as carbonization index in the study of low carbon economy. What is worth noting, these evaluation indexes reflecting low carbon performance are so one-sided that it is controversial whether it can truly measure the low carbon performance or not. For example, under the framework of total factor production and by using the environmental production technology and directed distance functions, Chinese scholars Qunwei Wang, Dequn Zhou, Peng Zhou (2011) constructed the single performance indicator (only requires to reduce emissions of carbon dioxide) and the comprehensive performance indicator (requires to reduce the carbon dioxide and expand economic output at the same time). As the example of Chinese major industrial provinces, they analyze the carbon dioxide emissions performance and emission reduction potential. Research shows that the overall performance is low and has a degradation trend in the period, annual average potential to reducing carbon and increasing economic output is at about 30%; the potential of carbon intensity is significantly less than the initial carbon intensity, and the orders of some industrial provinces will greatly change under the condition of the two kinds of carbon intensity. Using the standard & poor's 500 companies as the research object, Matsumura and Prakash (2010)^[3] studied

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empirically on the relationship between the carbon emissions and enterprise value, the equity cost of capital, debt capital cost. They found the carbon emissions being negatively related to the enterprise's market value, negatively related to the equity capital cost, and positively related to the cost of debt capital. However, because of different study basics and samples, current research about the relationship between carbon emissions and the enterprise value doesn't have a definite conclusion. Based on this, we study whether low carbon performance could influence enterprise value or not from a new perspective in this article. In this paper, the research expands the related literature about low carbon performance of listed companies.

2 Research Design

2.1 Research hypothesis

Value creation school regards the increasing environmental investment as a competitive advantage and the ways to improve investors' financial returns, the relationship between the market value and the environmental performance is positive correlation. Enterprises improve energy efficiency through energy saving and emission reduction to reduce carbon emissions, which is one aspect of the enterprises to improve their low carbon performance. Some scholars believe that those enterprises which can be responsible for the environment can also achieve social recognition and competitive advantage. The enhancement of low carbon performance is not only to gain the government incentives, but also help to improve the corporation social image and enhance the corporation reputation in the customers. So they are willing to pay more for green products. The application of the new technology reduces the energy consumptions and waste emissions. What's more, it can reduce the environmental management costs. The increasing of low carbon performance can increase enterprises' economic benefits. Hence, this paper put forward hypothesis 1.

Hypothesis 1: There exists a positive correlation between low-carbon performance and enterprise value.

In addition, the pursuit of the enterprise for environmental performance needs to increase the environmental investment. There may be a conflict in the pursuit of business financial goals. Some scholars believe that the environment cost will reduce the marginal profit in some special industry levels, which can made enterprises are often faced with competitive disadvantages. So companies tend to regard the environmental investment as the additional cost of enterprises. If enterprises want to achieve better environmental performance, some additional costs is bound to occur, which may make the enterprise at a disadvantage in the fierce competition. Thus, this paper put forward hypothesis 2.

Hypothesis 2: There exists a negative correlation between low-carbon performance and enterprise value.

The final influence of low-carbon performance on enterprise value depends on the quantitative relationship between income and expenses. Some impacts related to future periods and this effect may not be brought in a short time. In the end, this paper put forward hypothesis 3.

Hypothesis 3: There doesn't exist a significant correlation between low-carbon performance and enterprise value.

2.2 Sample selection and data source

This article's sample data is all from 14 energy consumption sectors of manufacturing industry listed on the Shanghai Stock Exchange, and we elect the top 5 companies of each sector by the listed company's asset size in descending order. In the end, 258 effective samples are established because of partial data loss and other causes.

The relevant financial data of the article's 258 sample enterprises is all from financial statement databases of CSMAR Service Center. Industrial energy consumptions and industrial outputs are from the Yearbook of China Energy Statistics and China Statistics. We use Microsoft Excel software and SPSS16.0 software to process the data.

The intensity of carbon emission is described as carbon emissions of unit GDP, which is used to measure the ratio relationship between the economic outcomes and the corresponding carbon emissions, the formula as following:

$$\text{The intensity of carbon emission} = \text{total carbon emissions} / \text{total industrial output value} \quad (1)$$

According to the emissions calculation guide of United Nations Intergovernmental Panel on Climate Change, the total carbon emissions of above (1) are as following:

$$C = \sum E_i F_i \quad (2)$$

C represents total emissions of carbon ; E_i represents consumptions of i kind energy, expressed in

tons, and the data can be obtained through the Yearbook of China Energy Statistics; F_i represents carbon coefficient of i kind energy, which is energy heating value multiplied by the carbon oxidation factor, basing on the IPCC (2006) <guidelines for national greenhouse gas emissions inventory >. The different coefficients of carbon emissions are shown in table 1.

Table 1 The Different Coefficients of Carbon Emission

Energy Varieties	Coefficients of Carbon Emission (t/t)	Energy Varieties	Coefficients of Carbon Emission (t/t)
Coal	0.7559	Full Oil	0.6185
Coke	0.8550	Liquefied Petroleum Gas	0.5042
Gasoline	0.5538	Natural Gas	0.4483
Kerosene	0.5714	Electric Power	0.6800
Diesel	0.5921	Heating Power	0.2550

2.3 Model and variable definition

According to the research hypothesis, enterprise value is as explained variable, and the carbon intensity of listed companies is as explaining variable, company size, asset-liability ratio, profitability and growth are as controlling variables. Multivariate regression model is as following:

$$ev = \beta_0 + \beta_1 cei + \beta_2 size + \beta_3 lev + \beta_4 roa + \beta_5 grow + \varepsilon \tag{3}$$

All variables are defined as following: (1) measurement for low carbon performance: normally, intensity of carbon emissions and energy efficiency are used as low carbon performance indicators. Considering energy consumptions affect corporate profits as a cost, thus influence enterprise value. The profitability variable has been as one of the factors that affect enterprise value, so intensity of carbon emissions is used to measure low carbon performance. (2) Tobin Q is used to measure the enterprise value. (3) Controlling variables: the natural logarithm of total assets is as company size; the growth rate of total assets is as growth. The two controlling variables measure the value of the enterprise from the dynamic angle. The ratio of asset-liability is as lev; the ratio of asset returns is as roa. The two indicators evaluate financial position and operating results of an enterprise from financial evaluation level.

3 Results

3.1 Correlation analysis

The correlation analysis of main variables is shown in table 2. Correlation results show that the enterprise value and carbon intensity are significantly negative correlation at 5% level. Thus, it explains that the carbon intensity will really affect the value of the enterprise. In addition, the company size, asset-liability ratio, profitability also present positive correlation with enterprise value. Generally, explaining variables will not affect multiple regression analysis as long as the coefficient is between 0.8 and 0.9. So, the relationship of each variable in the regression model will have not serious influence on the regression results.

Table 2 Correlation Test of Variables

	ev	cei	size	lev	roa	grow
	1.000	-.21	.22	.06	.38	.007
	-.21	1.000	.47	.16	.03	-.01
Pearson	.22	.47	1.000	.22	.17	.03
Correlation	.06	.16	.22	1.000	-.28	-.009
	.38	.03	.17	-.28	1.000	.15
	.007	-.01	.03	-.009	.15	1.000

3.2 Description statistics

Table 3 shows the descriptive statistical results of each research variable. In general, the mean value of explained variable enterprise value is 1.47, the maximum value is 4.57 and the minimum value is 0.48. It means there is a big gap in enterprise values of different public companies in different industries based on the selected samples. The mean value of explaining variable intensity of carbon emissions is 0.6662, the minimum value is 0.0518, and the maximum value is 2.98. There is also a big difference in it. The reason may be the difference between industries of the selected samples. For

example, the intensity of carbon emissions of nonmetal mineral products is 2.27 tons per ten thousand yuan in 2007. The intensity of carbon emissions of black metal smelting and rolling processing industry is 2.98 tons per ten thousand yuan, but for communications equipment, computer and other electronic equipment manufacturing industry, it is only 0.0547 tons per ten thousand yuan in 2007. In addition, with the further development of low carbon economy in China, some energy-intensive industries begin to pay more attentions to low carbon economy. As the example of black metal smelting and rolling processing industry, total industrial outputs values are 33703.01, 44727.96, 42636.15, 51833.58 (billion) respectively from 2007 to 2010. Although the gross values of industrial outputs have a rising trend, the intensity of carbon emissions decreases year by year, the values are 2.98, 2.32, 2.64, 2.26 (tons/per thousand yuan) respectively. It means that the enterprises gradually realize the importance of environmental protection and pay more and more attentions to enterprise's carbon emissions in China. In addition, the differences among the average, minimum and maximum of the controlling variables company size and asset-liability ratio are not large, while the differences of the profitability and growth are large.

Table 3 Description Statistics

Variables	Number	Minimum	Maximum	Mean	Standard Deviation
ev	258	.4848	4.5690	1.472972E0	.7518843
cei	258	.0518	2.9833	.666189	.7792449
size	258	8.9547	11.3595	9.918455E0	.5172095
lev	258	.1653	.9569	.555054	.1419722
roa	258	-.2493	.2367	.035437	.0567225
grow	258	-2.8405E3	234.9606	-1.137248E1	177.8732509

3.3 Regression analysis

In this paper, we estimate and inspect the model parameters by SPSS16.0 software. As it can be seen from the model in the table 4, $R^2 = 0.69$, showing that the regression equation fitting original data is better, and the effect of the observed value regression equation is significant.

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.714 ^a	.694	.649	.715357

As can be seen from the anova table 5, $F = 18.06$, $P = 0.000$ (approximation), it shows that the regression equation is highly significant. It can explain that the independent variables and the controlling variables have a highly significant linear influence on the enterprise value with the probability of more than 99.9%.

Table 5 Anova

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	38.334	5	7.667	18.061	.000 ^a
Residual	106.974	252	.424		
Total	145.307	257			

Table 6 shows the regression result of intensity of carbon emissions and enterprise value is negative correlation at the 5% significant level. The carbon intensity of enterprise is higher, while enterprise value is lower. Namely, low-carbon performance is positively related to the enterprise value, hypothesis 1 is tested in this paper. The reason may be that, with the development of low carbon economy mode and the transformation of extensive economic growth mode in china, the government of china begins to focus on industrial enterprises making large carbon emissions, and develop a series of policies and measures to encourage enterprises to carry out energy conservation and emission reductions. Investors will take into considerations of the enterprise's environmental behaviors when making enterprise investment decisions.

Table 6 The Multiple Regression Results of Low Carbon Performance and Enterprise Value

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.982	.887		5.614	.000
cei	-.118	.059	-.122	-1.986	.048
size	.415	.094	.283	4.407	.000
lev	.828	.312	.157	2.656	.008
roa	6.420	.780	.485	8.232	.000
grow	.000	.000	-.058	-1.056	.292

4 Conclusion

The conclusion of this paper shows that the carbon intensity of China's listed companies has a significant impact on the enterprise value. Namely, the enterprise value is low when the intensity of carbon emissions is high. Our explanations for this are as followings: first of all, the high performance of low carbon is not only making enterprises gain the government incentives, but also helping to improve the enterprises' social image. By enhancing the enterprises' reputation to customers, they will be willing to pay more for green products. Thus, it will improve the products' market value. Second, investors begin to concern the environmental protections of the enterprises. When they make investments, they will begin to take considerations into the enterprise's environmental behaviors. In addition, we can find from table 6 that although the carbon intensity will affect the enterprise value, the sig value closes to 0.05. Showing that with the further development of low-carbon economy, the effective of carbon emissions on some large energy industries is not obvious. On the one hand, this may be due to the nature of the industry itself, on the other hand, the government should enhance laws and adequate of rewards. Thus, as the government should not only increase the intensity of rewards and punishments for energy conservation and emissions reduction, but also increase intensify propaganda to improve investors' consciousness of the environment protection. Only in this way, it may promote the development of low carbon economy in manufacturing industry of China. At the same time, we also find that different sizes, asset-liability ratio, profitability will also have a significant impact on the enterprise value, and the company's growth is positively related to the enterprise value but not significant. Due to data limitations, this paper does not find further specific carbon intensity of each enterprise. So we substitute industry data for enterprise data, this may also affect the research conclusion of this article. Therefore, the conclusion of the article is preliminary and these problems should be further addressed in future research.

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The Research on the Effect of Mobile Subscribers' Perception and Behavior on Mobile Number Portability (MNP): Case Study of MNP in Kumasi Metropolis

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Abstract: In order to improve competition and ensure high customer satisfaction in the telecommunication networks in Ghana, National Communication Authority introduced a new functionality called Mobile Number Portability (MNP) following parliamentary approval from July 7, 2011. This research is based on the effect of mobile number portability (MNP) on mobile subscribers in Ghana by focusing on subscribers' perception and behavior related to MNP in the Kumasi metropolis. To achieve the objective of this study logistic linear regression model was used to estimate the impact of Customer service, service problems, usage costs and income on switching preference of network subscribers. The regression results indicate that income of the respondents, high service problems, average service problems, the high usage cost and average usage cost are very important in determining customer intention to switch. Network operators have consequently reduced their tariff rate.

Key words: Mobile Subscribers; Perception; Behavior; Mobile Number Portability (MNP)

1 Introduction

Ghana's telecommunication sector has undergone a major process of transformation through significant policy reforms, particularly beginning with the establishment of National Communication Authority (NCA) with the sole policy to regulate the activities of telecom companies in Ghana. The mobile communication plays a major role in telecommunication industry. Mobile network comes under the service sector, which is experiencing a rapid development which in turn is supporting the growth in Ghanaian economy, provides ample chances employment and self employment generation. The most challenging job for present day for network providers is to retain their customers. Driven by various policy initiatives, the Ghana's telecom sector has witnessed a major transformation in the last decade. It has achieved a phenomenal growth during the last few years and is poised to take a big leap in the future also. In order to improve competition and ensure high customer satisfaction in the telecommunication networks in Ghana, NCA introduced a new functionality called Mobile Number Portability (MNP) following parliamentary approval from July 7, 2011.

Park (2006) defined Mobile Number Portability (MNP) as a system that allow subscribers to retain their existing mobile number when they switch from one mobile service provider to another irrespective of mobile technology being used by the other service provider. Mobile number portability is used as tool by regulators globally to promote and encourage competition in the heavily monopolized wire line telecommunication industry (Reinke, 1998). After the advent of mobile telephones, many countries including Ghana allotted different network codes to mobile operators. In Ghana the following network codes are assigned to mobile operators (Airtel-026, Espresso-028, Glo - 023, MTN - 024/054, Tigo - 027 and Vodafone - 020). What this means is that a subscriber is identified to a particular mobile network by the network codes prior to MNP implementation, however with the introduction of MNP that may not be the case since subscribers can switch to other networks while they retain their original number. For instance an MTN subscriber with network code 024 who ports to Airtel for instances will still maintain his 024 number. Although there have been many studies looking at the effect of number portability on competition at the industry level, across the globe, little attention has been shown on the individual level such as subscribers' behavior or perception.

This research is based on the effect of mobile number portability (MNP) on mobile subscribers in Ghana by focusing on subscribers' perception and behavior related to MNP in the Kumasi metropolis. It will also explore how MNP is impacting on the operational strategies of mobile network providers. Kumasi Metropolis is chosen because, as the second largest city in Ghana with many commercial activities, the city has the highest mobile number subscriber penetration rate of about 80% in 2011 contrasted with national penetration rate of 80.5% for the same period (National communication Authority third quarter Report, 2011). Therefore the city is an ideal place to conduct such research.

Many experts and scholars have presented their opinions on the concept of mobile number

portability in a variety of ways. Humport (2008) defined mobile number portability as a process that permits a mobile phone subscriber to keep his or her mobile phone and number when he moves from one service provider to another. To Yengurk (2003), mobile number portability is the process enabling a mobile subscriber to move from a network operator to another network operator without changing his or her mobile number. The concept simply means that a subscriber can retain the whole mobile number. Various stakeholders in the mobile telecommunication industry have viewed Mobile number portability as an essential policy framework necessary to ensure competition and to protect new entrants into the industry (Lyons, 2006). The motive of providing a consumer with the freedom to move freely between service providers and to ensure healthy competition in the mobile industry has always been the benchmark for regulators to promote mobile number portability (Reinke, 1998 and Lyons, 2006). It must be emphasized that the implementation of mobile number portability does not automatically bring competition in the mobile market (Shin, 2006). It is a facility that leads to; better service quality, reduction in prices, e.t.c. because of the apparent desire to lure more customers, put intense pressure on them to offer a more competitive product to their customers (Park, 2009).

For operational purposes, this study defined mobile number portability as a system that facilitate mobile phone users to switch over mobile network operators without changing their personal number and codes, In pursuit of mobile number portability, Ghana was guided by the challenges that prominently featured in UK and elsewhere in choosing a particular model of porting system to adopt. Realizing the convenient associated with recipient – led porting system and with it international recognition, Ghana adopted the recipient led porting system. Again, Ghana adopted this mode of porting because it really gives meaning to mobile number portability.

2 Methodology

To achieved the objective of determining the impact of mobile number portability on the subscribers’ experience of mobile network in Ghana and to identify the factors that determine the network switching behavior of mobile subscribers in Ghana. In line with this, (Dix, Finlay, Abowd, & Beale, 1998) states that the best way to find out how a system meets users requirement and expectation is to ask the users their views on the effects of Mobile Number Portability. This survey uses the query techniques to obtain information from the respondents. It needs to be noted that the use of questionnaires is an inexpensive way to gather data from potentially large number of respondents. The use of questionnaires is feasible way to reach quite a number of reviewers large enough to allow statistical analysis of the results.

A simple purposive survey was used in this research work. The researcher concentrated on the impact of Mobile Number Portability on subscribers’ behaviors and perceptions in Ghana – using Kumasi metropolis as a case study, this study is based on the primary data. The survey method which was employed in gathering information from respondents consists of direct visitation, observation, interviews and questionnaires. A non-formal interview was conducted by asking operational managers of the various network operators about their views and strategies post MNP implementation.etc.

2.1 Conceptual Framework Extension

The conceptual framework in Figure 1 below is an extension of the work done by Nilsson and Peters (2009) was designed to help estimate the impact of switching characteristics (customer care, service problem, usage costs and income) on subscribers’ intention to switch from one network to another.

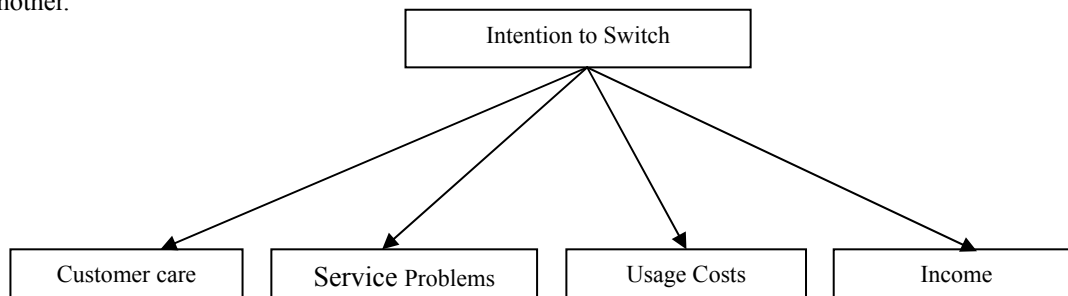


Figure 1 (Sources: Extension of Nilsson and Peters, 2009)

This conceptual framework was designed to enable the researcher find out how variations in these switching characteristics (customer care, service problem, usage costs and income) influence subscribers

switching behaviour following the implementation of mobile number portability in Ghana.

2.2 Tools of analysis (Model Specifications)

In this survey, a Binary Logit model was used. The main model (equation 1) measures the probability that a subscriber is willing to switch network operator. Thus, the model has a qualitative dependent variable with binary or dichotomous responses. According to Gujarati (2003) in models where the dependent variable, is qualitative, the objective is to find the probability of something happening. Thus, in this study the probability that a particular subscriber is willing to switch network operator is specified as:

$$P_i = \Pr(y_i = 1) = \frac{e^{X\beta}}{1 + e^{X\beta}} \tag{1}$$

And the probability that a particular subscriber is not willing to switch network operator is also expressed as

$$(1 - P_i) = \Pr(y_i = 0) = \frac{1}{1 + e^{X\beta}}$$

Thus the odds ratio i.e. the ratio of the probability that a subscriber is willing to switch network operator to the probability that a subscriber is not willing to switch network operator is written as

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{-X\beta}}{1 + e^{X\beta}} \tag{2}$$

The logarithm of the ratio P_i and $(1 - P_i)$ is the log-odds ratio and the log-odds ratio is a linear function of the explanatory variables. That is:

$$\log_e \frac{P_i}{1 - P_i} = \beta_0 + \sum_{j=1}^k \beta_j x_{ij} \tag{3}$$

This equation uses the natural log of the odds, and is called the logistic transformation, or Logic (for short). Logit model (L) has features which include:

- i. As P goes from 0 to 1, the logitL goes from $-\infty$ to $+\infty$. That is, although the probabilities (of necessity) lie between 0 and 1, the logits are not so bounded.
- ii. Although L is linear in the explanatory variables, the probabilities themselves are not.
- iii. If L, the logit is positive, it means that when the value of the regressor(s) increases, the odds are that the regressand equals 1 (meaning some event of interest happens) increases. If L is negative, the odds are that the regressand equals 1 decrease as the value of explanatory variables increase.

Table 2.1 Ranges of Probability, Odds and Log-Odds

		Lowest Level	Mid point	Highest Level
Probability	P	0	0.5	1
Odds	P / 1 - p	0	1	$+\infty$
Log Odds	Log (p / 1 - p)	$-\infty$	0	$+\infty$

Based on the above formulations, logistic linear regression model was used to estimate the impact of customer service, service problems, usage costs and income on switching preference.

Model specification

$$S = f(C, P, U, I) \\ S = \beta_1 + \beta_2 C + \beta_3 P + \beta_4 U + \beta_5 I + \mu \tag{4}$$

Where,

S = Switching preference, C = Customer service, P = Service problems, U = Usage costs

I = Income, μ = Is white noise (include all omitted variables that can influence the dependent variables)

β_s , = Parameters to be estimated to measure the impact of Customer service, service problems, usage costs and income on switching preference.

3 Analysis And Discussion Of Empirical Results

3.1 Tools of Analysis (The Logit Regression Equation)

This session explores the impact of switching factors (income, customer service, service problems

and usage costs) on the probability that subscribers are willing to switch or remain with the same network operator. Thus, the model has a qualitative dependent variable with binary or dichotomous responses. The SPSS (version 16) result of the Logit regression is used to estimate the model in equation 3.0 and the result is contained in Table 1 below. From Logit regression a proper interpretation of the coefficients is done by exponentiating the coefficient and interprets them as odd ratios.

Table 1 The SPSS Logit Regression Result

	B	Sig.	Exp(B)
income	-0.002	0.002	0.998
Low customer service	-0.416	0.734	0.66
Average customer service	-0.713	0.553	0.49
High customer service	-0.871	0.483	0.419
Low service problem	0.439	0.524	1.551
Average service problem	1.502	0.04	4.492
High service problem	4.647	0.022	104.28
Low usage cost	0.386	0.625	1.472
Average usage cost	2.137	0.01	8.472
High usage cost	1.788	0.042	5.98
Constant	1.332	0.276	3.787
Cox & Snell R square: 0.589, Nagelkerke R square: 0.825			
Wald chi- square: 97.853, sig. : 0.000			

Source: Author from field survey data, 2012.

3.2 Income

From table 3.0 below, there is a negative relationship between willingness to switch and the income of the respondents and this is also statistically significant. The negative relationship between willingness to switch and the income of customers indicate that as income of customers increases they will not be willing to switch but remain with the same network operator (i.e. switching will decrease). With GH¢1.00 increase income, mobile subscribers are 0.998 times ($e^{-0.002} = 0.998$) more not willing to switch to different network.

3.3 Customer service

Generally on customer service, the result from table 4.13 above indicate that high customer service, average customer services and low customer services were however not statistically significant in determining the willingness of network subscriber to switch or remain with the same network provider.

3.4 Service Problems

Estimates from table 3.0 suggest that there is a positive relationship between willingness to switch and the high service problems and average service problems and this is statistically significant. The positive relationship between willingness to switch and the high service problems and average service problems means that as high and average service problems crops up, subscribers will be more willing to switch and not remain with the same network operator. The results show that subscribers are 104.280 times ($e^{4.647} = 104.280$) and 4.492 times ($e^{1.502} = 4.492$) more willing to switch to different net work if high service problems average service problems respectively increases. Low services problem was however not statistically significant in determining the willingness of network subscriber to switch or remain with the same network provider.

3.5 Usage Cost

It is clear from Table 1 that there is a positive relationship between willingness to switch to different network and the high usage cost and average usage cost and this is statistically significant. This means that as usage cost increases subscribers will be more willing to switch and not remain with the same network operator. The results show that subscribers are 5.980 times ($e^{1.788} = 5.980$) and 8.472 times ($e^{2.137} = 8.472$) more willing to switch to different net-work if high average usage cost increases. However low usage cost was not statistically significant in determining the willingness of network subscriber to switch or remain with the same network provider.

The chi-square value of 97.853 indicates that the independent variables (Income, Service problems,

Usage cost and Customer service) explain changes in dependent variable (switching preference) by 97.85%. The Cox and Snell's R^2 (0.589) and Nagelkerke's R^2 (0.825) which measure compares the actual results obtained from respondents to the outcome predicted by the model. These two R^2 's accounting (0.589 for Cox and Snell's R^2 and 0.825 for Nagelkerke's R^2) are above 0.5 and therefore the model's explanatory power is high, though 1.0 is the ideal case. Perhaps there may be other more explanatory variables that may also account for the switching preference of subscribers in the era of mobile number portability.

Table 2 Trend in the Ghanaian Telecommunication Industry

Year	2002	2003	2005	2006	2007	2008	2009	2010
Subscriber number (thousands)	1641	3180	6910	13983	23443	26816	29045	32342
Penetration rate (%)	3.6	7.2	15.1	23.2	28.3	36.8	41.9	5.5
Sales (million USD)	6.4	13.7	21.6	33.9	50.5	70.1	86.4	107.3

Sources: The National Communications Authority (NCA) last quarter Report of 2011.

Some of the most noteworthy current developments in the Ghanaian mobile telecommunication services are the start of 3G (third-generation) services which give users up to 2 Mbps download speed on mobile networks. This has propelled explosive growth of wireless Internet in Ghana. Internet is showing sharp growth, boosted by the advance of mobile telecommunication technology, the extensive diffusion of mobile devices capable of connecting to the wireless

Internet and colour LCD display, mobile devices (HSPA USB modems, I pads, palm top e.tc), and diversification of digital content. The wireless Internet market grew from 2.0% of total mobile telecommunication services sales in 2002, to 30% in 2000.

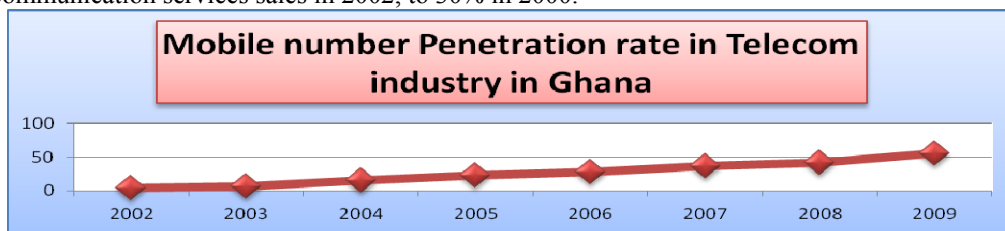


Figure 2 Pattern of Mobile Penetration rate in the Telecom Industry in Ghana
(Source: The National Communications Authority (NCA) last quarter Report of 2011)

4 Findings

The current findings provide new and important information regarding the relationship between subscribers switching intentions and switching characteristics (usage cost, service problem, customer care and income). Although Cox and Snell's R^2 (0.177) and Nagelkerke's R^2 (0.320) were low, some of the estimated coefficients of explanatory variables were significant at 5% level. It was found that there is a negative relationship between willingness to switch and the income of the respondents and this was statistically significant. High customer service, average customer services and low customer services were however not statistically significant in determining the willingness of network subscriber to switch or remain with the same network provider. Again, there was positive relationship between willingness to switch and the high service problems and average service problems and this was statistically significant. It is clear from the result that there is a positive relationship between willingness to switch to different network and the high usage cost and average usage cost and this is statistically significant.

5 Conclusion

We recommended that National Communications Authority should do more education and assist to reduce the porting duration in order to help and lure more subscribers to port. We concluded that generally, the concept of mobile number portability is a good and innovative technology which offers great opportunity to subscribers and network providers alike especially new entrants operational strategies in order to benefit from Mobile Number Portability.

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Ethics for Sustainable Development

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Abstract: The aim of this Paper is to bring some reflections on how the Vision / Approach of Interdisciplinary Education can help build the attitude necessary towards a new global Ethics for sustainable development. Reverence for Life and space for the creative aspects of the Being can bring innovations aligned to the sense of sustainability beyond the mere need to comply with regulations, but rather, the spontaneous will to adopt Universal Ethical Principles. Research has shown that this attitude is the result of inner transformation, an opportunity which is offered to both, teachers and students, through Interdisciplinary Education, in an environment of mutual trust and respect, helping develop awareness of the Being during the creative process. This attitude will be carried to the personal, academic and professional performance in any field of knowledge, bringing long lasting effects for humanity, as a whole.

Key Words: Creativity; Ethics; Interdisciplinarity; Sustainability

1 Introduction

For centuries, humanity has been striving to find a proper attitude towards the use of resources: material, human and economic. A more utilitarian view has often prevailed, despite the efforts of many, like Ashoka in India 23 centuries ago, for a more respectful view of Life, when he wrote the Dharma.

Eagerness for short time material results was accentuated during the Industrial Revolution, turning men into a mere part of a big production machinery. Natural resources, as well as human efforts have been used to exhaustion in a frenetic rush for more and more production of things: a very counter productive attitude!

In the sixties, a big concern with the outcome of such attitudes moved the people around the world and Sweden proposed the United Nations Organization to arrange an international conference on the issues related to the human environment. In 1972, the Conference in Stockholm gathered 113 countries, 250 non governmental organizations and the United Nations Organization. The outcome was the Statement of Stockholm and an Action Plan for the Environment.

Development could not proceed in the pattern of *single bottom line*- only economical one, in which *bottom line* represents the planet health, without which neither the economic activity, nor life itself are feasible. The *triple bottom line* related to economical, social and environmental development was the result of the Brundtland Commission – the World Commission of Environment and Development WCED in 1988 with the report on “Our Common Future”, in which sustainable development is one which assists the present needs without preventing future generations of doing the same, seeking for new postures, objectives and processes to be adopted by society.

In 1992, at ECO 92 in Rio de Janeiro – Brazil, a document called 'Agenda 21' was elaborated with regional, national and international efforts to stop and revert the deterioration process going on in the environment, together with principles to guide sustainable development stated in the Earth Charter. In chapter 36 of the 'Agenda 21' the basic principles of education are restated, recommending: reorientation of Education for Sustainable Development / expansion of public awareness and encouragement for continuous improvement.

In 1997, Rio + 5, a complementary agenda was elaborated, called *Millenium Development Goal* with focus in globalization policies and poverty eradication, adopted by 199 countries in an Assembly at the UNO, in New York, in the year 2000. In 2002, Rio +10, 'Johannesburg Summit' was produced in South Africa. In 2012, there was Rio +20 strengthening the commitment towards a new attitude to Life. 'Earth Charter International' launched a Campaign in Rio +20 with the slogan: “See the World through the Earth Charter Lenses. Embrace and Live the Earth Charter.” Action is expected in all fields of knowledge. Despite lots of resistance, there have been many achievements all over the world. Students from University of Georgia, in Athens, for instance, have written essays about how the Earth Charter is being put into practice, “Earth Charter in action at University of Georgia”.

We have been in the international UN Decade of Education for Sustainable Development (DESD) (2005 – 2014). Education is expected to bring a new Vision and Approach to develop an attitude of

Reverence to Life, starting in the Being. Since 2001, with Jacques Delors report in connection to UNESCO, there should be 4 pillars in Education: Knowing to know, Knowing to do, Knowing to interact, and Knowing to be.

2 Development

The Interdisciplinary Vision / Approach to Education can be valueable in the development of a new attitude to Life for Sustainable Development, in tune with the four pillars for Education by Jacques Delors and UNESCO.

2.1 Some Ethical Aspects of the Interdisciplinary Vision / Approach to Education

Interdisciplinarity, according to Fazenda (2002) does not have only one definition. It is an attitude towards knowledge: considering the visible and invisible aspects of studies and research. It takes into consideration the epistemological, praxiological and ontological aspects of knowledge – knowing, doing and being, and the various relations that arise – one with oneself, one with the others, and one with knowledge. It resets the position of the Being to a central one, regarding the many possibilities of development, as each one finds his /her own Ethics and Aesthetics, in a creative way, along the process.

Professionals and scholars are welcome to work together in a common project, integrating knowledge, coming out of the process of fragmentation of knowledge, which prevailed for a long time.

Creation of Knowledge, rather than reproduction of knowledge is encouraged, letting each one detect and construct meaning, from inside out, not the other way around. That is how consciousness of the Being emerges, bringing about a sense of worth for Life, as a whole.

It uses the phenomenological approach, as considered by Husserl, suspending judgement - “epoche”, as perceptions give way to more clear understanding, which in turn, becomes knowledge. All this process leads to knowing to know, knowing to do, knowing to be and knowing to interact.

The principles of Interdisciplinarity, by Fazenda (2008) are: Humility to recognize we build the world, Coherence between what we think and do, Respect for oneself and the other, who may be different, but not in opposition; Unnattachment of intellectual and material elements, being open to new ideas; Maturation- observation of phenomenon in time and space, reflection, and action taking in the most adequate time.

In a lecture by Bruce Rich at PUCSP, on April 13th, 2012, – based on his book: “To Uphold the World – a Call for a New Global Ethic from Ancient India”, we had a historical example of how the ruthless Indian Emperor Ashoka learned from his own experience, the futility of war and violence, in an empire prioritizing material wealth, over 22 centuries ago. The book relates to Ashoka's diagnosis of what was necessary to make the world a better place: Ashoka's focus was on mutual respect and sensitive deliberation that can generate it. A big transformation of consciousness showed 'Reverence for Life' to be an essential factor. Based on some Universal Ethical Principles of non violence, religious tolerance, species protection, human rights, compassion, promotion of peace, he set human life out of the utilitarian purpose, by depicting the 'Dharma' on Orissa rock edicts.

'Dharma' from the sanscrit, is related to what sustains Existence, associated to the universal direction, which does not consider only the visible reality. 'Dharma' in India, 'Tao' in China, and 'Logos' in the Western world are related to the universal principles permeating everything, from the creation of Galaxies to the interaction of people. Education that helps move the inner perceptions, in tune to this harmonious dynamics of Life, has long reaching effects.

Pineau (2004) considers that self development, together with hetero development and eco development constitute what he calls permanent development in temporalities. Self development is related to the inner process of transformation, taking place day and night; whereas hetero development is associated to development in connection with a facilitator, or teacher, in a particular time. Eco development being how you interact with the environment, and the influences you receive. These are the three movements going on along the time of the day, and the time of the night.

In the case of Ashoka, self development played an essential part, taking him out of an action which lost meaning. With Humility, he recognized we can build the world, therefore he adjusted his action to his new thinking, to reach Coherence. He could Respect different forms of religious beliefs, as he was Unnattached of the previous beliefs, and because of his own Maturation, he knew when to take action. He was aware of timing. Recognition of the worth of Life permeated his doings, after the big consciousness expansions. He applied the Ethical attitude of worth of Life to all living creatures: Being,

doing and knowing were interwoven.

Peter Singer, a philosopher of the present time, also concerned with preservation of Life in the different dimensions, offers what he calls 'Practical Ethics', the application of Philosophy to situations of everyday life. He believes that we can rationally choose to take an ethical action everyday, with autonomy, developing consciousness of the Being, in order to stop suffering to any living creature. That would help connect Mind and Heart, building an attitude of what he calls 'Effective Altruism', making each of us committed to, directly or indirectly, bring some effective contribution to the whole.

Sustainability requires urgent action taking, as there are millions of Beings inflicted with suffering.

2.2 Temporalities, Self Knowledge and Knowledge Creation for new Ethics

Knowledge development that allows for consciousness of the Being, in perceptions of the moment, help show the worth of Life in each of us – a starting point for an attitude towards new Ethics.

In what concerns Temporalities, Gaston Pineau (2004, p.13) reminds us that:

“Time is a measure of movement, not only its accounting, quantification, its average, but also the tuning, rhythm, tone, quality and meaning”.

We can start developing some awareness of rhythm, by allowing ourselves to perceive the beat of our heart, our breath, the pace of our walk, the way our thoughts flow, as well as our speech. The awareness of our inner rhythmical movements makes us contact our inner flame: Life and Creation inside ourselves. According to Espírito Santo (2007), the educator who has this inner flame lit as a result of self knowledge, so important in his development, will be aware of the importance in activating that in the pupil, creating mutual trust for the process to take place – an open ended process in continuous expansion. In such environment of trust, Creation can take place, as the inner beat finds its way out. Gaston Pineau (2004, p.19) stresses the importance of involving the personal time in education, when he says that: “Each moment one takes possession of his or her time, he or she takes over the temporal development as a condition to one’s evolution. Eminently personal appropriations which also express potentialities of all human kind. A big field of research is open on “Temporalities on Development”. He keeps on valuing (2004, p.220) the ontological development as a permanent one for the human evolution, putting together, in rhythm, the three sources of movement: development with yourself, the others and the things. Allowing this time during the process of development brings about autonomy, which otherwise would not show. That is what Pineau calls “Chrono – Development” (2004 p.15). He says that: “Saving time without gaining your time is a race against the clock, rather compulsive than formative “. Fazenda and Pessoa (2013, p. 18), in their book on Care, show affection as the first element that helps student and teacher walk side by side; “ The deepening of the knowledge of the teacher on the universe of the student takes place through a process of unveiling... Through an embrace it is possible to see the inner eye of the student. Something coming from inside, very deep, essential, but still not shown clearly. Only after the unveiling of the first veil is it possible to approach other factors in the life of the student which are exposed in the written and spoken productions... It is through the speech of the students that the teacher can more clearly see what was hidden in the Being in the beginning of the relation.”

With such care, what was hidden comes forth, opening way to a flow of speech coming from deeper inside, through which Knowledge Creation can take place. There is a flow of inner rhythms transforming what was tacit in an explicit way. Nonaka and Takeuchi (1995) wrote about the Knowledge Creating Company, where constant interactions among the collaborators of the company on particular topics, helped bring to light what was not apparent. Professionals from different departments got together around common projects, integrating knowledge, opening way to the creation of more knowledge, in a spiraling, continuous process: an interdisciplinary attitude.

If the Being is engaged in Knowledge Creation, fully Present in the moment, aware of his/her internal rhythms, the Creation process will bring Self Knowledge too. Temporalities help integrate the four pillars in Education: Knowing to know, Knowing to do, Knowing to be and Knowing to interact.

2.3 An Interdisciplinary Approach to Creation

Being engaged with the spoken /written expression in a foreign language, I had the challenge to help professionals and scholars create and present innovative proposals on a topic. I observed that language understanding and expression took place in a rhythmical pattern.

Indeed, Understanding of a listening or reading comes rhythmically, as the stress of the key words is recognized. Practice through rhymes, poems and songs can help the Being tune his/her own 'inner beat' to that of the message, becoming conscious of the own beat. Equally, in the spoken and written expression, the flow comes with the beat in key words. The Being sustains the flow in a movement from inside out.

In more proficient levels of language development, when ideas are discussed or a point has to be made on a philosophical topic, it is essential to have the chance to expand the perceptions on the topic without getting lost, by registering only words, or pictures first. The correlations of the words or pictures will generate meaning, which can be articulated individually, or in groups.

Then, decision follows on what direction to develop the topic. In this process, feelings, perceptions, possible courses of action are evaluated, for the proposal to gain full flow. Achievement, in offering an innovative proposal comes with self realization, encompassing the Being, doing, knowing and interacting.

Below, I share the 12 'shades' involved from the Creation to the Presentation of a proposal on a topic, considering it a possibility, within the Interdisciplinary Vision / Approach:

Creation	Registering Perceptions on a Topic – through words or pictures Correlating the Perceptions - by putting words / pictures together Detecting the Meaning of the Correlations – through sentences reflecting the ideas
Unity	Selecting some of the ideas or pictures for the Proposal Defining the Position of the pictures / ideas for the Proposal Enriching the Proposal – with examples to illustrate each idea
Way	Adjusting / Confirming the Proposal Rehearsing the Proposal – pictures / ideas on a poster Naming the Specific Proposal
Realization	Defining the Style for spoken / written expression Sharing Joy – feeling happy for being able to create/show your proposal Offering the Proposal – Written / Spoken / Visual Presentation

This approach to Creation can take place after a favorable environment is built, with the Interdisciplinary Vision of Education. The different colors represent attitudes and actions involved in the process.

The three first shades concern the Creation of a proposal: blue refers to the attitude of *determination* to start *collecting words or pictures in relation to a topic*; pink is related to the *loving* attitude which enables *correlations* to be made; yellow represents *wisdom* to *let ideas emerge*.

As for the definition of the Unity of the proposal, which is essential to proficiency, the white shade represents the *selection of the ideas for the proposal*, together with a feeling of *peace*. Even if not all the elements are used in this proposal, they have been registered, and are, therefore, saved for another proposal. Green represents the *organization of the proposal with the ideas chosen*, with *coherence*. Red is related to the attitude of *devotion* in *bringing illustrations which relevant to the topic*, for the development of each idea.

There are not two proposals which are the same. Each one has a specific Way to treat a topic. Richness comes while sharing the various ways. The Purple refers to the possibility to *perform adjustments to the proposal*, if there is a feeling that *something does not fit the proposal well*.

Acqua marine represents *clarity*, enabling the proposal to *be in tune with the author/ authors*. Magenta means *harmony*, to assure a *good flow during development*.

For the presentation of the proposal, be it written, verbal or visual, *special brightness* is reflected in the style, represented by the golden color. A feeling of *joy* will arise for the evidence of *being able* to come from the creation to the presentation of a proposal, represented by the salmon color. All this is *achievement* with a sense of *self realization*, represented by the emerald color.

The moment the Being is not only engaged in knowledge reproduction, but realizes that Knowledge Creation is possible, individually and collectively – making explicit what was tacit, with time to make adjustments and reach clarity and harmony in relation to him / herself, to the others and the environment, a more respectful attitude to Life may be developed, guiding his/her innovative proposals to Reverence for Life. And each one can be perceived as an instrument of Creation – part of a much bigger process that we all share, in a dance, in tune with the beat of the Cosmos, for we have had glimpses of what sustains Existence in ourselves - we share the Logos, The Tao, the Dharma. ..

3 Conclusion

The Interdisciplinary Vision / Approach of Education does not produce these glimpses, but allows us to come to a position to get them, as it regards the infinite possibilities of the Being through the loving eyes of the facilitators, who have had the opportunity to become conscious of their own worth, first. Encouragement of the others to do the same is continuous, with full respect to the individual time, providing the possibility to contact the Essence of the things.

Through the Qualitative Research, Interdisciplinarity approaches Human Nature and the Nature of things for significant learning, awakening the inner sensors to detect meaning, reorienting action. Consciousness of the Being expands and care for Life becomes part of the permanent development.

Sustainability seeks for a new global Ethic, for which the Interdisciplinary Vision / Approach has a contribution to bring, by allowing each of us to awaken the perception of how better we can do our part. Like a fertile soil, it offers itself for the natural unfoldings of those who are open to take place.

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Effective Building of Human Environment of Hi-Tech Industrial Clusters Based on Organization Ecology

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Abstract: This paper applies the basic methods and principles of organizational ecology to reveal the ecological characteristics of hi-tech industry clusters, analysis on the connotation and basic components of the organization ecological environment and proposes the evaluation model of ecological environment. Based on pointing out that the human environment factors of hi-tech industrial clusters include the innovative spirit of the actors, the opening atmosphere of ideas exchange and the collaborative relationship of mutual trust, the construction path the human environment of hi-tech industry clusters will create the people-oriented and cooperation cultural atmosphere, build the culture of encouraging risk-taking and tolerating failure and establish the culture system suitable for innovation.

Key words: Hi-tech industry clusters; Organizational ecology; Human environment; Innovation and cooperation

1 Introduction

Autio and Kauranen (1994) pointed out that when entrepreneurs make the decision of location choice, what can have a significant impact is often satisfactory principle rather than the principle of profit maximization. Sakesenning (2001) pointed out that, the success of Silicon Valley industrial area compares with the industrial area near Boston Route 128, which the former engineers and technical experts is a mutual commitment, and committed to the region, while the latter, due to vertical integration, hierarchical, rigid, Jewish traditional family point cultural, resulting in behind, When Saxenian (1992) studied the development of Silicon Valley, he stated that good social relations in the local environment may speed up the generation and dissemination of new knowledge. Li Hui and Li Ge (2007) found that when the industrial cluster sets up, the enterprises within the cluster grow very fast, but it does not have a sustainable development of the environment. When the industrial cluster grows stronger, it will have big competitive power and realize sustainable development. But it takes long time and huge money for the development. So, industrial cluster must develop very quickly at first and the competitive power will be the key to its sustainability. Henjiang and Chen Jixiang Chen (2005) described that the cluster dynamic mechanism for being the fundamental forces of obtaining cluster sustainable competitive advantage and promote the development of industrial clusters and discussed the action mechanism of cluster's continual growth from the endogenous and exogenous dynamic mechanism respectively. Yang Kunpeng and Liang Lei (2004) believes that culture has dramatic effect on enterprise innovation for its intrinsic compulsion, reviews the basic theory of culture and innovation, and then it re-defines the boundary of enterprise innovation and discusses the relative independence of enterprise culture, and probes the effecting mechanism and dimensions of culture to enterprise innovation are put forward to explain the effecting model. Although there are some researches on cluster environment, few scholars specialized in the perspective of the cluster human culture to explore the mechanism of sustainable development and continual growth of the hi-tech industrial cluster.

2 The Composition of Organizational Ecological Environment of Hi-Tech Industrial Clusters

Because they not only adapt to but also make a huge transformation effect on the environment, the hi-tech industrial cluster and its environment are inseparable. Once the hi-tech industrial cluster forms distinctive to prolong the enterprise life cycle and sustain the enterprise brand. A good cluster environment is the fertile soil of the enterprises fast-growing.

The organization ecological environment of industrial clusters is the sum of a variety of environments in which the clusters survive and develop. Specifically, it includes the natural and social environment. The natural environment refers to the indispensable material conditions in the process of survival and development of hi-tech industrial clusters, including climate, vegetation, minerals, geography and so on, the social environment refers primarily to the system, culture, policy, legal and

other conditions, which has a major impact to hi-tech industrial clusters mainly including geography environment, cultural environment, technological environment, institutional environment and social environment (as showed in Figure 1).

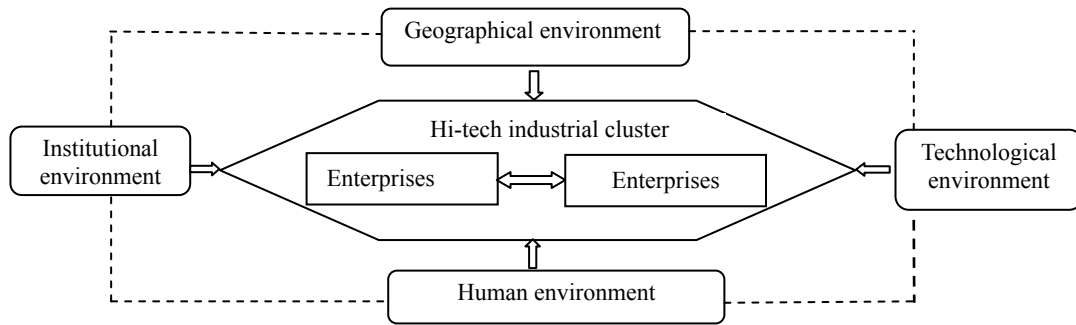


Figure 1 Composition of Organization Ecological Environment of Hi-Tech Industrial Cluster

3 The Evaluation Model of Organizational Ecological Environment of Hi-Tech Industrial Clusters

By analyzing the relationship between hi-tech industrial clusters and the cluster enterprises, it can be seen that creating local optimized environment by hi-tech industrial cluster is to attract hi-tech enterprises to grow and develop within the cluster. So the hi-tech enterprises can be regarded as customers, in order to retain their customers, the hi-tech industrial clusters should provide enterprises with products or services that they need, that is hi-tech industrial cluster environments. Based on customer satisfaction theory and model, it can come forward that an evaluation model of the organization eco-environment of hi-tech industrial clusters to analyze the effective mechanism of the organization eco-environment on the performance of hi-tech industry clusters (as shown as Figure 2).

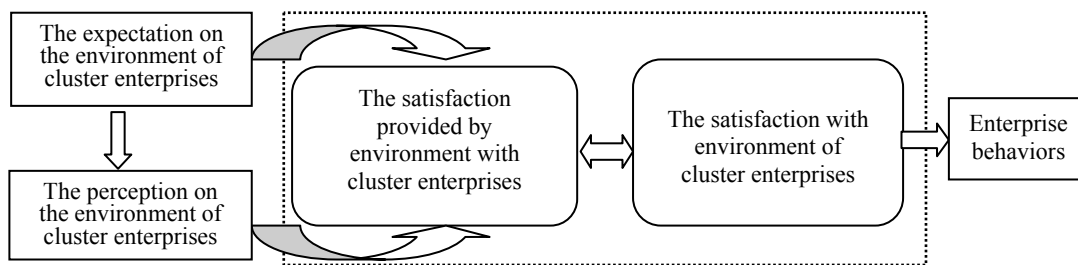


Figure 2 The Evaluation Model of Organizational Ecological Environment of Hi-Tech Industrial Cluster

The core content of this model is the satisfaction of enterprises with organizational eco-environment, is an overall evaluation of business environmental conditions and its experience of hi-tech industrial cluster, which enterprises do. It is also a cumulative satisfaction that it is an overall evaluation, which for some time in the hi-tech industrial clusters hi-tech enterprises experience. The satisfaction level of the organization with organizational eco-environment is affected directly by the satisfaction level of enterprises with what they need, which constitute the main part of the model.

There are two front elements in the model: the enterprise's expectation and perception of hi-tech industrial cluster environment. The main aid which the enterprises enter the hi-tech industrial cluster is to get the resources and conditions which they are not in other parts. Therefore, from the beginning of entering the cluster, enterprises have certain expectations about the cluster environment, which formed an expectation of business on the environment. When hi-tech industrial clusters cannot meet their relatively high expectations and needs, then enterprises will make an impact on the satisfaction of business with environment whether can meet the needs, which will reduce satisfaction of enterprises. And the perception of corporate on the environment is the general understanding of the actual construction of the hi-tech industrial cluster by business, which have a direct effect on the satisfaction degree of business on the environment, and will ultimately affect the satisfaction level of business on the environment .

There is behind elements in the model: the enterprise's behavior. If enterprises are satisfied with the organizational eco-environmental of hi-tech industrial clusters, it explains that the environment will have a positive impact on business performance, these companies will continue to remain in the hi-tech industrial clusters and migration does not occur. But if it cannot meet the needs of hi-tech enterprises, these enterprises will look for the hi-tech industrial clusters that can meet their needs to the environment and thus migration occurs. Therefore, as a hi-tech industrial cluster, the needs of hi-tech companies the on organizational ecological environment should be explored, find out their expectations, and thus make more targeted environment construction, enable enterprises to satisfaction, and ultimately increase the performance of hi-tech industrial clusters.

4 The Human Environment of Hi-Tech Industrial Cluster

Human environment refers to a value system formed by members' the community ideals and beliefs, values, codes of conduct and spiritual habits and so on. Research, development, production, management and sales and other activities of hi-tech enterprise are achieved and completed by business people. Business people live in a certain social and cultural environment, all are social beings. Social and cultural environment have an effect on people, and then business. The cultural environment whose main spirits are encouraging innovation and tolerating failure, can nurture and train a large number of entrepreneurs of courage of development, taking risks and self-sacrificing spirit; On the contrary, the cultural environment of *golden mean* will strengthen people's values and behaviors that do not develop, do not take risks and do not self-sacrifice. To a certain extent, cultural environment can lead to success or failure of hi-tech industries. In 1950s and 1960s, many entrepreneurs set up companies in Silicon Valley, companies from somewhere else have moved in Silicon Valley. In addition to local universities to provide ready-made and readily available human resources for these companies, the unique cultural environment is one of the basic factors that the hi-tech industry in Silicon Valley forms and develops. The essence of Silicon Valley culture is to encourage risk-taking, tolerance for failure, open communication, co-operation. Without this environment, Silicon Valley might never take off. The reason why it is difficult to replicate Silicon Valley's success is also for this reason.

The human environment of hi-tech industrial cluster can be understood as the customs, educational level of labor, psychological quality, mainstream values, social values and social networks and other social and cultural patterns, which is accumulated in a specific area by hi-tech industrial clusters for survival. The human environment of hi-tech industrial cluster generally includes two parts: First, the regional culture in the place where the hi-tech industrial cluster is—it appears as the cultural foundation formed by historical tradition and cultural background and so on, which influences character by environment in the process of development of hi-tech industrial cluster from beginning to end; secondly, industrial culture, which accumulates, based on the cultural foundation with the development of hi-tech industrial clusters, reflects the culture and behavior, especially the consistency of economic behavior. As hi-tech industrial clusters geographically concentrate and extensively divide the work and cooperate, this makes the cluster members be able to not only share the same cultural foundation, but also have a very frequent interaction on the basis of this, which significantly contributes to build the human environment of hi-tech industrial clusters.

Relatively speaking, human environment is a fairly flexible environment system of development. It is the cultural atmosphere of every industrial cluster, mainly comprised by public agreed lifestyle and value judgment formed by external performance of cultural quality, which embodies in each person. This kind of culture will create an external environment for development of an industry cluster by means of recognizing or excluding, and stimulate or limit the emergence and development of industrial clusters. It has a direct impact on whether people have the enthusiasm to pursue innovation, and whether people can establish mutual trust and mutual cooperation between each other.

4.1 Innovative spirits by behavioral subjects

It includes people's acceptance of innovation, recognition, enthusiasm and courage to take risks and so on, which are people's motive power of innovation. The one who is full of adventurous and innovative spirit, will generally hold a positive attitude to innovation activities, be conducive to the transfer and diffusion of knowledge, information and other resources. In such an atmosphere, enterprises have a particularly keen insight to market, are good at discovering the potential needs of the market. And drove by the interests, enterprises result in starting a company and other innovative strong desire, which in turn strengthen the innovative environment, from benign cycle and maintain continuity of innovation.

4.2 Collaborative relationships of mutual trust

Collaborative relationship of mutual trust is the key to clusters of innovation. The reason why hi-tech industrial clusters can overcome the disadvantage of innovation of a single enterprise is the long-term and stable cooperative relationship among enterprises, and foundation of establishing long-term stable cooperative relations is mutual trust and integrity. Game theory experts believe that, economic activity has the typical characteristics of the Prisoner's Dilemma, cooperation can make the overall interests of the participants largest. But in one game, betrayal is always dominant. In the course of repeated games, it is possible to achieve the result of cooperation, trust is one of the mechanisms of its implementation, it provides both parties with a good expectation and cooperative behavior encouraging parties to the transact, and help attract new trading partners.

4.3 Atmosphere of open exchange of ideas

Equal, free and relaxed working environment and open communication environment conduce to communication, learning of new ideas, new technologies in the areas. Equal, free and relaxed working environment makes economic subjects, in the field of its business, do real commitment and energy inputs, and thus they have more hi-quality innovation. Mutual trust and an open mind, making frequent communication and interaction between people, accelerate the speed of diffusing new ideas, information and innovation. In cluster, the boundaries among enterprises, between enterprise and inter-agency are porous, and they mutually penetrate. Enterprises learn in the competition, through formal cooperation and informal exchanges, keep abreast of changing markets and technology, to prepare for innovation.

5 The Construction Path of Human Environment of Hi-Tech Industrial Cluster

5.1 Creating the human atmosphere of people-oriented and cooperation

Human capital is the core strength of construction of hi-tech industrial cluster, and competition of hi-tech industry, in the final analysis, is a competition of talents. U.S. experience shows that the first condition of setting up hi-tech industrial clusters is to have a soft environment to promote production of talents, release of human energy. Because technological talent is the carrier of knowledge and technology, whether can encourage and attract universities and scientists and research institutions to doing business in the park, is the starting point and core to achieve a combination of technology and production, accelerate the industrialization of scientific and technological achievements.

Silicon Valley's success is the success of talents is that, its culture system is made full use by human resources, and provide favorable conditions as well as an appropriate cultural environment. The greatest asset hi-tech companies have, is the human resources of the company and the innovative wisdom of employees.) In the Silicon Valley, the flourish of hi-tech industrial clusters essentially is due to the talent pool, and the pool of talent relies on "people-oriented" concept. Talents are widely respected, human values are fully reflected, giving employees more equitable opportunities in order to get rich by their own, and that is the biggest secret of the success of Silicon Valley. Widespread implementation of the system of holding company bonus, which this incentives system not only greatly strengthened employees' sense of ownership, but also effectively stimulates employees' creative potential, inputs and pursuit on the work.

5.2 Creating the cultural atmosphere of encouraging risk-taking and berating failure

Innovation and risk are often closely linked, and culture of hi-tech industrial clusters encourages a culture of innovation, but also a culture of risk-taking. Silicon Valley entrepreneurs have a spirit of adventure, due to intense competition; there are only one-tenth people who are successful to do pioneering work. However, people are still keen on business, for failure of business, Silicon Valley people are able to recognize and accept. In order to support innovation, Silicon Valley design a reasonable risk aversion mechanism, which inspires Silicon Valley people's spirit of adventure. More and more Silicon Valley people experience that adventure is together with opportunity. No risk, no new opportunities for development. That the Silicon Valley people, in this risk-taking and entrepreneurial careered, previous failure is inevitable. Compared with the outsiders law-abiding, laid-back mind waiting for windfalls, it is difficult to be mentioned in the same breath. Because of this, it is very tolerant for Silicon Valley people to face failure, their understanding and concept of *Failure is the mother of success, business failure breeds success, failure is an asset to the development of human*, which has become a sensible approach generally agreed by Silicon Valley people, but also become an inherent innovative power of spirit for people to take risk.

In Silicon Valley, many companies will take the initiative to reward the one with risk-taking, courage and knowledge, actively participating in, but not to punish the losers in adventure. In Silicon Valley culture, being tolerant of frustration, greatly motivate and inspire employees innovative enthusiasm of bold attempt, courage to explore. It should be said that, in Silicon Valley, the unique culture of encouraging risk-taking and tolerance of failure means that human intellectual development, the development of civilization reaches a new sublimation of the new level.

5.3 Establishing the cultural institution suitable to innovation

Economic and technological development is deeply rooted in the soil based on certain cultural system. Behind the success of Silicon Valley, there is an atmosphere, which can be through design of a cultural institution and arrangements of cultural institution, express the innovative spirit of outstanding creative talents and creative ability to capacity, and from the innovative culture pursuing innovation and excellence. As Professor Sakesenning referred out, Silicon Valley flourished and Route 128 gradually declined, simply because they exist difference of environment of cultural institution and cultural backgrounds.

In Silicon Valley, competition between enterprises is very brutal, only a few companies can survive by the competition of survival of the fittest. However, even in the strong competitive pressure, internal loyalty and mutual agreement on the dominant technology can also unite the members of our industry. Competition requires constant innovation, and in turn, innovation requires cooperation among companies, which are so-called "paradox of Silicon Valley." In order to gain a competitive advantage, both interior of enterprise and exterior of enterprise, have formed a team spirit of mutual cooperation, engineers and experts through formal and informal information exchange and knowledge sharing, blurred the boundaries between employees and employers, the boundaries among companies, form a regional innovative network based on spectral technology. Construction and development of the human environment of hi-tech industry cluster differ from region to region, but have a common law. We can learn from effective models and methods of human environment of foreign hi-tech industrial cluster. Meanwhile, it is also necessary to consider our own cultural traditions and human values, and special effects on the establishment of human environment of hi-tech industrial clusters.

6 Conclusion

Although it is the soil of cluster enterprises which survive and develop, the organization ecological environment of hi-tech industrial cluster also may limit the development of the cluster enterprises. The relationship between the cluster and the environment is not simply to adapt, at the same time but to transform, to guide, even to create a new environment, which leads to the hi-tech industrial clusters towards a healthy, efficient, continuous direction. To a certain extent, cultural environment can lead to the success or failure of the hi-tech industries. The construction and development of the human environment of hi-tech industrial clusters vary due to regional differences, but also have common law. By studying and learning from the effective models and methods of the human environment in Silicon Valley, it is also necessary to consider their own cultural traditions and cultural values, special effects for the establishment of the human environment of hi-tech industrial clusters.

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An Exploration for the Rules of Hierarchical Design in Pictorial Map in Tourist Area*

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Abstract: Maps help pedestrian to find their orientation and destination in unfamiliar environment. The common maps follow the rules of proportion, and pay attention to the function. But the leisure maps are the special thematic maps which should combine functionality and entertainment. Considering different levels of the crowd, we should use a more freedom way to draw the leisure map. In this way, we can improve the usability of maps. This article is aimed at introducing the concept of pictorial maps and the ways of hierarchical design, through comparing and analyzing the characteristics of world famous tourist area, summarizing the design rules of pictorial maps and presenting the stratification in map design, then they can provide a train of thought for designers.

Key words: Tourist area; Pictorial maps; Hierarchical design; Information classification

1 Introduction

According to the tradition definition, maps all have rigorous foundation of mathematics. The exact map-making can lead the user to get his destination quickly. But there is a form different from other art which we called “pictorial maps” --- without mathematics and technology style. Early in the Renaissance, the pictorial maps were drawn by artists. They used them as a gift to the visited merchants in order to add more business opportunities.

Even in the science and technology developed today, the pictorial maps are still used in our daily life as a irreplaceable way in way-finding, including the site map, the navigation map in public places, the tourist maps and so on. This type of map has various forms and doesn't have a stable standard. The reasons for this situation are two: 1, There is a variety of art forms so the visual perception of information ability is different. 2, Some information of maps is complex and lack of planning. All the information is listed in the map but it's still hard to use. The former is a expression of individual style and the latter is a rational analysis and programming of information. By comparing the two, the latter is easily to hold, especially for less experienced graphic designers.

This article focuses on the discussion of information classification and the ways of hierarchical design in maps. According to the pictorial maps collected from world famous tourist area, discussing the design rules of classification area, map symbols, color, configuration and notes from information classification to visual layering, we can get feasible design proposals.



Figure 1 Pictorial Map -Islands of Adventure

2 Map Information Classifications and Map Design Layered

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Hierarchy division helps clear logical order and show the relationship between the contents in the case of the map information jumbled variety. According to the theme or the content of the tourist area maps classify the information into a complete system. In primary and secondary relation in of the tourist map between visual layering design performance, In order to achieve the transformation from the classification of the information to the visual hierarchy process.

Tourist map from the functional is classified as: tourist attractions / facilities, restaurants, shops and public service facilities, etc. Its content includes name, location, and details. When designing graphic map, because it can not all rely on the traditional method of drawing the maps, so when the map information formed into a complete system, it needs innovative design approach to transform the graphic information into visual elements to show on the map. Map information visualization is not only simply listed, but needs a more intuitive and stereo way to deconstruct and reorganize, in order to achieve a consistent visual experience and information communication.

Layered map design includes two modes: plane layered and solid layered. The plane layered is referred to the average distribution of the different nature of the individual information on the one floor. Solid layered is in accordance with certain rules to divide the tourist map into multiple layers, each layer on the distribution of different information. In the process of analysis design method of the tourist map, we will use the both two modes. Tourist map of graphic information planning is divided into two ways: (1) functional division (2) the first zoning division and then functional division. According to the two different ways of dividing information, corresponding map is also divided into plane layered and solid layered. Such as Figure2.

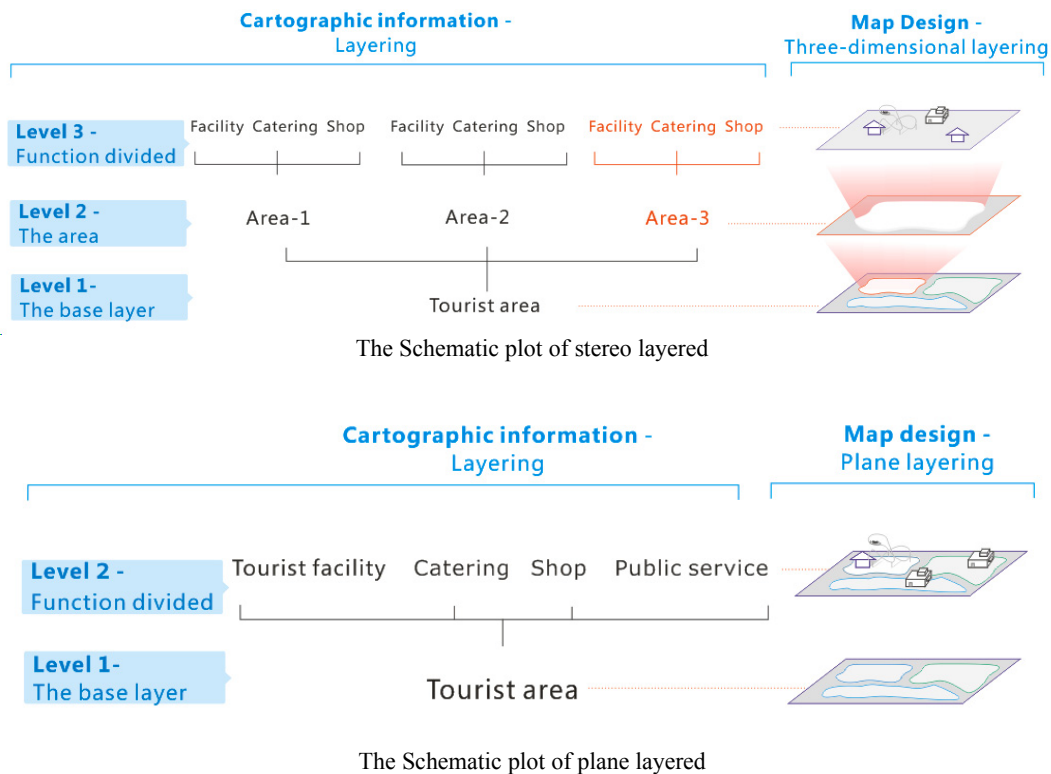


Figure 2 The Relationship Between Information Classified and Layered

3 The Relationship Between the Basement Elements of Pictorial Map in Tourist Area and the Hierarchical Design

The literature is lack of concrete analysis for pictorial maps in tourist area. So I collect a large number of maps, and choose 10 famous pictorial maps as samples. I sum up 9 common elements, and they are shown in Table 1:

10 maps are:

- ① Cedar Point [U.S.A] Ohio Sandusky
- ② Universal Studios Florida [U.S.A] Florida Orlando
- ③ Valdosta Wild Adventures [U.S.A] Georgia State

- ④ Islands of Adventure [U.S.A] Florida Orlando
- ⑤ Efteling [Netherlands] North Brabant
- ⑥ Wild Waters [U.S.A] Florida Ocala
- ⑦ Hong Kong Ocean Park [China] Hong Kong
- ⑧ Disneyland [China] Hong Kong
- ⑨ Guangzhou Chang Long Happy World [China] Guangzhou
- ⑩ Korea Lotte World [Korea] Seoul

Table 1 The Base Elements of Pictorial Map

Tourist map elements	Tourist map of graphic elements	Count
Base Map Elements	Route/communication network	10
	Area divided	5
	Boundary line	1
Tour Elements	Map mark	10
	Scenic spot/facility	10
Supplementary Elements	Annotation text	10
	Title	10
	Live-action photo	3
	Mascot	2

This paper tried to summarize the common elements of pictorial maps in tourist area based on the maps above.

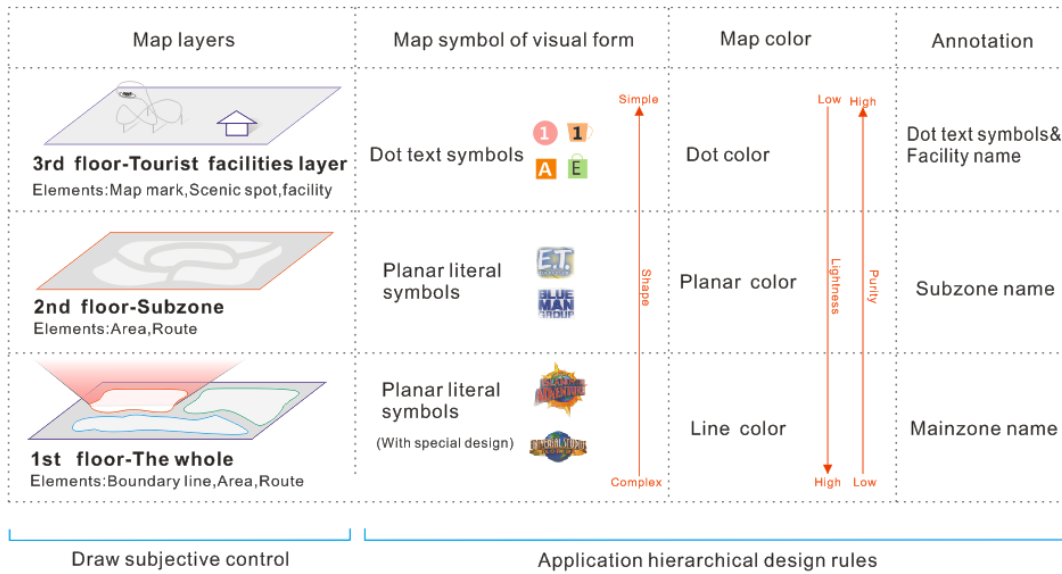


Figure 3 The Layering Show of Pictorial Map

From Figure 3 we can know that the route, area and the boundary line is drawn on the basis of objective environment. The map marks and the annotation text are the directly reflection of information, which added the drawers own subjective thinking.

Except for the information that can be delivered from symbols and marks in basement elements, the color of maps is another way to perform information. None of these three is performing information by a artistic way. They use efficient way to classify information in order to achieve the goal of fast recognition. The following will introduce the relationship among the three and the design principles.

3.1 The pictorial map symbol design based on layering

The symbol system is an important part of map. In the process of map design, we use map symbols to present the similarities and differences of different things in the space. In this way, we can reflect the different nature and important significance. This change of map symbols is called “visual variable” which first proposed by J.Bertin—a French cartography. The basic variable are: location, shape, measurement, orientation, color, annotation (text, number, font), luminance, density.

This passage is focusing on classification and planning of symbols in service facilities. After analysis of 10 pictorial maps of tourist area, getting a conclusion that the four variables: location, shape,

color and annotation, we can get that the symbols in pictorial maps are complex, so according to the different functions of facilities they are divided into two parts: public service facilities mark symbols and tourist facilities/scenic spots/shopping mark symbols. The public service facilities mark symbols is using international general graphics.

3.1.1 Public service facilities marked symbol variable statistics

The main shape of public facility symbols is square, but the use of color difference is bigger. There is blue-white and black-yellow color combination. This color combination is a common color in national public symbols. We should use common symbols and colors on pictorial maps in tourist area. The more colors, the easier visitors get visual confusion.

3.1.2 the various statistics of tourist facility/scenic spot/catering/shopping marked symbols

According to the classification of map symbols in visual form and the generalization from 10 maps, we can get a conclusion that the tourist area pictorial map is primarily using dot text symbols (shape+color+character/number).

Shape: The most commonly shape used to divide function is round and square (facility/scenic spot/catering/shopping). Sometimes it also uses connect in the mind to convey the information, especially in catering and shopping.

Annotation in picture: The annotation was divided into annotation in and out of picture. Annotation in picture means the characters and numbers hints corresponding to the symbols, and the annotation out of picture means extra explanation on the marked map symbol. In this passage specially means annotation in picture.

In the 10 maps collected, the annotation usually is letter and number in order to distinguish different unit. Using which way to make annotation is decided by the specific circumstance we draw maps.

3.2 The color design of pictorial map based on layering

The color of elements for base map and tourism of tourist area pictorial map is drawn by objective environment. There are varieties of color expression, but it doesn't mean that we can't have a system planning for colors. Under the circumstances of clearly readable information, we can have a layered design for colors after the information of map classified. There are color rules to follow in the relatively complex environment.

Color has three properties: hue, value and purity. The representation of colors on maps are: dot color, linear color and planar color.

Dot color means the color of dot symbols. They show the difference of individuals via different colors. The map symbols on 3rd layer of pictorial map mainly use dot colors.

Linear color mainly means the color of route and boundary lines. We use bright boundary lines to divide sections on pictorial maps. The linear color is usually used to divide bigger sections on the whole layer.

Planar color means colors used on a certain area. The main color in tourist area pictorial map is the base color. 5 of 10 collected maps use area divided color. And most of them use low concentration of contrasting colors.

From the related studies we can get the rules of color matching:

Choosing the color of area before color of symbol;

The color of area should be in line with the color of symbol. And we distinguish the two by purity and value. Generally speaking, area color has high value and symbol color has high purity.

3.3 The outside annotation design of pictorial map based on layering

There are 4 of 10 maps classified by functions of tourist area, and other 6 classified by sections. The ways to make annotation outside are 2. One is classified by functions, and another is classified by sections. If we use the former way, we should add names of facilities all by character symbols. For the latter way, first we should divide the area. Then divide facilities, catering and shopping and named under the function. We also should have layered explain for the elements in words on maps. In this way, the tourist will easily find their destination.

The advantage for this annotation is that they can have a comprehensive system of state map information framework. But there are disadvantages too: It may bring noise information at the same time. We should pay attention to the information arrangement when we design. There must have relationship between the color of annotation and the symbols. The annotation outside is the textual description for marked symbols. So they should have corresponding colors and the difference should be their purity.

4 Conclusions

The basic elements of tourist area maps include pattern element, tourist element and subsidiary element. Assist elements include notes, map topic/logo, mascot and real photos.

Symbolic system: Communal facilities would preferably use international symbols and colors, and avoid to use too many colors and difficult patterns.

Symbols for tourist facilities/view spot/shows/restaurant/shopping do not have specific patterns, so we can use regular geometrical patterns or relevant patterns. Among those, restaurant and shopping spot we mostly use relevant patterns. Sectional colors and symbolic colors usually change in pureness and pellucidity. Regularly symbolic colors will be higher than sectional colors in both pureness and pellucidity.

Look out for special symbols while drawing the map--entrance symbol. Using arrows and bright colors for they are easier to identify.

Use stratification to classify colors.

The area color have the same hue with symbol color. The higher the purity of area color is, the lower the purity is. To the color of symbol, the lower the hue is, the higher is the purity.

To sum up, we can get a series of basic and reasonable principles for designing by classifying the information together with designs on the tourist area map and excluding the disturbs from the art forms during drawing the map. Besides improving the designer's works, it may also become a reference of designing virtual maps in the future. People will see the tourist area maps' designs basing on not only designer's experience but also systematic information with better effects in the virtual way.

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A Study on the Influence of FDI, R&D on the Energy Intensity in Central Region

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Abstract: The thesis used the panel data of energy intensity, FDI and R&D in central region from 1998 to 2009, on the basis of panel unit root test, it found that there is long-term equilibrium relationship between energy intensity and FDI, and among energy intensity, FDI and R&D by cointegration test. From the panel regression analysis, we know that FDI can effectively reduce the energy intensity in the central region, namely FDI improved the technological progress in the central region biotechnology spillovers, and R&D is more effective in terms of reducing energy intensity. Meanwhile the thesis put forwards some corresponding policy recommendations.

Key words: Foreign direct investment; R&D; Energy Intensity

1 Introduction

China has a vast region; there is a big difference among different region in economic development level, technology level, opening up level and the resources endowment, etc. Due to the different degree of opening to the outside world, the impact on local energy efficiency of FDI in all different parts is different, too. Central area lies between east and west, has played an important role in linking the east and west. Researching the impact on energy efficiency to central region, can help to make effective opening-door policy, utilization of foreign direct investment to reduce energy intensity in the central region, these have a very important practical significance to realize energy-saving and cost-reducing in central region, to achieve the commitment of China made to the world about the target of energy conservation and emission reduction, and to the sustainable development road.

The influence of FDI to the relatively backward in host country on environment pollution and energy consumption, Lenard(1984) put forward that "Industry to escape Hypothesis" and "Pollution Haven Hypothesis", he thought that the more strict environmental policy in developed countries forced the energy-intensive and highly polluting industries transferred to developing countries. Meanwhile, developing countries may reduce their own environmental protection and energy requirements to attract FDI in order to develop economy, therefore, FDI has a large influence to industrial structure, energy consumption, and consumption structure^[1]. Blackman, etc.(1999) summarizes the foreign investment policy in the field of energy in China, came to the conclusion that FDI is conducive to China's energy efficiency^[2]. Mielnik and Goldemberg (2002) made a statistical regression with the sample of FDI and energy intensity in 20 developing countries, found that the increasing of FDI can significantly reduce energy intensity, the main reason is the presence of FDI technology spillover effect^[3]. Xian Zhou and Yong Zhang (2007) used the spatial regression model to analyze the spatial relations of FDI on energy intensity effect, and thought that FDI has significant spatial spillover effects^[4]. Zongcheng Yin, etc.(2008) used the time series from 1985 to 2006 in China, examined the influence direction and degree of FDI, human capital and science and technology research investment and industrial structure to energy efficiency in China. The result showed that FDI, human capital and science and technology research investment has significant positive effect to improve the energy efficiency in China^[5]. Puyang Sun, etc.(2011) built a panel data around the world covering 74 countries (including the industrialized countries and emerging market countries) from 1985 to 2008, and made verification to the hypothesis of "introduction of FDI can improve their energy efficiency, reduce energy consumption intensity"^[6]. Min Zhang (2012) used the time sequence data from 1986 to 2009, examined the different source of FDI and the relationship between Chinese energy consumption intensity, the result showed that FDI share change in different source on the impact of Chinese energy consumption intensity has a significant difference^[7].

On the one hand, FDI may create "Pollution Haven Hypothesis"; On the other hand, technology spillovers of FDI can improve energy efficiency. The reason is one country's technological progress can improve through technology spillover of FDI, and then to improve energy efficiency. Based on the above literature research, we can find that scholars in FDI and energy efficiency have not formed a consistent conclusion at present, and there are few literatures from the point of area to study the effect of FDI on energy intensity, and few literatures separately aimed at the impact of FDI on energy intensity in central region. Therefore, the article associates FDI, R&D and energy intensity, studying the relationship

between FDI, R&D and energy intensity in central region, in order to explore a new perspective for improving the efficiency of energy utilization in central China.

2 Variable Selection and Data Description

The article selects the sample panel data of six provinces (Jiangxi, Shanxi, Henan, Hunan, Hubei, and Anhui) from 1998 to 2009 to do empirical study. In order to eliminate the influence of price, all variables involving price metric are calculated in 2000 constant price.

2.1 Energy intensity

Energy intensity is the ratio of energy consumption and GDP or area total output value. It indicates the difference of economy development level, technology level in nation or region, it can reflect the energy utilize level in one region to some degree. Energy consumption data of six provinces in central region are from < China Energy Statistical Yearbook >, GDP data are from < China Statistical Yearbook >. The variable was got by energy consumption divided by the GDP expressed by constant price in 2000 in different provinces over years.

2.2 FDI

FDI is expressed by the actual utilization of foreign capital in six provinces of central region. The actual utilization of foreign capital is calculated by dollar in < China Statistical Yearbook >, as a result, by inquiry the RMB exchange rate of those years in < China Statistical Yearbook >, multiplying FDI expressed by dollar, we can get the FDI expressed by RMB, then changing it into the constant price in 2000 by fixed assets price index.

2.3 Independent R&D

The independent R&D in this article is expressed by R&D internal expenditure data. The price index is set to the weighted average of the consumer price index and the fixed assets price index, the weight of fixed assets price index is 0.45, the weight of consumer price index is 0.55. The R&D expenditure price index each year is converted by constant price in 2000. R&D internal expenditure data is from < China Technology Statistical Yearbook > over the years, fixed assets price index and consumer price index are from < China Statistical Yearbook > over the years.

2.4 Energy intensity, FDI and R&D coefficient of variation trend

The article calculated energy intensity, FDI and R&D coefficient of variation by formula of coefficient of variation, as shown in Figure 1.

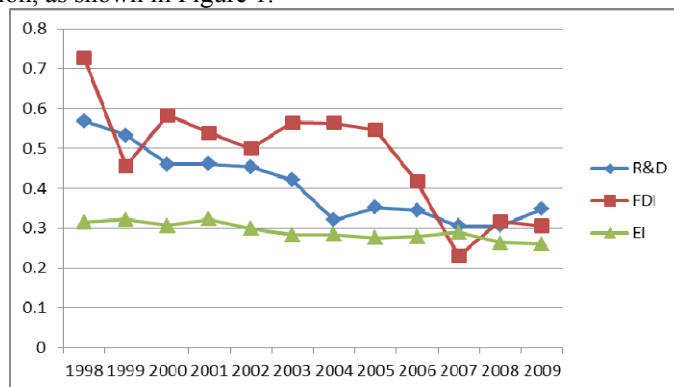


Figure 1 EI(Energy Intensity), FDI, R&D Coefficient of Variation Tendency Chart in Central Region

From figure 1, we can find that energy intensity, FDI and R&D of central region all showed an overall downward fluctuations, it indicated that the difference among three variables becomes small in central region. Among which, the change tendency of FDI and R&D coefficient of variation are stronger than the change tendency of energy intensity, the reason of which may be there is a certain rigidity in energy utilization technology, however, FDI and R&D are affected by the international and domestic economic development greatly, as a result, it exists a great fluctuation in a certain extent, but the overall difference is reducing.

2.5 Unit root test of panel data

In order to avoid "spurious regression" problem caused by non-stationary time series, it is necessary to make the panel unit root test at first. The article used five test methods to make stationary test to \ln FDI, \ln EI and \ln R&D separately for making the test results more robust. The result is shown in Table 1.

Table 1 Panel Unit Root Test Result

Test Method	lnFDI		lnEE		LnR&D	
	Horizontal Test Result	Difference of First Order Test Result	Horizontal Test Result	Difference of First Order Test Result	Horizontal Test Result	Difference of First Order Test Result
LLC	-0.7147 (0.2374)	-11.3673 (0.0000)	-0.2341 (0.4075)	-8.8050 (0.0000)	-1.6712 (0.0473)	-3.8428 (0.0001)
IPS	-0.1774 (0.4296)	-4.0777 (0.0000)	0.3239 (0.6270)	-2.7215 (0.0032)	-0.5836 (0.2797)	-1.6098 (0.0537)
ADF-Fisher	12.7385 (0.3883)	42.3036 (0.0000)	7.9033 (0.7926)	34.0644 (0.0007)	14.2583 (0.2845)	25.7585 (0.0116)
PP-Fisher	19.6302 (0.0744)	51.5620 (0.0000)	10.8149 (1.0000)	38.1024 (0.0001)	13.0947 (0.3622)	43.9067 (0.0000)
Hadri	4.5674 (0.0000)	4.2666 (0.0000)	4.4266 (0.0000)	5.8815 (0.0307)	2.9162 (0.0018)	7.7408 (0.0000)

Note :Different from Hadri test, the four tests in front:H₀:data is I(1),H₁:data is I(0).The data in parentheses represents the probability corresponding, that is p value.

The result of the five test methods above shows that horizontal quantity of lnFDI, lnEI and lnR&D are not stable, however, their difference of first order has stationary. Judging from these, all of the variables of lnFDI, lnEI and lnR&D are I(1) order of first order integrated, thus to satisfy the necessary condition of cointegration test.

2.6 Cointegration test of panel data

On the basis of unit root test, in order to ascertain whether the three variables have a long-term relationship, it is necessary to make further panel cointegration test. The article will make cointegration test for three pairs of variables. (1) lnEE, lnFDI and lnR&D, (2) lnEE and lnFDI. The result is shown in Table 2.

Table 2 Panel Cointegration Test Result

Statistic		Cointegration Relationship (1)	Cointegration Relationship (2)
Pedroni Test	Panel v	-1.264379 (0.8970)	6.307948 (0.0000)
	Panel PP	-0.792320 (0.2141)	-2.501815 (0.0062)
	Panel ADF	-4.432730 (0.0000)	-4.073775 (0.0000)
	Group PP	-2.077983 (0.0189)	-1.728464 (0.0420)
	Group ADF	-3.625500 (0.0424)	-3.781012 (0.0001)
Kao Test	ADF	-3.453091 (0.0003)	-1.629038 (0.0517)

Note: all the null hypothesis of tests is “non-existent cointegration relationship”. The data in parentheses represents the probability corresponding that is p value.

It indicated clearly from the various test methods result that the three pairs of variables exist cointegration relationship, that means there is a long-run equilibrium relationship among FDI, Energy intensity and R&D, in addition, FDI and energy intensity have long-run equilibrium relationship ,too.

2.7 Regression analysis

By the cointegration test shows above, FDI and energy intensity(EI) have long-run equilibrium relationship. Here, we make EI as the explained variable, FDI as the explanatory variable, to do regression analysis. The regression result is as follow:

$$\text{LnEI}=0.428135 -0.280718\text{LnFDI}$$

(0.0000) (0.0000)

$$R^2=0.997806, \text{Adj-}R^2=0.997603 \quad F=4926.201(0.0000)$$

The regression result showed that there is a significant negative correlation between EI and FDI, which means the introduction of foreign direct investment can effectively reduce the energy intensity in the central region.

Also, by the cointegration relationship, there is a long-run equilibrium relationship among FDI, Energy intensity and R&D. The article makes EI as the explained variable, FDI and R&D as the explanatory variable respectively, for studying the relationship among EI, FDI and R&D. Before using panel data to estimate the three pairs of variable, we make Hausman test and likelihood ratio test first, for judging whether to use fixed effect model or random effects model. The specific test result are shown in Table 3 and Table 4.

Table 3 Hausman Test

Test Summary	Chi-Sq statistic	Chi-Sq d.f	Prob
Cross-section random	9.160304	2	0.0103

Table 4 Likelihood Ratio Test

Effects	Statistic	d.f	Prob
Cross-section F	163.352862	(5.64)	0.0000
Cross-section Chi-Square	188.777303	5	0.0000

The corresponding P value of Hausman Test in Table 3 is less than 0.05, the null hypothesis should be rejected, we should establish individual fixed effects model. P value of Likelihood ratio test in Table 4 is 0, far less than 0.05, the null hypothesis should be rejected, we should establish individual fixed effects model. Therefore, given the above two kinds of tests, the individual fixed effects regression model is more appropriate. Here, we make regression analysis to EI, FDI and R&D, the regression results is shown in Table 5.

Table 5 The Regression Results of EI, FDI and R&D

Variable	Central Region
Constant Term	0.267724 (0.0000)
LnFDI	-0.026415 (0.0693)
LnR&D	-0.276552 (0.0000)
Adjusted R ²	0.968497
F Value	312.8222 (0.0000)

Note: P value is shown in brackets in the table

From Table 5, we know that the adjusted R² is 0.968497 in the model, and the F value is 312.8222, passed the test. It indicated that the model is reasonable. Foreign direct investment is significant at 10%, and the coefficient is negative, which shows that FDI can effectively reduce the energy intensity in central region, that means FDI improved the technical progress of central region by technology spillovers, and improved energy utilization efficiency of the central region. R&D is significant at 5%, and the coefficient is negative, which indicated that R&D also can reduce the energy intensity in central region. From the perspective of variable coefficient, the coefficient of R&D is 0.276552, far more than the coefficient of FDI 0.026415, which means in terms of reducing energy intensity, R&D is more effective.

3 Conclusion

As for policy recommendations, central region should further improve the level of introduction of FDI, taking full advantage of the superiority of FDI in improving regional technology progress. However, introducing FDI blindly is inadvisable, the quality of FDI is important. Central region should pay much attention to the quality and the combination of FDI technology and local energy utilization technology, the introduction of advanced technology and relatively backward technology are not desirable. Meanwhile, we should increase the level of R&D in central China, which can not only promote the local technology progress to a certain extent, but also can better to absorb the relatively advanced technology introducing by FDI, better to promote the reduction of energy intensity and improve energy utilization efficiency.

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A Study of Driving-Force/Press Impact Model for Green Supply Chain Management*

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Abstract: The green supply chain management has become a sustainable development strategy for enhancing international competitiveness in many developed countries. Green supply chain management is still at primary stage in China. Literature about green supply chain management at home and abroad was traced in the study. 'Press - status - response' (PSR) and 'driving force - status - response' (DSR) analysis models were adopted for constructing driving force/press impact model of enterprises to implement green supply chain management. The operating status of supply chain system was comprehensively analyzed for studying the resistance factors affecting implementation of green supply chain management in enterprises, and proposing countermeasures and suggestions in this paper.

Key words: Green supply chain management; Driving force/press impact model; Sustainable development; Resistance factors; Countermeasures

1 Introduction

Green supply chain management has become an important strategy for sustainable development in enterprises^[1] with increasingly stringent environmental production regulations, improvement of public environmental awareness as well as the continuous development of supply chain management. Green supply chain management aims at harmoniously developing environment, economy and society. All node enterprises on the supply chain can optimize overall efficiency of enterprises by cooperating with upstream and downstream enterprises as well as enterprise internal changes, thereby promoting sustainable development of enterprises and supply chain thereof. Min and Galle found that enterprises were not active enough to integrate environmental issues into supply chain management, and enterprise green management was mainly driven by reducing the responsibility of terminal disposal and meeting regulatory requirements rather than establishing environmental partnership^[2] according to green research on U.S. purchasing managers. Environmental management implemented in enterprises is mainly driven by regulations^[3]. Foreign developed countries have relatively mature study in the aspect of green supply chain management driving force. Green management is implemented in some international well-known large companies.

Green Supply Chain Management was relatively late studied in China. Driving force and press were rarely studied. The empirical study of Qu Ying, Zhu Qinghua, etc. (2007) proposed that main driving force and press for Chinese enterprises to implement green supply chain mainly lie in the follows: environmental requirements from enterprise suppliers and higher authorities, cost for implementing environment management in enterprises, foreign environmental regulations, environmental requirements of foreign companies, Chinese laws and regulations and green consumption concept^[5]. Some scholars qualitatively studied the barriers and incentives in implementing green supply chain management^{[6][7]}. However, there are relatively few literatures for comprehensively studying driving force, press and resistance in green supply chain management. Domestic and foreign literature about green supply chain management was tracked in this study. Main driving force and press factors promoting China's enterprises to implement green supply chain management was analyzed and studied. 'Press - status - response' (PSR) and 'driving force - status - response' (DSR) analysis models were adopted for constructing driving force/press impact model of green supply chain management. The resistance factors of implementing green supply chain management as well as countermeasures were discussed.

2 Construction of Driving Forces/ Press Impact Model for Green Supply Chain

* Fund Project: National Education Ministry Project (Project Number: 10YJA630162): Study of relationship between Guangxi traditional manufacturing green supply chain and enterprise green economy behavior; Guangxi University Talent Funded Project (Grant No.: 201050): Study of relationship between Guangxi automobile manufacturing green supply chain and enterprise low-carbon economy behavior.

Management

2.1 PSR and DSR Analysis Model

PSR analysis model was developed on the basis of concept model of sustainable development policy analysis commonly developed by European Organization for Economic Cooperation and Development (OECD) and the United Nations Environment Program (UNEP). A policy analysis concept based on causality was actually proposed in PSR model for explaining three basic questions of ‘What happens? What is current situation? How shall we handle?’ in policy analysis. DSR analysis model replaces PSR mode press into driving force aiming at adapting to addition of some new indicators, such as social, economic, institutional and other indicators.

2.2 Green Supply Chain Management Driving Force/Press Impact Model

Supply chain is a complex system composed of supplier, manufacturer, distributor, retailer and end customers. It is urgent for enterprises to implement green supply chain management since society and government pay much attention to increasingly serious resource and environmental problems. .

PSR analysis model inspires study on implementation of green supply chain management: 1)What happens? - the requirement impact of society and government on the environment is the press (P); 2)What is the current situation? - Low running efficiency of traditional supply chain is the status (S); 3) How shall we handle? Forcible implementation of green supply chain in enterprises is the response (R).

Traditional supply chain system aims at maximizing economic performance on each node. However, the green supply chain aims at maximizing enterprise overall economic performance, social performance and ecology jointly after environmental and social factors are added.

DSR analysis model provides new interpretation for studying green supply chain management: 1)What happens? - economic performance, social performance and ecological performance form the driving force (D); 2)What is the current situation? - Low efficiency of traditional supply chain efficiency is the status (S); 3) How shall we handle? - Active implementation of green supply chain management in enterprises is the response (R).

Social press and government press caused by resource shortages and environmental pollution do not directly drive enterprises to implement green supply chain management. The enterprise solves environmental problems by some resources to reduce external risks and ensure maximum economic benefits [8] [9] at all. Press is converted into driving force under certain conditions, thereby enabling enterprises to actively implement green supply chain management rather than passively implementing green supply chain management in the study. The model is constructed as figure 1.

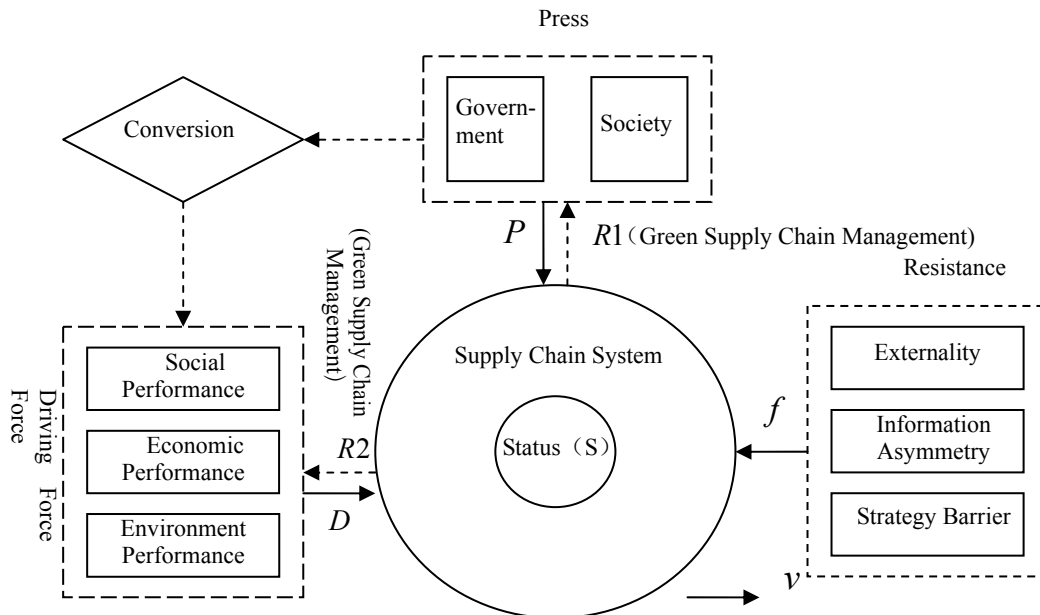


Figure 1 Green Supply Chain Management Driving Force/Press Impact Model

3 Analysis of Driving Force/Press Impact Model for Green Supply Chain Management

The driving force /press impact model for enterprise to implement green supply chain management is composed of press, driving force and resistance, which jointly affect enterprises in implementing green supply chain management.

It is hypothesized in the study that the green supply chain system is a ball on the desktop. The horizontal rightward velocity of the ball v represents the operation efficiency of green supply chain system. The ball is affected by horizontal rightward driving force D , vertical downward press P , horizontal leftward resistance f and the supporting force of desktop to the ball. When $D \leq f$ and $v = 0$, it indicates that the enterprise does not implement green supply chain management. When $D > f$ and $v > 0$, it indicates that the enterprise implements green supply chain management.

3.1 Analysis and Assumption of Press and Driving Force Factor

The press (P) on supply chain system comes from government and society as shown in Table 1. S refers to status of supply chain system. Green supply chain management is passively implemented as response ($R1$). The driving force (D) of supply chain system mainly comes from social performance, economic performance and ecological performance. Green supply chain management is actively implemented as response ($R2$). Assumption: all press and driving force factors are mutually independent. Press (P) does not affect the velocity of the ball (v), enterprises passively implement green supply chain management for converting press (P) into driving force (D) Since the force on the vertical direction is balanced.

Table 1 Associated Factors of Enterprises Under PSR and DSR Modes

Factors	Name	Description
Press (P)	Society (P_1)	Enhancement of consumer awareness of environmental protection, rise of green consumerism, etc.
	Government (P_2)	Domestic and foreign policies, laws and regulations about environmental protection, etc.
Driving Force (D)	Social performance ($D1$)	Serving customer, quality standards, high customer loyalty, etc.
	Economic performance ($D2$)	Cost saving, high market share, continued profit, etc.
	Environmental performance ($D3$)	Low environmental influence (side effects), high resource utilization rate, etc.
Status (S)	Environment pollution (S_1)	Production with high consumption and high pollution
	Resource waste (S_2)	Production with high input and low output
	Efficiency lowering (S_3)	Low efficiency of traditional supply chain operation
Response (R)	Response (R_1)	Enterprise passive implementation of green supply chain
	Response (R_2)	Enterprise active implementation of green supply

3.2 Resistance Factor Analysis

Most enterprises have driving force and press to carry out green supply chain management in China, which are not converted into practice [10]. If green supply chain management is not implemented in enterprises, ie $v = 0$, it is indicated that the resistance for enterprises to implement green supply chain management is greater than the driving force, namely, $D \leq f$, which mainly includes three factors in operation process of green supply chain: resource input externality, information asymmetry and green strategy obstacle.

3.2.1 Resource Input Externality

Externality refers that the individual utility function contains the actions of other people; it can be expressed as follows with the function formula: $F_j = F_j(X_{1j}, X_{2j}, \dots, X_{nj}, X_{mk})$ (1.1)

Where in, j is not equal to k ; F_j is welfare function of j ; X ($i = 1, 2, \dots, n, m$) refers to economic activity. j and k refer to different people (or vendors). It indicates that the revenue of individuals (or vendors) j is not only affected by economic activities controlled by themselves, but also is affected by economic activities controlled by other people (or vendors) k . The revenue of j can obtain profits due to economic activity of k when m is a positive number, namely, positive externality. The revenue of j will be lost due to k activities when m is negative, namely, negative externality.

Generally, externality is studied on the basis of discussion in the same time period, namely, j and k belong to economic entities in the same time period. However, it is clearly not enough to examine economic entity externality only from the same time period according to the study on green supply chain system pursuit of sustainable development goals. It is necessary to examine the externality from different time periods, ie j and k can belong to economic entities in different time periods. Resource is the input source of supply chain operations, which is necessary for operating the supply chain. Supply chain node is determined when its marginal revenue equals to marginal cost according to the resource input and development process due to the presence of self-interested behavior in the supply chain system. There are also externalities in different generations during the development process of the supply chain on resources. It should belong to the public (including the unborn generations) from the ownership point of view although the common property boundaries on resource are clear for collective (community, city, country or world), and every member of society has equal rights in the resource property^[11]. Contemporary must develop high-quality resources with high added value and high return rate in order to lower the resource use cost, thereby maximizing own utility. They ignore environmental costs, thereby leading to over-exploitation of resources and accelerated deterioration of environment.

3.2.2 Information Asymmetry

Information asymmetry theory is used for describing the influence of asymmetric distribution of related information between transaction parties on market transaction behavior on incomplete information market, as well as subsequent issues about market operation efficiency. Information asymmetry is mainly analysis in two aspects in the study, namely, information asymmetry of all nodes in the green supply chain system, and information asymmetry between consumer and green manufacturer on green product market.

The party with information advantage can obtain transaction behavior with relative advantage in the transaction process since each node in the supply chain asymmetrically masters related information on own trading behavior. The relative advantage is mainly reflected in developing internal price in internal market of supply chain system. If there is a supply chain composed of n nodes, the normal margin rate of green products implementing green supply chain management is r , the unit green cost is c , the green cost includes cost of green procurement, green packaging cost, green transportation cost, etc. the internal price of each node transaction in the supply chain is $p_i = c_i(1+r)$ (1.2) under the condition of information symmetry.

Wherein, p_i is price of the i th node, $i = 1, 2, \dots, n$; c_i is the green cost of i th node; r is normal margin rate of green product.

However, the information is asymmetric in actual economic activity. The party with information advantage can falsify the green cost c_i of product and develop higher internal price p_i in the internal market transaction process, thereby getting more profits. However, the exceeded profits are obtained with the expense of encroaching normal profit of other nodes on the green supply chain. The overall total profit on the green supply chain is unchanged. The driving force on the information disadvantage nodes for participating in green supply chain management is weakened, and green supply chain management can not be operated properly as a result.

All nodes of the market in the green supply chain system have information asymmetry on one hand, and the external product market also has information asymmetry phenomena between consumers and green producers on the other hand. Manufacturers are clear about whether their products are green and environment-friendly or not, but they often exaggerate the green and environment-friendly extent of products through media advertising in order to obtain greater profits and higher market share. Consumers can not distinguish green products from traditional products in the case of information asymmetry. The green products are generally replaced by traditional products, and the green supply chain system can not be operated properly as a result.

Examples: It is hypothesized that there are a traditional supply chain and a green supply chain in the market. S_1 refers to the supply curve of traditional supply chain to supply traditional product, while S_2 refers to the supply curve of green supply chain to supply green product. The demand curve of consumers on traditional product is D_1 . The demand curve on green products is D_2 . The general supply curve on the market can be described with $S(S = S_1 + S_2)$ as shown in figure 2 because consumers can not distinguish traditional products from green products on the market.

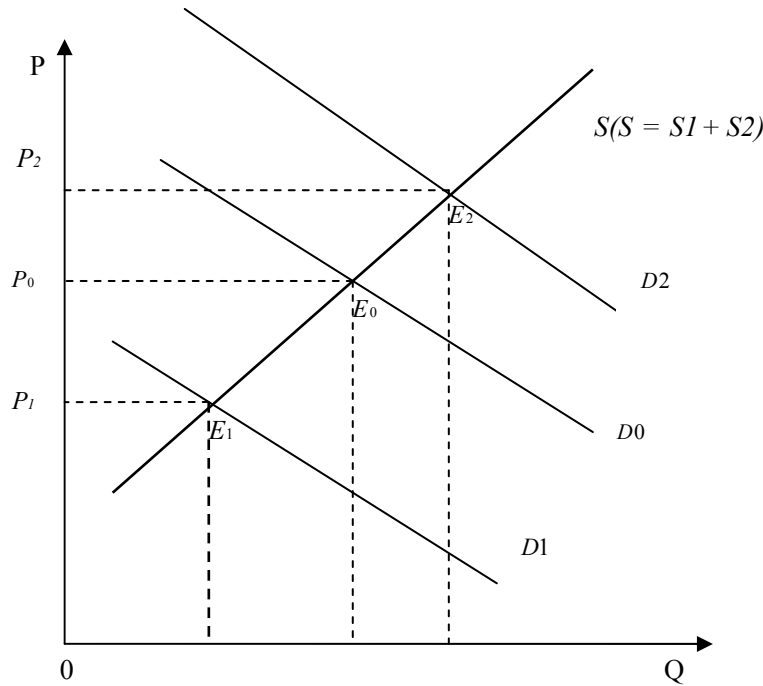


Figure 2 Market Competition Behavior Analysis of Traditional Product and Green Product

P_1 refers to equilibrium price of traditional products in the market, while P_2 refers to equilibrium price of green products. However, consumers may purchase traditional products according to P_2 price since the aggregate supply curve is composed of traditional product supply curve and green product supply curve. It is hypothesized that: the possibility for consumers to estimate own purchased green products and traditional products according to recognition is respectively e and $(1 - e)$, and the actual demand curve is: $D_0 = (1 - e)D_1 + eD_2$ (1.3)

Actual price is: $P_0 = (1 - e)P_1 + eP_2$ (1.4)

Assumption: r refers to market normal margin, C_1 for the unit cost of traditional product, C_2 for green product unit cost, apparently $C_1 < C_2$. $P_1 = C_1(1 + r)$ $P_2 = C_2(1 + r)$ (1.5) is available under completely competitive market conditions.

Profit rates of traditional products and green products are obtained as follows respectively according to formula 1.4 and formula 1.5

$$r_1 = \frac{p_0 - C_1}{C_1} = r + \frac{e(1+r)(C_2 - C_1)}{C_1} \quad r_2 = \frac{p_0 - C_2}{C_2} = r - \frac{(1 - e)(1+r)(C_2 - C_1)}{C_2} \quad (1.6)$$

The traditional product profit rate r_1 is larger than the product market normal profit r since $C_1 < C_2$. However, the profit rate r_2 of green product is less than market normal profit r of product, namely, $r_2 < r < r_1$ (1.7)

The actual market price P_0 is not beneficial for the green product provided by green supply chain. The supply of green products is reduced on green supply chain system as a result. Consumers' possibility e to estimate own purchase of green products will be decreased due to the reduction of green products, thereby further increasing $\Delta r (\Delta r = r - r_2)$. The green product supply will be further reduced on green supply chain system, and the system will eventually retreat from the supply of green products and turn to provide traditional products in traditional supply chain.

3.2.3 Green Strategy Barrier

More and more domestic enterprises treat supply chain management as enterprise development

strategy at present. However, fewer enterprises treat green supply chain management as enterprise development strategy. It is difficult for enterprises to implement green supply chain management due to weak environmental protection consciousness and imperfect environmental protection system. Firstly, many enterprises ignore the negative externality of environmental problems in developing enterprise development strategies, and believe that cost will be increased if enterprise implements environmental management, which is contrary to the objective of maximizing enterprise value. Secondly, Chinese citizens have not formed concept of green consumption as a whole although their consumption awareness is directed to green products. The citizens are not fully aware of the importance of green consumption on environmental protection prior control. Thirdly, environmental protection system needs strengthening, enterprise pollution behaviors are lightly punished at present according to China's laws and regulations without effective supervision. For example, existing sewage discharge charge collection standards are much lower than the pollution comprehensive management costs. Enterprises always pay sewage discharge charge from the cost-benefit point of view rather than governing the produced pollution.

4 Conclusions

Green supply chain system can not function properly because the resistance factor is greater than driving force factor. The resistance mainly lies in three aspects of resource input externality information asymmetry and green strategy barrier. The following measures are proposed in this study for reducing the resistance of green supply chain system, and meeting conditions of normal operation in green supply chain system, namely, making driving force greater than the resistance:

Firstly, green investment funds should be established; Green investment fund refers that the investment objects are screened according to enterprise social, economic and environmental comprehensive performance for investment in the stock market. Green investment fund is assessed according to social, economic and environmental comprehensive performance, thereby effectively reducing the external barriers of resource input in supply chain. Special green investment fund can be composed of donations from governments, individuals, enterprise, consortia, NGO etc, thereby providing fund support for enterprises to implement green supply chain management.

Secondly, information sharing platform should be established. Information asymmetry lies in all nodes in the green supply chain system, while information is also asymmetrical in product market externally. The local area network information sharing platform for connecting all nodes can be established inside the supply chain, while Internet information sharing platform between supply chain system and the consumers can be established outside the supply chain as shown in figure 3. The information sharing platform in the supply chain can be established by core enterprises of supply chain. The information sharing platform outside the supply chain is established by government.

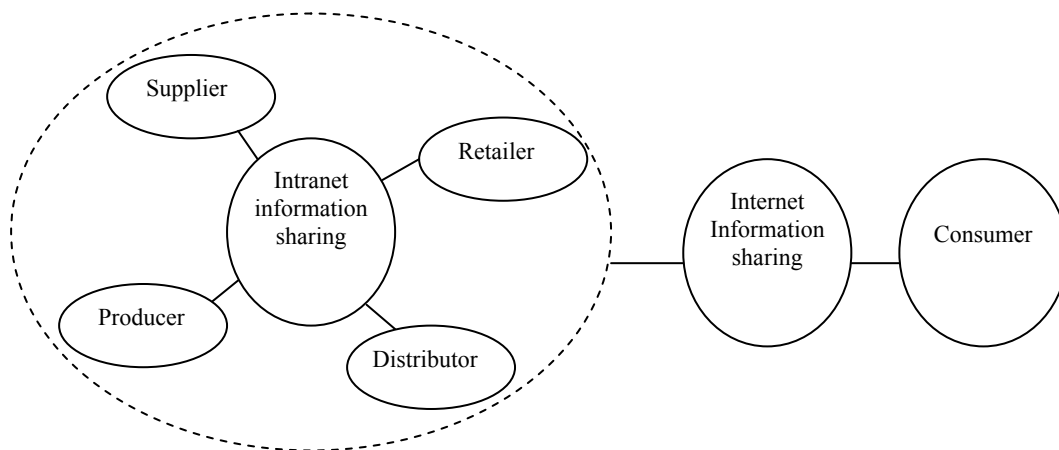


Figure 3 Green Supply Chain Information Sharing Platform Based on Intranet/Internet

Thirdly, green accounting should be implemented. Only economic efficiency of enterprises can be accounted in enterprise financial reports in the traditional supply chain, which ignore enterprise environmental efficiency and social benefits accounting. Green supply chain not only takes into account the economic efficiency of enterprises, but also considers the environmental and social benefits.

Therefore, "green accounting" should be implemented in green supply chain management, i.e. traditional economic benefit accounting accounts should be expanded to integrated accounting accounts including economic, environmental and social benefits. Enterprise financial report includes both economic benefit information and information on environmental and social benefits by green accounting, which has important practical significance. The public can obtain data about enterprise social benefit, thereby enhancing the concept of green consumption, while the government can get data about enterprise environmental benefits, thereby establishing more comprehensive system of environmental protection accordingly. The enterprise development goals are converted from maximizing economic efficiency into maximizing economic benefits, environmental benefits and social benefits jointly. It is bound to treat green supply chain management as enterprise development strategy.

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A Research Based on the Local Literature Service Mode under the New Media Environment*

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Abstract: This paper analyzes the present situation of the local literature service mode or environment as a traditional service environment together with the service bottlenecks, and discusses the change to this local service mode under the new media digital environment and innovation. Mainly from the service perspective this paper discusses the intelligent service platform, to improve the depth of the service level, and also the service concept development in the field of subject specialization. Finally a proposal for the local service development direction and prospects is made.

Key words: New media environment; Place literature; Service mode; Change; Innovation

1 Introduction

Local literature as a collection of characteristic literature resources of university library, is a reflection of a certain area of the economy, culture, politics, history, geography, natural resources, science and technology is the floorboard of the literature resources. As new media tools are widely applied in library information science, local literature service mode and fundamental changes have taken place. Traditional local literature service mode has not adapted to the current rapid development of Internet of things era information requirements. The author in March 2012 in hubei province at all levels of the library for the special questionnaire investigation, summarizes the conclusion after all survey data: consciousness of local literature service concept is relatively backward, service efficiency and quality is not high, less number of professionals engaged in the local literature, service mode and the domain is extremely narrow and related conclusions. Especially in new media environment, the information users high expectations on the local literature service model, which requires the library's local literature service to adapt to the current readers' information demand under the new media environment. Using digital technology, network technology, mobile technology, through the Internet and wireless communication network, satellite channels and computers, mobile phones, digital TV terminal in the local literature service work is the trend of the current mainstream in library service, but also to engage in local literature workers put forward the new responsibility and mission.

2 The Status of Current Local Literature Service

2.1 Backward service idea, service consciousness

On the concept of local literature service, is still the continuation of the traditional library information service with the center of literature thought, no more to consider the importance of readers, lack of deep and characteristic of information service^[1]. In library local literature service work, many librarians didn't realize the importance of local literature service in theory and in practice and is bound by traditional concepts and mind-set. Service mode is very passive, waiting for the documents the user visits, lack of initiative service consciousness, active development of local literature information is insufficient. Make a rich and distinctive can not effectively use information resources of library, create rich of local literature resources are idle in library stacks cannot play their literature value^[2].

2.2 Service strength weak, backward service level

After registration of registered in the local literature seminar in hubei province of librarians in questionnaire survey, after finishing summary for library local literature service personnel at all levels education background survey results (table 1), for example.

Service personnel degree level is uneven, service technical force is weak, cause local literature service does not reach the designated position, service level is uneven. After each type of library local literature service in hubei province the result of the questionnaire summary and analysis, from local

* This paper is supported by yuyang normal college youth in 2010 project "development and utilization of local literature research" (project number: 2010C04) and "three periods of the ministry of education CALIS 'wudang culture characteristic database project' instructional project (project number: 4401 - HUB - 507) was one of the research results

literature service personnel's education level analysis (see figure 1) : the specialized level of librarians can only do some simple work of literature retrieval, accounts for about 90%; Research subject service and the active service accounts for the proportion of about 10%, and for some innovation level and the heart is unable to work. Bachelor's degree in librarians relative to improve service levels, can carry on some research service auxiliary service work, but not heavy, the proportion of about 30%; Master degree of librarians in the information retrieval services proportion fell to 50%, and to develop service for teaching and scientific research and the proportion of data mining project is on the rise, accounted for 20% and 20% respectively; Doctoral degree deep subject librarians can do some service, such as: service research, data mining, information integration, information platform construction, etc. A high level of service, can effectively to develop the depth of local literature. But the reality is the library staff in master and doctor of the proportion of less, can't form the team strength local literature development. Various library local literature service work, therefore, there is still a service team strength is weak, the service level and reader demand growing literature also has very big disparity.

Table 1 All levels of Local Literature Service Librarians' Education Background Questionnaire

Quantity and degree Distributing type	Distribute copies	Recycling number	The recovery	Degree			
				College degree	Bachelor's degree	Graduate degrees	Doctoral degree
County library	30	28	90%	95%	5%	nothing	nothing
Higher vocational college library	50	40	80%	80%	15%	5%	nothing
University college library	40	35	88%	15%	30%	50%	5%
National library of province	10	8	80%	nothing	10%	75%	15%

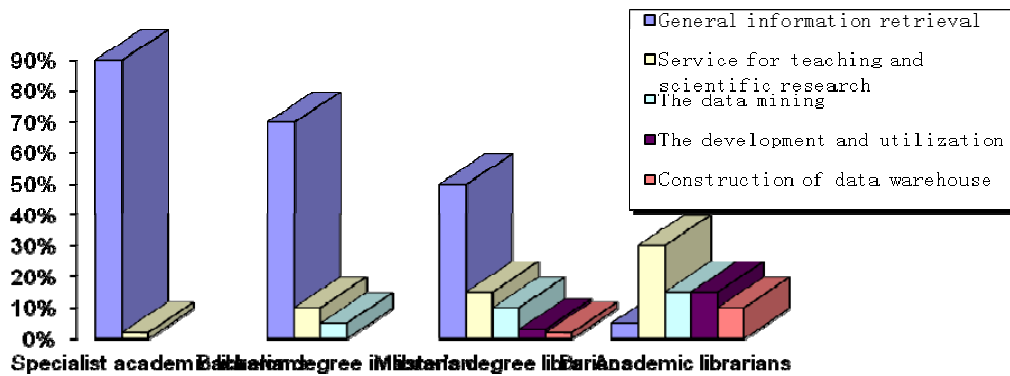


Figure 1 The Degree Level and Local Literature Service Type Proportion Relationship Chart

2.3 Service quality is not high, a single service model

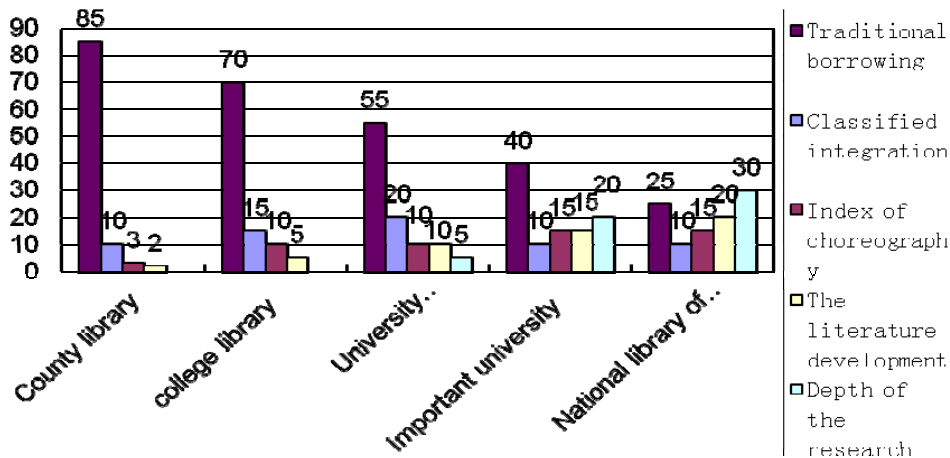


Figure 2 Each Type of Relationship Between Library and Local Literature Service Mode Ratio Charts

Through the analysis of the local literature service questionnaire survey statistics for each type library local literature service project in hubei province, found that at present basically establish the local literature service model in the traditional literature service mode based on borrowed. Main show is insufficient amount of literature, service methods, document resources distribution uneven, local literature service quality and efficiency not higher status^[3]. From each type of relationship between library and local literature service mode percentage chart (see figure 2) can be seen that the traditional circulation pattern in the counties and cities occupy high proportion of the state and the undergraduate course colleges and universities library: about 85%;70%;, and integrating the classification, development of literature service project occupies proportion is small, almost zero depth development. Level rising, but with the library local literature service quality gradually ascend, diversified local literature service mode are complex, diverse direction development.

2.4 Narrow inaccurate positioning, service fields

Throughout the various types of library's local literature service mode can be found that local literature service of positioning is not clear, target is not clear, service sector is very narrow. Traditional simple literature service mode occupy high proportion. The high standard, high quality, occupy a very small proportion of the high level of service. Through the analysis of local literature, questionnaire survey, refer to the hubei province cultural department of local literature statistical reports concluded that local literature service group services in relation to the chart (as shown in figure 3) : the proportion of local literature service for teaching and research accounts for 53%, the proportion is larger; Archaeological history revision occupies 21%; To serve local economic economy accounts for 15%; Macro decision-making for the government hold only 11% of the proportion, some less. Disadvantages of these service models and bottleneck in local literature service platform has been unable to deeper levels of development, make the library local literature service level has been lagging behind the current intelligence service technical level.

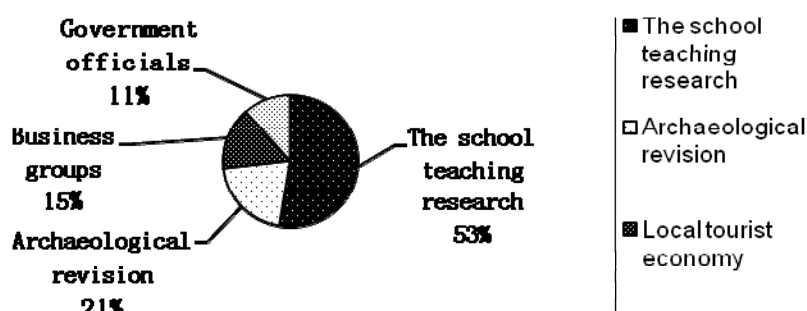


Figure 3 The Local Literature Service Group Servicesin Relation to the Rate Chart

3 Change of The Local Literature Service Mode

Readers way of reading under the new media environment and habits change, local literature service mode in the intelligent, the direction of specialization, depth and expand^[4]. As the government departments at all levels have stepped up efforts for the development of local cultural resources, but also in policy, funding, personnel, technology gives certain tilt. Through the guidance of government policy, will be disordered and complex restructuring local literature focus on integration in together, form the literature resource pool. So you can make local literature resources better for readers to use, for scientific research, as used by the government. Local literature service has strong mergence and ages. As engaged in the local literature service workers should extend service field width, expand function and range of professional services, the traditional local literature service combined with the current library service concept knowledge organization, found that latest dig into it, in a flexible and intelligent service concept to promote change and innovation of local literature service.

3.1 Service concept constantly advancing, the service object gradually broad

Local literature service means now with the development of science and technology and the huge change, service concept closely combine with today's advanced science and technology unceasingly, the service object is also gradually spread to the public from professional readers. Especially in modern library reference consultation, sdi service, subject librarians, topic tracking, document searching, universal search, intelligent services service mode has been gradually applied to the local literature service system in^[5]. The modern advanced science and technology level of local literature resources use and development has played a very important role, for the user of the services is more broad. Traditional

local service scope radiation only campus readership, influencing factors is limited. And the wide application of digital technology and network technology makes the local literature service concept gradually with today's technology. Service object is also gradually spread across professional, at all levels and in all areas of each group.

3.2 More remarkable services librarian to professional, the service level

Services provided by the local literature service librarians by non-professional gradually turned to professional transformation. Service team gradually by the part-time staff before the transition to professional senior consulting research librarian. Related statistical data, the author combined with hubei province library after the local literature in a survey data analysis, concludes that hubei province each type library local literature service team of record of formal schooling and title TAB (see figure 4) can be seen: local literature service of librarians' education level are improved, by the general university and college education gradually to the master, doctor degree in transition. Title structure more reasonable, gradually promoted from assistant librarian to research librarian. More and more highly educated and high title of professional librarians are in position on the local culture service. As the service team of high degree, high title librarians ratio increased. Local literature towards professional service teams are starting to service groups also gradually to high-end services, service level is more distinct.

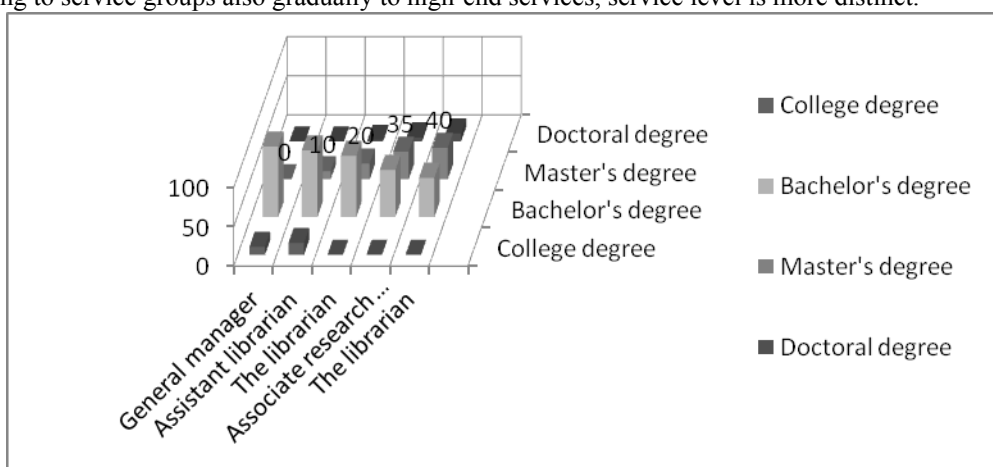


Figure 4 The Degree of Local Literature Service Team With Professional Titles Proportion Relationship Chart

3.3 Gradually improve service quality, service methods are varied

With the continuous development of library cause, the local literature service quality also gradually improve, local literature service quality also gradually from the shallow, passive, low-end, decentralized to the depth, active, high-end, integrated direction [6]. Service mode also gradually from a single literature borrowing, indoor reading services extended to the academic forum and so on some knowledge, academic service level, service quality has gradually improve. Such as local literature forum, regularly invited experts and scholars local literature academic exchange meetings and other forms of activities. In addition service method has various forms, rich and colorful. Through local literature show films, local literature resources development strategy seminar held a variety of activities such as make the jobs of local literature service development situation gradually formed a "heat island effect" makes the local literature service quality have greatly improved.

Such as local literature service extension project in our school invited a Taoism culture, han river, automobile, exile, the three leading figures in the field of culture, the book of culture research: YuBin, Yang Lizhi, rao to bite into, Wang Xuefan forum, experts and scholars to open local culture can not only lead the research direction of local culture, so on sets up the local literature service brand plays an extremely important exemplary role.

3.4 Service technology to deepen and service areas continue to expand

In current local literature service technology, the use of knowledge map, weibo, micro letter, databases, information pushing, qr codes and constructing an RSS technology for users to access business such as trend analysis, the contact between the knowledge work can make local literature service technology becomes more mature. We use the books management system management system, advanced to dig deeper into the car culture. Bibliographic retrieval results from a car culture collection figure related to car culture library as shown in diagram (see figure 5, 6) : car culture aspects of books

by automation system will auto culture through the library's analysis of data and connection of knowledge map visualization can be observed from different latitudes, and local culture more in-depth knowledge of a link between the observation and analysis. In order to more in-depth mining knowledge depth of local literature.

The screenshot displays a library catalog entry for the book "Cartography: thematic map design" by Borden D. Dent. The entry includes the following information:

- 题名/责任者:** Cartography : thematic map design / Borden D. Dent.
- 版本说明:** 5th ed.
- 出版发行项:** Boston : WCB/McGraw-Hill, c1999.
- ISBN:** 9780097304959 (acid-free paper) :
- 载体形态项:** xiv, 417 p. : ill. (some col.) ; maps (some col.) ; 29 cm.
- 个人责任者:** Dent, Borden D.
- 论丛主题:** Cartography.
- 论题主题:** Thematic maps.
- 中图法分类号:** P285
- 科图法分类号:** 56.193
- 书目附注:** Includes bibliographical references and index.

On the right side of the page, there are sections for "相关资源" (Related Resources) featuring links to "豆瓣读书" (Douban Reading) and "当当网" (Dangdang.com), and "把本书分享到" (Share this book to) with various social media and utility icons like EverNote, 微博 (Weibo), and 腾讯微博 (Tencent Weibo).

Figure 5 Car Culture Figure Library Bibliographic Retrieval Results

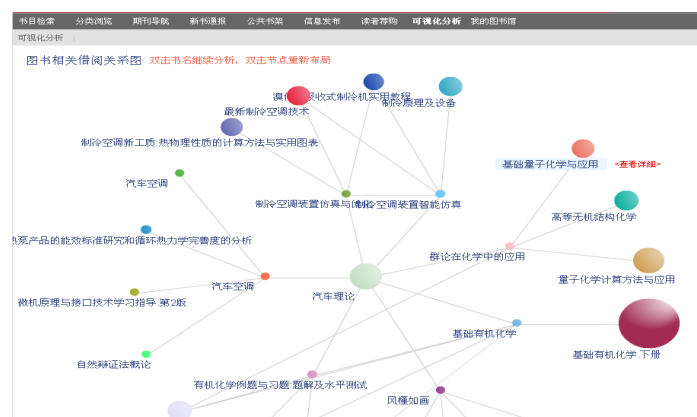


Figure 6 Car Culture Related Library Diagram

4 Local Literature Service Mode

4.1 The innovation of the service concept

Library service concept is the basic principle of guide library service work, is the main component of the overall project. Is the library user service principle, attitude, service mode. For digital and network into the characteristics of modern university library, set up the new service concept is not only their own development needs, is also a response to various challenges under the network environment of competition needs [7]. Local literature service mode of university library under the network environment should have the latest service concept. Using current advanced mobile service platform to carry out the palm reading local literature pattern (mobile), WIFI, etc., to carry out the library's "knowledge service", "intelligence services", "topic" service model, the innovation of the local literature service ideas and means.

4.2 Service technology upgrades

As new media communication technology matures, the library local literature service technology has development in the direction of intelligent, networked and digitized. Knowledge to promote integration and docking with the mainstream media gradually. Blog, BBS, micro bo, micro letter, fetion, QQ group, group of micro letter, fetion group messaging tools such as accepted by the public gradually. Qr code from mobile phone in library bibliographic query system application (figure 7) as can be seen. Readers can direct use of mobile phones will qr code to convert bibliographic information to text information retrieval related literature. Readers at the same time also can use weibo with instant online consulting (as shown in figure 8) : the development of information technology drives the escalation of local literature service technology. As the latest scientific research analysis and evaluation tools such as academic search, database in library local literature service system, the application of these advanced information interchange tool will greatly promote the refinement and deepening the service function of library's local literature.



Figure 7 Phone Qr Code In a Library Bibliographic Query System Applications



Figure 8 Weibo Consulting Service In the Library Application

4.3 Transformation of service mode

Across the land to build local literature. Use academic conference, the aggregate special local literature resources in university library. Through scientific research and academic guidance, to make local literature service specialization, characterization and clustering, brand development pattern [8]. Increase the intensity of local literature service project development, actively carry out local literature forum, the forum of "jingchu" culture; academic exchange activities such as tai chi wudang BBS, can make local literature resources more fully by the scholars. In addition special literature exhibition activities. Will local historical data exchange exhibitions, rubbing, etc; Out of hubei, and promote the wudang between different provinces, literature of hanshui culture exchange activities; Collection, wudang Taoism classics into Taiwan, and Taiwan culture sector to carry out cultural exchanges, with cultural exchanges to promote cross-strait exchanges and cooperation. In addition can also further abroad, to Singapore, South Korea, Malaysia and other countries of wudang literature communication. Really use cultural transmission power scope and field of promoting local literature service. The local literature service of this region to do deep, wide, do strong, do big, do really become culture communication facilitator and enabler of cultural development.

4.4 Development in the field of service

Promote the docking and sharing of local literature platform, service regional economy, promoting the development of local culture. Local literature with 211 schools and 985 colleges and universities cooperation projects. Use high school the abundant technical force and advanced technology and equipment, development, sharing of local literature resources. Through resource integration, technology innovation, to assist the development, mutual benefit cooperation mode, local literature resources in the implication of the literature information digitalization, intensive and public welfare^[9]. Local literature services from pure academic services to service culture, tourism, education, publishing, the Internet industry. Using new media communication tools such as micro letter with qr code identification function, information pushing, information customization, the latest trend of service means such as RSS, constantly digging potential of local literature information resources, establish local literature service department cost region cultural information consultation center of authority.

In addition, must enhance the cooperation with the competent department of culture. Such as museums, cultural centers, art communication. Actively to the government office of local Chronicles understand today's latest research field and relevant government policies. Increased cooperation with tourism departments, to embed the culture elements of local literature classics tourist landscape layout.

Made Suggestions or offered plans to the government department in charge of planning, in the city planning and construction, into the properties and characteristics of local culture. Such as YunXiXiantianhe went into cultural square in Chinese cultural elements. Fangxiancounty of cultural square in the book of songs into the cultural factors. In addition to the danjiangkou water theme park is set with a lot of han river, such as immigration culture elements in it. So say: library local literature service radiation field can be popularized in culture, tourism, urban construction, government policy, education publishing plays a distinctive features such as, produce great social effects.

Combined with regional characteristics as our local literature service project to carry out some of the more characteristics. Such as: to carry out the collection of wudang culture and the culture of han river, development and mining, wudang literature service center was established, offer the experts and scholars of our university in wudang culture knowledge mining. Also often with of shiyan government local historical office to strengthen cooperation, long-term and wuhan university, huazhong normal university, the deployment of colleges and universities to carry out the local literature research project of research, make full use of the library collection literature richness of effective local literature service work, has been the industry peer recognition, some provincial librarians have also follow to learn. Our local literature service in serving local economic construction, scientific research and teaching, tourism and cultural aspects to explore the many worthy of promotion experience, has led to other paid attention to the service of local literature work of university library, has a strong demonstration and leading.

5 Conclusion

Hubei Northwest local literature development and utilization of chongqing should accelerate the construction of shiyanEYuShan adjacent to the regional central city with strong literature guarantee support. As a local university libraries should actively undertake to speed up the build strategic pivot to new mission of local colleges. Bigger and stronger regional local literature service center, integrate the existing literature resources, and increase with 985 colleges and universities, government, culture and tourism department cooperation, improve the local literature service team cohesion and influence, with scientific research and academic guidance driving the development and utilization of literature resources. To seize new opportunities, development platform, for the development of local education, culture, tourism and economy to provide a compendium of high quality support services, encourages local characteristics gradually formed in the local literature service in university library service brand. Make special local resources, improve the contribution rate of colleges and universities to local economic and social development, which provide solid literature for regional center city building security support.

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Exploring Low-Carbon Development Model in China

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Abstract: This paper puts forward a low-carbon development principle which combines practices of carbon reduction and sequestration with a focus on the latter approach. It proposes a low-carbon development model in China, in order to reduce carbon emissions at source as well as throughout operational processes, achieve terminal biological carbon sequestration, and promote coordinated development between industrial and agricultural sectors through domestic carbon trading.

In order to reduce economic-related carbon emissions, efforts need to be made so as to utilizing low-carbon raw materials and extraction technology to reduce CO₂ emissions at source; saving energy and reducing consumption during the whole process of material exploitation, production and terminal consumption; promoting agro-forestry to increase food yields; developing bio-energy and improving the soil to enhance carbon sinks; and speeding up the carbon recycle and carbon sequestration, to eliminate terminal CO₂ accumulation.

In addition, by referring to the clean development mechanism (CDM), China's industrial and mining enterprises can compromise emissions between themselves. Through off-site carbon sequestration in the agricultural sector, low cost emissions reductions will also be achieved. All these methods will lead to a low carbon economy which does not compromise GDP growth rate and people's living standards. Meanwhile, these methods will provide solutions to issues connected with national energy security, food security, environmental safety, the protection of arable land, urbanization, improvement of the agriculture by the industry, the "Three Rural Issues" (agriculture, rural areas and peasants), thus enabling the country to achieve its low-carbon goals over a long period of time.

Key words: Low-carbon economy; Development model; Low-carbonization; Source; Process; Terminal; Carbon Trading model

1 Introduction

To reduce CO₂ emissions in order to achieve green and low carbon development has become a global agenda. Tackling climate change caused by emissions of CO₂ and other greenhouse gases has become one of the world's biggest environmental challenges. As the climate deteriorates, its impacts have drawn increased attention all over the world. Adopting a low-carbon pathway is believed to be a strategy to combat climate change while also achieving GDP growth, social and ecological development. Under this global trend and with its own goals, China is moving forward to a low-carbon era. As the largest coal consumer and the second largest energy user in the world, China emitted 6 billion tons of carbon dioxide equivalents (tCO₂e) in 2008, surpassing the US to become the global leading emitter. Considering its current GDP growth pace, China's CO₂ emissions will rise by 3% on a yearly basis in the coming years. In response, China has set a target to reduce by 2020 its carbon emissions per unit of GDP by 40-45% than 2005.

In China, unbalanced, uncoordinated and unsustainable development is a prominent issue. To solve this problem, the critical task is to strength the conservation of resources so as to drive economic development. As a big country undertaking international responsibilities, China is doing everything possible to cut its emissions while reducing the carbon intensity. Meanwhile, the country is still facing many issues and challenges, such as food and energy security, preservation of arable land from falling below 120 million hectares, shortage of land caused by urbanization and industrialization, industrial restructuring and efficiency improvement, increased gap between rural and urban incomes, the "Three Rural Issues", energy saving and consumption reductions, as well as environmental protection.

In response to the above-mentioned challenges, the author proposes a low-carbon principle consisting of efforts in carbon reduction and sequestration as well as a focus on the latter. Under this principle, a low-carbon model is to be created in order to achieve carbon emissions reductions at source and throughout operational processes, to facilitate terminal biological carbon sequestration, and to sustain industrial and agricultural development by means of domestic carbon trading.

2 To Avoid High Emissions at Source

In modern industrial production processes, most raw materials come from a variety of sources and are exploited using different methods, which cause different levels of CO₂ emissions. So applying appropriate methods to exploit suitable raw materials will help avoid unnecessary emissions at source. This has proven to be one of the most effective ways to cut emissions. This approach requires support from national policies in taxation, industrial restructuring and upgrading, as well as rational energy pricing mechanisms^[1]. Taking coal-fired power stations as an example, choosing fine coal with low dust and proper excess air ratio can effectively reduce the amount of flue gas and loss of waste heat, thereby enhancing the utilization ratio of coal and cutting CO₂ emissions. Similar results could be achieved by applying the circulating fluidized bed (CFB) and the integrated gasification combined cycle (IGCC) technologies, as well as poly generation and ultra supercritical power generation. Taking the technology to produce synthetic methane as an example, the methane content of the synthetic gas which is produced by using lignite and long-flame coal through Lurgi and CFB pyrolysis gasification processes is about 10% higher than that produced through the entrained-bed gasification process. Technical calculations show that the former processes consume less coal, energy and oxygen, thus creating less CO₂ emissions. The CFB pyrolysis gasification process features dry ash extraction, relative easier heat exchange and low water consumption. And unlike the Lurgi process, the CFB pyrolysis gasification process does not create coal tar, nor does it result in producing phenolic wastewater. Thus the CFB process consumes less energy and is more effective in avoiding high carbon emissions. Avoiding high emissions at source might be realized by the coal chemical industry employing efforts such as producing oxygenated fuels through combined processes. Other methods include an increased use of natural gas as domestic fuel, further development of clean energy (nuclear, hydro-power, wind and bio-mass), the adoption of circular economy in the chemical industry, and an increased production of pure electric vehicles.

3 To Reduce Emissions during Operational Processes

During the whole process of economic activities, all stages, from the exploitation, production, application to end-product consumption, require energy consumption, thus raising an issue of energy efficiency. China's energy consumption for per unit GDP is 20-30% higher than the level of developed countries. In 2007, in comparison to international advanced levels, China needed to consume an extra 44 grams of standard coal to generate per kWh of electricity, an extra 58 grams of coal to produce per tonne of steel, and additional 31 grams of coal to produce per tonne of cement. These figures were 14%, 10% and 24% higher, respectively, than international levels.

On the other hand, a low utilization ratio of products indicates a high energy consumption in the end. Optimizing designs, using highly-efficient and energy-saving expertise and facilities, applying appropriate catalysts and choosing quality products will lead to energy conservation and a reduced consumption of end user products. Reduced consumption of end user products will then lead to reduced production of these products, thus cutting energy consumption and CO₂ emissions accordingly. So far, this is the easiest and the most cost effective way^[2] to reduce emissions. With national mandatory policies in place, these goals could be achieved through enterprises' own restructuring and transformation.

For the large-scale coal gasification process, a key element in the modern coal chemical industry, air separation is an indispensable part which accounts for 50% of both investment and energy consumption. The main product is liquid oxygen, and the byproduct of liquid nitrogen is only partly used, with the rest either used inefficiently or discharged.

If separate-stage cryogenic separation is used, most of the nitrogen composition at the low voltage side will have been sent out as product gas and does not need pressurizing by consuming high energy. The final product of this process is liquid oxygen and some liquid nitrogen. Hyperbaric oxygen required for this process can be supplied through hydraulic pressure with low energy consumption. This greatly reduces the processing and energy consumption of air compression, thus reducing gasification technology investment and energy consumption.

The cost spent in producing nitrogen fertilizer from fossil fuels is high in terms of investment and energy consumption. China also faces problems of low efficiency in production, low quality of nitrogen fertilizer, and poor methods to deliver the fertilizer to the crops. The utilization rate of nitrogen fertilizer in China is only 30% of that in advanced countries. This causes not only waste but also poisonous pollution. If slow or controlled release fertilizers are used and corresponding cultivating methods are

applied, crop yields and the efficiency in the use of fertilizer will be increased, and thus reducing fertilizer consumption and the CO₂ emissions which would otherwise be generated.

In order to substantially reduce energy consumption, it is suggested the chemical industry choose highly-efficient catalysts, energy-saving separation, reaction, heat transfer and pumping equipment, and frequency modulation techniques. For the chemical processing industry, distillation is the most preferred homogeneous-system separation technology and is also currently the process consuming the largest part of energy for chemical separation.

If an inclined, long and three-dimensional NS compound tray, an organic combination of a trapezoidal vertical bar cap cover with structured packing, is used to transform F1 floating valve plate, valve hole kinetic energy factor could reach up to 34, with the opening rate of up to 40% (Currently, the maximum opening is only about 20% at home and abroad). The processing capacity can be improved by more than 200%, much higher than the current maximum of 70%; Meanwhile, downcomer's carrying capacity will be increased by more than three times, with pressure dropping by more than 30% and board capacity rising by more than 30%; operating flexibility will increase by four times. All these will solve issues to do with structure and installation of large-scale tower-shape facilities and is the first case of its kind domestically.^[3]

There are too many energy-saving technologies and products to cite for the varied number of industries in China. All of them are the most effective options for China to achieve emissions reduction goals. What is needed is a coordinated effort between related departments, agencies and associations to promote these solutions.

4 Terminal Sequestration and Storage

Any economic activities which consume resources and energy will inevitably produce carbon emissions. It is impossible to achieve a state of zero carbon emissions. But carbon emissions caused by significantly increased use of fossil energy has risen way beyond the capacity of carbon cycling. And approximately 25.7 billion tCO₂e of emissions is released into the air every year, and its accumulation has led to the global climate change crisis. To tackle the climate issue, enterprises and scholars at home and abroad have paid increased attention to research and implementation of CO₂ capture and storage (CCS). It will be a forced option and the last resort, because it is an immature technology which is both costly and dangerous, and might cause secondary disasters.

In fact, the solutions to anthropogenic CO₂ emissions include not only efforts in cutting emissions, but also those in increasing the utilization of CO₂ in a bid to realize carbon neutral. This is a positive step to take and a breakthrough to make to speed up efforts in emissions reductions. This not only raises a technical issue, but also calls for the creation of carbon markets among enterprises, industries and regions in China for better solutions to cut emissions.

China has surpassed Japan in GDP to become the second largest economy in the world, but per capita GDP in China remains low. China is still in the process of developing its economy, improving its economic structure and increasing living standards of its people. Doing so will lead to an unavoidable increase of the country's CO₂ emissions year by year. This will result in China, which has already been the world's leading emitter, facing an even greater challenger to cut its emissions while growing its economy. Besides, it has to deal with other strategic issues, including national energy and food security, protection of arable land, industrialization and urbanization, nursing the agriculture by the industry, the "Three Rural Issues" and environmental conservation.

Considering China's situation and development stage, and referring to international emissions reduction mechanisms, the author suggests that industries with emissions of varied concentration adopt different carbon reduction and sequestration methods and approaches. At the current stage, for those industrial and mining enterprises which low-concentration emissions, off-site biological carbon sequestration measures is a cost effective option to speed up carbon cycling. This will not only lead to emissions reductions, but also help improve the soil to increase the areas and efficacy of cultivated areas to substantially increase food yield. People's living standards are expected to be improved under the drive to develop a low-cost low-carbon economy. Meanwhile, other strategic issues as mentioned above will be addressed at the same time, thereby increasing the country's capacity and global position in its response to climate change.

For those coal chemical and lime industries with high concentrations of emissions (above 90%), it is a better option to capture their emissions and apply them for such production as dry ice, synthetic urea, salicylic acid, cyclic carbonate and polycarbonate. CO₂ flooding oil extraction and CO₂ gas-fertilizer,

the latter being used for agriculture greenhouses, are among other low-cost and low-energy-consuming methods. At the same time they are effective and profitable ways to use the greenhouse gas to cut emission reductions.

Figure 1 Advantages and Limitations of CCS

Sequestration methods	Volume(10^8 t)	Advantages	limitations	Current status
Natural carbon sequestration	100-1000	Green and Environmental; Using ecological systems to store the carbon element;	Cannot reduce CO ₂ in the air in short time	Large-scale use
Geological sequestration	Diluted oil field: 1250 Exhausted gas field: 8000 Underground salt-water layer: 4000 Deep coal layer: 1480	Capable of improving oil-gas recovery efficiency, and obtaining more oil and gas;	CO ₂ is easy to be emitted and pollutes water if earthquake or volcano eruption occurs	Mature (IPCC)
Deep-sea sequestration	40000	large amount of sequestered carbon;	CO ₂ is easy to be emitted and destroys ocean system if earthquake or volcano eruption occurs	Under development
Optical and chemical synthesis techniques	N.A	High processing efficiency and easy to be combined with other techniques;	Slow reaction time may cause difficulty in large-scaled application	Under development
Artificial reef	N.A	Low cost, no power compensation is required, the product is stable, safe and unpolluted;	Slow reaction time may cause difficulty in large-scaled application	Under development
Ocean fertilization	N.A	Large construction area, capable of increasing fishery production	Large amount of methane emitted may destroy the ocean system	Under development

For the largest number of and widely scattered power plants and small-and-medium-sized boilers with low concentrations of emissions (less than 16%), there is no need for them at this stage to focus on centralized carbon sequestration. Through domestic carbon trading, they could achieve low-cost off-site carbon sequestration.

Considering the factors such as China's land distribution and soil composition, the agricultural status, plans to develop bio-energy, and development imbalance between the industry and the agriculture, the author suggests that industrial and mining enterprises which emit low-CO₂-concentration flue gas re-allocate the investment and operational cost for carbon sequestration to re-feed and support the development of the agriculture and forestry.

Government agencies and related departments could put the funds together for the transformation of low-yield farmlands, to improve grain yield and quality and increase bio-mass production; The money can also be used to improve non-cultivated land, saline-alkali soil and shoals, and address issues of land desertification and heavy metal pollution. To achieve these targets, modern technologies will be applied to the sowing of fast-growing energy plants and crops, to develop carbon sink forests and pastures, and to transform degraded grassland.

All these efforts will enable us to better use solar energy, speed up the carbon cycle, and increase CO₂ utilization, in a bid to reduce the amount of CO₂ which cannot be offset. In return, all these will substantially increase arable lands and production of bio-mass, output of bio-crude through pyrolysis technology, as well as farmers' incomes. At the same time, the cost for enterprises to cut emissions will be reduced. This will deliver a multiple winning result for the industry, the agriculture, the government and the society as a whole. This comprehensive approach could be simply summarized as a process route: enterprises fund the formation of a carbon fund, to invest in agro-forestry, to improve soil and enhance its carbon sink capacity, to increase food and bio-mass production, to produce bio-crude - to

benefit all stakeholders in the end.

Genetic modification (GM) and toxic and hazardous trace substances, which are often issues raised for agricultural food products, are not an issue when bio-mass is used for producing energy fuel. On the contrary, GM technology will help increase crop yield and rehabilitate contaminated soils, thereby delivering economic, environmental and social benefits. Fast pyrolysis of bio-mass is the best technology to utilize carbon to produce bio-fuel, thereby speeding up the carbon cycle and realize a carbon cycle balance^[6].

In addition, humic acid, produced as a result of fast decay of bio-mass within seven days, could be used to produce organic fertilizer, which will help improve soil fertility and water retention, thereby increasing crop yields. To increase the current humus content of less than 1% in the vast majority of soils in China to about 2% will create a huge opportunity to store hundreds billions of tonnes of carbon.

5 Conclusion

The paper suggests developing and choosing appropriate and suitable raw materials and technology will help avoid CO₂ emissions at source. This proves to be the most effective way to reduce carbon emissions.

Energy saving could be achieved during the whole operational process from energy extraction, production and application of product, to end-product consumption. This approach to cut emissions during the process of economic activities is the most achievable and cost-effective way to realize emissions reductions. It is also expected to deliver better economic benefits.

Different carbon capture, utilization and storage methods and approaches are suggested to be adopted by industries with varied CO₂-concentration emissions. Considering the current stage of China's industrial and agricultural development, domestic carbon trading together with off-site carbon sequestration will offer solutions to achieve low-cost carbon emissions and meanwhile benefit both the industry and the agriculture at the same time.

To ensure GDP growth and the gradual increase of people's living standards is the prerequisite for the development of a low-carbon economy, which requires collaboration of the industry and agriculture to better utilize CO₂ to eventually achieve emissions reductions. The low-carbon pathway will also provide solutions to other issues facing the country, including energy and food security, protection of arable land, urbanization, rural problems, and shortage of freshwater resources and strategic challenges of environmental protection. The industry, the agriculture, the government and the society will benefit from low-carbon development. And the country as a whole will see its capacity enhanced to achieve its emissions reductions targets, thus demonstrating its position and contribution to global efforts in combating climate change.

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Teacher Education for Sustainability in Pakistan

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Abstract: Education plays vital role in sustainable development. Education is permanent modification of creativity and behaviour as the result of new experiences through education (Kaushik, 1997). It is not only a catalyst with potentialities to transform all the aspects of development but contributes in the current challenges of sustainability. The aim of education is to ensure and secure the basic purpose of education, to achieve the tasks of life and to attain basic life skills in an integrated and sustainable manner (Azam, 2003). According to Singh (2008) "Education is essentially a process of growth and development, which goes on throughout the whole life" (p.7). Education for sustainability is less understood and less practiced by teacher educators in Government Colleges of Education offering Associate Degree in education and four years B.Ed program. It is difficult to assume that whether teacher educators have proper acquaintance with education for sustainability, skills and willing to incorporate education for sustainability in teacher education policies and practices. In addition, it cannot be presupposed that through experience teacher educators will attain such skills. Therefore, education for sustainability should be carefully planned and made as integral part of teacher education programs instead of ad hoc based approach for education for sustainability.

This study will investigate how Associate Degree for education teacher training program for prospective teachers has been designed or shaped and find out how teacher educators are affianced with education for sustainability in their teaching. The purpose of study is (i) to determine the elements of Education for sustainability before and after Associate Degree program, (ii) to investigate teacher educators knowledge, skills and attitude related to education for sustainability and, (iii) to examine the perception and engagement of teacher educators regarding education for sustainability. The focus of this study will be on five indicators of sustainability which include the social impact of education, education as strategy for development, financial viability, adaptability and capability to bring socio-economic change. A case study approach will be used for this study. Data will be collected through surveys, in-depth interviews and analysis of over five years documents.

Key words: Sustainable Development; Process of growth and development; Teacher educators; Prospective teachers; Social impact of education; Financial viability; Adaptability and capability; Socio-economic change

1 Introduction

The teacher education in Pakistan has been facing serious challenges in terms of policy, quality and lack of resources. During the past two decades several initiatives have been taken to improve the teacher education but recently innovative reforms have been initiated by under PRE-STEP project with the support of USAID. The aim of this innovation was to enhance the quality of teacher training through introduction of a two-year Associate Degree in Education (ADE) and BEd (Hons- a four-year). The new introduced programs have replaced Primary Teacher Certificate (PTC), Certificate in Teaching (CT) and one-year B.Ed program prevalent during transition period. Both the ADE and a four years BEd has been initiated in elementary colleges of education in Pakistan including public universities It is assumed that EFS have been considered in the design of programs.

Education is essentially human capital as it is directly promotes the quality and capability of human being. Education improves and develops the verbal skills, and expenditure on human resources increases the national product and also increases the wealth. Education produces a society, which has more productive capacity to satisfy the material and non- material wants of the population (Singh, 2008, p.80). The teacher has a new role of to improve positive impact on social circumstances (Rao, 2008). The main purpose of education is imparting literacy and numeracy and it is process of socialization and total development (Singh, 2008).

Education for sustainability in teacher education has been also a common term but people know little about EFS. This study was carried out at government elementary college of education to assess knowledge, skills, attitude and perception about EFS in ADE pre-service teacher education program. This study investigated the knowledge, skills and attitude of teacher educators related to education for

sustainability and examined the perception and engagement of teacher educators regarding education for sustainability. The study involved interviews with teacher educators on the inclusion of EFS in teacher training programs.

2 Theoretical Framework

Education promotes social, economic and environmental change in society and development through education and training must be sustainable so that creativity and change in behaviour as result of education should be positive and permanent. Kaushik (1997) believes that news experiences through education and training is permanent modification of creativity and behaviour. The balanced social, economic and environmental thinking for future with reference to development and ensuring quality of life is called sustainability (UNESCO, 2012). The sustainable development is a development that “meets the needs of the present without compromising the ability of future generations to meet their own needs.” (United Nations, 1987, p.15). The transformation of education into all aspects of development is great challenge for sustainability. Azam (2003) argues that the purpose of education and training should be to achieve the basic tasks of life and learn life skills in sustainable way. Singh (2008) define education as a continuous process of growth and sustainable development

The teacher education and trainings is an instrument to provide educational opportunities to individuals to attain the educational objectives to create knowledge making process for sustainable development. In teacher education several approaches and methodologies have been adopted to achieve the educational objectives. The study seeks to answer the following questions

- (1) What are teacher educators knowledge and skills related to EFS
- (2) What teacher educators have attitude to learn about EFS in teacher training program
- (3) What they perceive about EFS and what are their engagements to implement EFS

This study will identify how Associate Degree for education teacher training program for prospective teachers has been designed to ensure sustainable development through teacher education. In addition this paper will determine the fundamental principles of sustainability incorporate in Associate Degree program and changes in knowledge, skills, perception and attitude in teacher educators related to sustainable development. The focus of this study will be on five indicators of sustainability which include the social impact of education, education as strategy for development, financial viability, adaptability and capability to bring socio-economic change.

The study will focus on evaluation of B.Ed teacher education program previously offered by elementary colleges of education and ADE in the context of context of pedagogy, quality, environment, use of technology and cooperative learning in sustainability perspective. The study presents the observations and findings on program design, scheme of study and teaching methodologies to achieve the sustainable development through education

3 Education for Sustainability

Education brings structural social change (Scimecca, 1980). It has been proved that there is a close relationship between school and community which helps to solve the social and economic problems (Silver, 1980). There is a requirement to establish strong linkages between teachers and parents for social change to promote education and sustainability (Safdar, 2005). Education for Sustainable Development (ESD) is gathering momentum in education sector which is “overarching paradigm of the United Nations” (UNESCO, 2012). The teacher training institutions are supposed to scrutinize their role to accomplish education for sustainability in relation to the training of pre-service teachers (UNESCO, 2005). This movement has been facilitated by the development of several initiatives and UNESCO defines that

“Sustainability is a paradigm for thinking about a future in which environmental, social and economic considerations are balanced in the pursuit of development and an improved quality of life. These three spheres – society, environment and economy – are intertwined. The sustainability paradigm is a major change from the previous paradigm of economic development with its damaging social and environmental consequences” (UNESCO, 2012, p.5).

It is expected that teacher education is fulfilling the goals of the United Nations’ Decade of Education for Sustainable Development (DESD). The overall goal of pre-service teacher education is to promote “critically reflective approach to all aspects of the curriculum, especially themes such as citizenship, which lie within the social domain” (Wilkins, 2004, p.242) that leads towards education for sustainability. “The teacher and school should expect that students are developing sense of community

in classroom and establishing climate of mutual respect” (Killen, 2005, p.19). Therefore, it is very pertinent to say that the role of teacher is to bring effectiveness and change new beliefs of students (Macmillan & Garrison, 1988) and teachers can easily motivate community for sustainable social change.

It is fact that “ throughout the world, societies of all kinds are facing war, terrorism,, inequalities, starvations, diseases, energy crises,, environmental disasters, and so many other threats to life and peace” (Mattos, 2009), p.204) and in this critical situation teachers can play vital role in sustainable change and development in society. The role of teacher is to facilitate motivated learning to achieve the objectives of education (Mishra, 2007) which can be possible through proper training of prospective teachers. Information and communication technology is also tool face the challenges of 21st century to achieve the educational objectives and adopt new learning strategies for sustainable development in the new knowledge economy instead of implementation of policies to achieve only learning experiences (Siddiqui, 2007). The UNESCO setting the objectives for Education for Sustainable Development emphasis that:

Education that allows learners to acquire the skills, capacities, values and knowledge required to ensure sustainable development;

Education dispensed at all levels and in all social contexts (family, school, workplace, community);

Education that fosters responsible citizens and promotes democracy by allowing individuals and communities to enjoy their rights and fulfill their responsibilities;

Education based on the principle of life-long learning;

Education that fosters the individual’s balanced development.(UNESCO, 2005, p.9)

The sustainability is required in every aspect of teacher education program including establishment of strong linkages to achieve the objectives of EFS, therefore, to overcome the current challenges and ensure sustainability in teacher education programs it is necessary to enhance the professional development of prospective teachers through training and capacity building. The existing teacher education in Pakistan faces several challenges with reference to education for sustainability. There are so many barriers to EFS that includes absence of sustainability objectives in curriculum, lack of financial resources to integrate ICT in teaching methodology, poor quality of training programs, time constraints, marginalization of education for sustainability and conceptual misunderstandings on the part of stakeholders. An additional potential constraint emerged from limited competencies on the part of supervising teachers in professional practicum schools.

4 Methodology

A case study approach was adopted for this study. Data was collected through surveys, in-depth interviews and analysis of documents. In total 34 teacher educators (18 male and 16 females) of B.Ed program and ADE program participated in study. All 34 teacher educators of ADE classes were surveyed to canvass their views about the EFS. Possible examples were provided verbally, including the social impact of education, education as strategy for development, financial viability, adaptability and capability to bring socio-economic change. The teacher educators worked in groups of 5 or 6, generating 26 response sheets. The teacher educators were offered two suggested models for reporting their responses, either listing pluses or minuses with regard to the scenario, or a PMI (Plus, Minus, Interesting, de Bono, 1992). They were free to respond in any form they chose, however. The anonymous sheets were placed in a box. The responses benefited from the group discussions that took place. The documents produced by groups of teacher educators were analyzed for patterns and outlying responses and as part of a systemic analysis of the enablers and constraints with regard to Efs. The response sheets were codified and the codes tallied to illustrate frequency and patterns of responses.

5 Findings and Discussion

Most of the participants confirmed the importance of education for sustainability, however, all the participants of study were not clear about the indicators of sustainability supposed to be achieved through education and training. A group of teacher educators’ stated:

“We know that education brings social reforms and with the help of community a teacher can change mindset of students and parents to value the knowledge for sustainable development but how those objectives will be achieved that is not reflected in the curriculum and dispensing education for social change.”

Group participants comprising 8 teacher educators indicated “we are training the student to be a

teacher” but “how to achieve the goals of education for sustainable development seems to be missing in teacher training program offered for pre- service training”. Another participants group pointed out that:

“the Associate Degree in Education (ADE) leading towards B.Ed (four years) is new initiative taken by government of Pakistan to improve the quality of teacher education and ensure that the pre-service training program is linked with the recruitment of teachers. We are concerned about the quality of prospective teachers and what skills and knowledge is required to be a good teacher. The concept of educational for sustainability is missing”

The common issue was raised regarding the training teacher educators on education for sustainable development. “We have heard about EFS but neither we are not properly trained nor curriculum objectives specify the education for sustainable development” one group of participants indicated that “social change is the need of hour, our society is shattered, terrorism and extremism has been penetrated in our society, therefore, a teacher can play vital role to bring social change through education”.

All the participants confirmed that new initiatives taken for the improvement of pre-service teacher education are remarkable but “divert ADE/ B.Ed program toward integration of information and communication technology and education for sustainability is missing”. A few teacher educators showed their concerns that “shift of teacher education program for one year to two or four cannot may make significance difference in the quality and sustainability of professional development”, however, rest of the participants appreciated the new initiatives taken by government of Pakistan in the field of professional development.

6 Conclusion

Almost all the participants identified that the objectives of education for sustainability have been envisaged neither in one year B.Ed program nor in ADE and B.Ed four years pre-service teacher education program. The results of study shows that a large number of teacher educators have positive attitude to learn more about EFS but they possess very less knowledge and skills to achieve the objectives of education for sustainable development through teacher training program during the preparation of prospective teachers.

Most of the participants perceive that EFS is very important particularly in the context of Pakistan where low level of participation in education, extremism and terrorism have distorted the society. Teacher educators believe that they prepare prospective teacher who are responsible to impart the education at primary school level, therefore, it is very important that the objectives of education must be sustainable to bring social and economic development. The study did not find any engagement of teacher educators with reference to education for sustainable development.

The constraints and issues were highlighted by the participants that include lack of recourses, inconsistency of curriculum with the objectives of EFS and educational quality. Variance in the in-service teacher training program offered by elementary colleges of education and donor funded projects and recruitment policy issues were highlighted as one of the major concern by teacher educators. The participants also pointed out that ADE and B.Ed are very new initiatives which need more coordinated efforts and policy reform at national and provincial level to ensure the inclusion of this program graduates into the teaching profession.

All the participants highlighted the importance and strength of ADE and B.Ed four years program but suggested that curriculum of these programs must be associated with the sustainability paradigm which will lead towards sustainable social and economic development.

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Theoretical and Empirical Thoughts on the Development of Low-Carbon Buildings

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Abstract: Under the influence of international situation and domestic policy, low carbon economy has become the trend of world economic development, in recent years, concept prototype of “low-carbon buildings” has also been introduced into the low-carbon economy, and gradually low-carbon technologies and concept are applied to architectural decisions, design, implementation, operations, low-carbon buildings are not only of great significance for resource-saving and environment-friendly society, but also conducive to the ultimate realization of low-carbon economy strategy. In this paper, we conduct a theoretical and practical exploration on theory and ways to achieve low-carbon buildings

Key words: Low carbon buildings; energy consumption; recycling economy

1 Introduction

Air pollution, noise pollution, light pollution and electromagnetic pollution produced by buildings has exceeded 1/3 the amount of total environmental pollution, in addition, construction waste has occupied 40% of total waste generated by humans; With people's living standard continuing to improve, living comfort requirements also are increasingly high, energy consumption per capita has also been accompanied by increased emissions of carbon dioxide and other waste year by year; Statistics estimates that by 2020 China building energy consumption will reach 1.089 billion tons of standard coal, which will lead to 2 billion tons of carbon dioxide^[1]. The promotion of low carbon buildings will achieve low emissions and low pollution, reduce carbon dioxide and other greenhouse gas, mitigate environmental pressures generated by the Earth due to the greenhouse effect, protect environmental and resource to a large extent. Meanwhile, the construction and use process of buildings will be accompanied by a lot of energy and resource consumption, especially with the accelerated pace of China's urbanization, the development of low-carbon construction, efficient use of low-carbon technology, full use of renewable energy, will save a lot of resources and energy which is of great economic significance. Furthermore, low-carbon buildings can meet people's growing needs for construction environment and provide them with a comfortable living environment, such as natural lighting, natural ventilation, water treatment, clean energy and so on. The effective use of low-carbon technologies can achieve the goal of efficient recycling, comfortable and healthy built environment, which reflects its social value. Significance of low-carbon buildings are not independent, but tightly linked around sustainable development objectives, in order to live more harmony between person, buildings and natural harmony.

2 Theoretical Thoughts on the Development of Low-Carbon Buildings

2.1 The theory of full life cycle energy consumption

“Life cycle assessment” (Life-Cycle-Assessment, LCA) stemmed from energy crisis in the 1960s, in mid-1970s, the theory began to focus on energy use and waste recycling, until 1990s, it was introduced by scholars to study the energy consumption of buildings, life cycle is divided into several stages, that is, planning, design, construction, operation, dismantling and reuse. Only by taking appropriate technology in line with various stages of the life cycle of low-carbon buildings, can we truly make it.

Based on the theory of product life cycle, for the building, we evaluate the carbon dioxide's effect on environment according to several stages of the life cycle, that is planning, design, construction, operation, dismantling and reuse, thereby to measure low-carbon performance, such as the material of construction site, and mechanical processing, construction, energy, transport process will all have an impact on the environment, therefore, the effect on the performance of low-carbon buildings at any stage cannot be ignored. As shown in Figure 1.

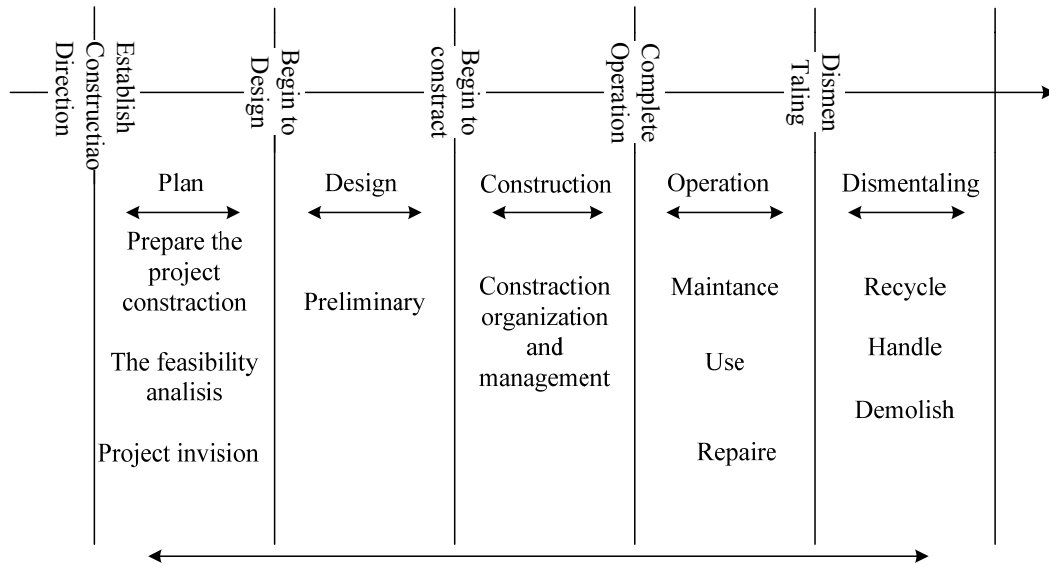


Figure 1 Full Life Cycle Stages of Low-Carbon Buildings

2.2 Circular economy theory

Circular economy is based on ecological, economy and less material of system integration strategies, regarding sustainable development as the goal, focusing on efficiency, and recycling, with the growth model of low consumption, low emissions and high utilization. the circular economy follows “3R” principles, namely reduce, reuse, recycle [2], as shown in Table 1 below:

Table 1 “3r”Principle of Circular Economy Theory

Principle	Specific content	Connotation
Reduce	In the production and services, minimize resource inputs, maximize the utilization of resources, the least consumption of resources, less generation of waste and pollutants, use alternative and renewable resources	Control resources and energy consumption from the source of building life cycle
Reuse	Continued use of product after being repeated, repaired, renovated, in order to extend its life cycle, thereby saving resources input	Reduce the consumption of resources and energy from the process of building life cycle
Recycle	Maximize the waste into resources, which is based on the first two, maximize waste materials into recycling, to reduce the waste of energy and resources and environmental damage	Process and control from the terminal building life cycle processing and control

Based on Circular Economy theory, optimal use of resources plays an important role in achieving the maximization of the performance of low-carbon buildings, including water resources, land resources, timber, etc. Also, attention should be paid to the quality of the indoor and outdoor physical environment, including light, sound, air environment, and they have some pact on the comfort of public life. In addition, resource recycling stage will have influence on carbon emissions, recycling processes will consume energy and carbon dioxide, in order to reduce carbon emissions, carbon emissions need to be quantified.

2.3 System engineering theory

Systems engineering theory is based on the system, the object of investigation, based on the whole and the parts, from the whole and external mutual ties and operations, the relationship between the angle of mutual restraint, the objects are integrated and accurate investigation, thus objects system elaborate nature and law of motion, in order to achieve the purpose of optimization methods [3].

Based on the theory of system engineering, regard low-carbon building as complex system engineering, involving both micro-economic factors and macro-economic factors involved, integral part of a combination of a number of specific features and has a whole, and energy consumption in the building microscopic entities involved in the process input and output is determined by the contents of the interaction or mutual influence, to fully consider the various factors coordination and cooperation between. Systems Engineering-Theory of low carbon building has the following three characteristics:

(1) Overall

For the evaluation of low-carbon buildings, not only to consider the energy efficiency of low-carbon buildings, but also contact the rest of the other elements in order to achieve the maximization of overall function.

(2) Open

Surrounding environment will affect the realization of low-carbon buildings, to achieve the purpose of low-carbon buildings, and we need to work together with surrounding environment, in order to effectively implement low-carbon.

(3) dynamic

As low carbon buildings is not a static implementation process, we need to take resource recycling of full life cycle, project management and other factors are should be taken into account, and carry out dynamic considerations.

Low-carbon buildings is a systems engineering, not only energy associated with its own resources and other factors, but also the need from the project environment, characteristics, and management factors are to be considered, as shown in Table 2.

Table 2 Based on system engineering theory elements to consider low-carbon buildings

Factor	Content	Range
Project environment	Macro-environment	Natural environment and policy environment (including geographical location, construction, conditions, etc.)
	Micro-environment	Reflection of the relevant parties' abilities implementation and monitoring)
Project Features	Site planning	Focus on coordination with surrounding environment, and urban planning
	Project Properties	Size of the project, floor space, building area, as for subsequent quantification
	Item Function	Project adaptation and disaster prevention extent
Project management	Organization	Project organization structure, reasonable estimation etc
	Plan	Project funding, resources and costs reasonable estimate
	Design	Design, construction, operations are the goals of low-carbon buildings, control and manage cost, schedule and quality
	Construction	
	Operations	

3 Empirical Thoughts on the Development of Low-Carbon Buildings

Low carbon buildings is an organic whole, the implementation of low-carbon buildings including the production of material, construction and operation of the project and other aspects, which not only need government guidance, technical support of industry bodies, but also need public propaganda and education, so low-carbon buildings can be divided into three levels, building level, architectural level and social level.

3.1 Construction level

Construction level includes two aspects: firstly, low energy consumption low-carbon material constituting the building, that is, low energy consumption in the process of production, processing, transportation and installation, using material which meets the operational requirements of the process of low-carbon buildings after completion, including steel, concrete, etc. Secondly, the low-carbon systems for the building, namely operational use of the building process, to meet the basic functional requirements, based on low energy consumption, and do not negatively affect the external environment various operational equipment. Including drainage systems, firefighting equipment, etc., it is the building material composition from the low-carbon building perspective overview of the realization is the realization of a low carbon building foundation.

3.2 Project level

The research scope of project level is very broad, is not limited to mere architectural entity, but involves multiple perspectives, including organizational perspective (relationship between the parties involved in the project, participation model, etc.), technical perspective (design, construction, technology, etc.), and so on, from the perspective of the project to study ways to realize low-carbon buildings, only through this level, which can we achieve low-carbon within the project of life cycle, thereby to achieve the goal of building low-carbon buildings. Each part of the project level are

interrelated, which affect the realization of low-carbon buildings. It plays a key role in the implementation level of low-carbon building.

3.3 Social level

The research of social level based on social factors, which have an influence on low-carbon buildings, compared to the previous two research angle is more macroscopic, study objects are also further expanded, including government, media, social institutions, etc., through the mutual cooperation between the main body to form a good atmosphere for low-carbon buildings, to provide “soft” security in environment, public opinion, legislation and other aspects for project level and construction level.

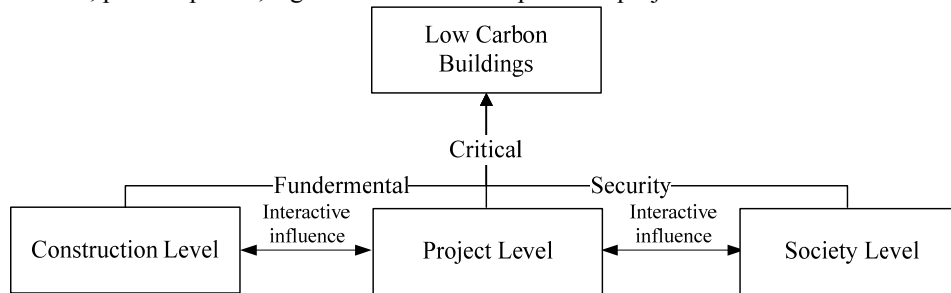


Figure 2 Way to Implement Low-Carbon Buildings

The realization of low-carbon buildings is the result through between architectural projects and social interaction, which is an organic whole (Figure 2). Social level secures the realization of low-carbon buildings in policy, regulatory and other macro directions, provides relevant norms and standards for the project level, construction level, in addition, to create a favorable market environment for low-carbon buildings, make low carbon concept better into people's lives; project level is a key aspect to achieve low-carbon buildings, low carbon concept through project level will be integrated into the construction sector, for the construction of low-carbon level of the material to provide power. Building level is the material basis to achieve low-carbon buildings, low carbon building materials and equipment for research and development and production is the source for building low-carbon entities, construction level is low carbon achievements and social aspects at the project level to achieve low-carbon buildings ways to achieve the effect of reflection. Only through mutually reinforce of system can we ultimately achieve a low-carbon buildings.

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The Urgency of Civic Education and Youth Policy to Sustainability of Innovative Cities in Postmodernity: A Report of the Legislative's School of Pouso Alegre (MG)

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Abstract: Postmodernism has required major changes in the various spheres of community life. The growth and development of cities have required new knowledge and practices, both the leaders and the people to choose their representatives. The unsustainability of the planet caused by human predatory attitudes towards the consumption of natural resources, bathed by greed and desperate search by the particular interests of elitist groups have caused devastating effects on the population contributing to an alienated life, instigated consumption and away from active participation in public life. The civic education and policy could alleviate some of the problems generated. This article articulates concepts of postmodernity, emotional intelligence, sustainability of cities, underscoring the Pouso Alegre (MG) Junior Parliament, which operates in the political and civic education of young students from the municipality.

Key Words: Sustainable cities; Civic education and policy; Sustainable leadership; Postmodernity

1 Introduction

The discussion about development's model and environment necessarily involves how urban centers are organized and managed. It is in the cities – which nowadays concentrate most of the world's population – that political decisions are taken, and they are the most fertile ground for a development's paradigm change, either for its countless problems or for its economic and social importance. The estimates predicts that 60% of the world population will live in cities by the year of 2030. In Latin America, Brazil is the most urbanized country, derived from the structuring of cities started in the 50s, concentrating 85% of its population in urban areas with forecast to reach 90% by the year of 2020. The municipalities are facing many problems, which are accentuated with the postmodernity, related to the social inequality, pollution, disposal of waste, mobility, housing insecurity, violence, and others (Sustainable Cities Program, 2013).

Managers have been challenged to act leading more sustainability to cities, apparent challenge to titans against to the existing level of complexity and tending to increase in the municipalities' management.

The development concept begins to consider the sustainability, through economic, social and environmental pillars, and so the adopted management models get in evidence. "We need to change the development model, because science shows us that we are depleting the planet's resources and increasing inequality between people. And the big challenges are in the cities, where the majority of the world population currently lives". Grajew in Toledo (2012) highlights a very delicate issue and makes it difficult, because there are many interests at stake, from groups that take advantage of current model. For example, if you benefit a wide and efficient public transport system, you just hinder the interests of the automobile industry and construction, which by the importance in the economic scenario just have great influence over political decisions. Personal and collective interests often collide due to pressure from groups and corporate organizations (corporatist), holders of power who wish to prioritize their own interests at the expense of the community's goals and interests.

On the cities sustainability's issue, we come across several subjects and areas that are affected by the theme.

The major problem is on the governance of urban space, states the Economist Dowbor in Toledo (2012).

Cities are consumption centers and, under this look, they become inserted in the current discussions of economic and environmental development. The issue revolves around the need for learning to consuming with awareness that natural resources are finite. There is a need for a major paradigm change in the consciousness of individuals, regardless of their economic power. Resist, however, is not an easy task, because we are all incessantly affected by the media appeals, addressed to the exacerbation of an uncontrolled and unconscious consumption. Thus, a civic and policy education is required for all individuals; including human values and principles, holistic vision and sustainability requiring the knowledge dissemination about the interconnection of parts in the whole of the life's web.

The transparency of actions of our political representatives comes in late, but it still missing learn to want follow these practices and realize once and for all that these are only people's representative, then it makes no sense keep criticizing their actions passively or innocently, without understand and participate in fact of this management and the existing challenges by the communities we belong and the own time we arrived and helped to build, with our actions and omissions. "We need to change the development model, because science shows us that we are depleting the planet's resources and increasing inequality between people. And the big challenges are in the cities, where the majority of the world population currently lives" brings Grajew in Toledo (2012).

The discussions about the development model and environment undoubtedly permeate how urban centers are organized and managed, as remember Dowbor in Toledo (2012), where the appropriation of citizenship is needed so that the changes can happen with a balance between rational and emotional aspects, promoting the common good.

For a sustainable leadership of cities, this *paper* articulates on postmodernism, urbanization, emotional intelligence, sustainability of cities and civic education.

2 Methodology

The research is bibliographic and exploratory and implements a practical-cultural reflection addressed to an experiment political-community situated: the Legislative's School at Pouso Alegre (MG). For this purpose, we took the challenge of facing the sustainability topics in cities, on the postmodern context, and its idiosyncrasies. The work is strengthened by the experience of the Legislative's School and their contributions to the civic education of youths. The interdisciplinary treatment of the themes impelled us to move between philosophy, political science, economics, public administration and law.

3 Postmodernism

We live in days coined by changing, by the perceived sense of passage, by instability and incompleteness. For many, they would be the postmodern times¹ (BIRMAN, 2000). However, it is worth clarifying *ab initio* that the adjective attribution to our present contingency of 'postmodern' is not unanimous. Other expressions have been suggested as more appropriate to designate the *status quo*: "super modernity" (AUGÉ, 2004); "reflexive modernity" (BECK; GIDDENS; LASH, 1995); "late modernity" (HALL, 2002) etc.. However – and aware of recognized disagreement (that takes us from his birth to the use) – that was the expression that succeeded greater receptivity in the context of philosophical and contemporary sociological investigations (BITTAR, 2005).

The current socio-cultural contingency remains problematic (sometimes the limit of stalemate!) because, as a transition, have to deal with the tensions between the 'past' (and their intelligibility assumptions) and the 'multifaceted present' (which has no compunction about critically question these same assumptions, and even to remove them). The investigative question of the current condition addressed to the eroded past leads us to experience the 'contemporary condition', within which there are no absolute truths, only compatible discourse anchored on the culture, ideologies, political choices, and even the unconscious. The current condition requires us all, openness, tolerance and otherness. The present is a possible construction among others historical and socially coined compatibilities – the modern experience was not able to stand the test proposed by critical consciousness against the being,

¹ According to Joel Birman, the attribution to the present contingency of "postmodern" or "late modernity" would relate, among other aspects, to political aspects (that are inserted in a global social context). Authors that defend the use of "postmodernity" would align to American culture – the rise of the culture and American mode of being, occurred in the twentieth century, spread through the mass communication media, while authors that defend the use of the expression "late modernity" would align to the European culture – cradle of revolutions and traditions that have indelibly marked the culture and Westerners way of being according BIRMAN, J. Malaise at present: Malaise today psychoanalysis and new forms of subjectivity, 2000.

assumed as natural data, a-historic and thus perennial. The institutions, concepts, social classes and things in themselves are revealed naked – as buildings or born possibilities, reared on the horizon of culture and ending near or far – aligned with interests of the entire order; appearances wanting to be perceived as being.

The world of life – removed the veil of naivety that darkened and calmed the eyes – is no longer assumed as a natural reality against which remains us only a speculative-revelatory nature exercise and became assumed as a possibility or possible experience among others. The nature of things¹ is no longer assumed as inevitability, chalking up the status of experiential and falsifiable hypothesis. The world is not the sum of regularities and mathematical constancies, which focus on things and men inevitably, but an essentially open space which the spectacle – even if, unmistakably, limited by the available resources and accessible to its actors – can be conceived and implemented in different ways. The world is not a finalized and constant creation which meaning and intelligibility would sustain itself in a greater and excellent ratio – laic or not. The absurdity is no longer the dead snake at the foot of modern man (SARTRE, 2011) – penetrable by the modern rationality of Cartesian type that knows and sees everything (although its full potentiality remits us to an apology for the future that will come!) –, indicates, instead, the perception of the crisis generated by the sense of passage, inconstancy and finiteness. After all, the key to our existence and our nausea is on the disintegration of the certainties, the distinctions, the concepts assumed as truths settled in the nature of things.

The term postmodernity may intend to nominate a current state of things or a modification process that project itself over all dimensions of the current contemporary experience. Our habits, values, individual and collective needs; our worldly experience coined by the rupture is called to (re)thinking critically in order to accept-propose new ways of being in the world better suited to the demands of the present time. In the current context of crisis, there is little (or almost none!) space for statements that will get its logical force in the ‘nature of things’ or ‘naturalness’ of the contemporary ‘condition’ – built on the beams of universality, abstraction and generality.

The criticism reaches the imperialisms of modern rationality that is assumed redemptive of the society, able to illuminate the darkness of ignorance² and liberate the man from his bodily contingency. The reason, assumed as higher faculty of the human, would have the power to guide men and societies to meet the beauty of the concepts and liberation of the vices inherent to the bodily condition. However, can reason be thought so apart from emotions? Or more appropriately, should reason and emotion be assumed essentially different dimensions, immiscible?

Recent studies on the neuroscience, psychology and psychoanalysis horizons suggest that no. Emotions are cognitive and perform a prominent role in the personal, social and professional life of people. However, and alongside the numerous evidence supporting this claim, we are not encouraged to think about our emotions. Traditionally, to emotions are associated the errors and mistakes, so emotions should be neutered or strongly contained, otherwise committing, often irreparably, the judgment and the action of the “rational man”.

Emotions, according to the anti-emotional philosophers, should be taken with suspicion and restraint. The wise person, according to those thinkers, not direct their actions and decisions in order to achieve happiness. The search of the wise man is for peace, i.e., by the virtue of the impassivity of soul. Just as the waters of a river flowing, the man should cultivate the state of impassivity towards external events that strike him, whether good or bad. The happiness that the cultivation of philosophy would bring those who seek it engaged was assumed as lasting and, therefore, its search would be worthwhile (at the expense of sacrifice and selflessness). The happiness that events and things external to the self-subject are able to provide you are fleeting. Just as reach you abruptly, generating, as a necessary result, great pleasure, when removed by the Wheel of Destiny that runs incessantly and short of our control, may cause great pain. Live according to the chance and the contingency whims contingency predisposes men to pain and madness. Neutering (or containment) of emotion through the rational exercise predisposes us lasting happiness that builds a solid foundation for a harmonious society.

The postmodern man is heir of this rationality that separates, distinguishes and hierarchizes

¹ The criticism proposed by the historical materialism of Karl Marx invites us to see reality as appearance and not as cause. Is it effect of ideologies, assumed social and historical phenomena, presented us as evidence or realities belonging to the nature of things. The effect is presented us as cause, legitimizing the status quo and its immutability.

² Ignorance thought of as the absence of scientific knowledge derived, desirably, of the empirical and mathematics sciences and not of Socratic molds, as a synonym of education of souls (moral education).

emotion and reason. Professional success will only be achieved, they led us to believe, if the emotion is subdued by the reason. Emotions have nothing (or very little) to do with the professional environment, the school environment or the public decision taking. The kingdom of emotions is limited to the private sphere – where, tendentiously, we not usually do very well in, considering that the topic of emotions is assumed as self-evident and self-explanatory. We are not encouraged to think about our emotions or taught how to deal with them, whether on school or at home, hence our patent inability to live together and develop our emotional competence, absolutely necessary to become also citizens.

According to Martha Nussbaum, it is not possible to think about the public sphere and the public decision taking without summing the emotions. Emotions, differently than common sense says, are not dangerously “close to home” on self- narcissistic mode. (NUSSBAUM, 1995). The experience of the rational emotions situates us on the world and in the cities; the natural instance of the man, according to Aristotle (2008).

We are city beings immersed on the praxis that can only be realized fairly and tending to the happiness of theirs if we assume the human person as a corollary and related of this community experience. The citizen experience begins on the radical assumption of man as the foundation and related of the community experience. An experience that, more every day, becomes complex. Megacities, impersonal and faceless, put all kinds of challenges to the man viewed as citizen. How to exercise citizenship in a sea of cold stone and lifeless where we feel reduced to formless beings, with no history, memory and future?

3.1 Cities

Castells (1999) warns about the urbanization of the third millennium through the megacities when he says that the big cities articulate the global economy, list the informational networks and monopolize the world power. “But they are also depositaries of all these population’s segments who struggle to survive, as well as those groups who want to show their state of abandonment, lest they die ignored in areas neglected by communication networks”. (CASTELLS, 1999, p. 492).

Social actors conceive, decide and implement the spatial logic, which are determined by a technocratic and financial enterpriser elite occupying leadership positions in our societies that will naturally make specific space requirements concerning the material/spatial support of their interests and practices, as well as manifested spatial the informational elite.

Castells (1999) is provocative when talks about the domination of our society which is based on the organizational capacity of the ruling elite, who walks interlinked with their ability to disorganize the society groups that “although they constitute a numerical majority, they see (if they really see) their interests partially represented only within the structure of attendance of dominant interests”.

“The articulation of the elites and the mass segmentation and disorganization seem to be the twin mechanisms of social domination in our societies”. (CASTELLS, 1999, p.505). The management of sustainable cities require an integrated management model. The development of holistic and systemic vision is urgent to act in this context of sustainable urban planning. Several areas interact in cities such as economic, cultural, social, environmental, technological, fiscal, demographic, and others. Responsible for all these areas in the municipalities need to be involved, mobilized and integrated to become aware and commit to the exercise of ethical, transparent, accountable governance and assertive to the demands of the population and the common good.

The Sustainable Cities Program was born on the initiative of the organized civil society, which aims at improving the quality of life and welfare of the general population, proposes 12 thematic axes, grouping principles and values: governance; common natural goods; equity; social justice and peace culture; local management for sustainability; planning and urban design; culture for sustainability; education for sustainability and quality of life; dynamic, creative and sustainable local economy; responsible consumption and lifestyle choices; better mobility, less traffic; local action for health; from local to global. (SUSTAINABLE CITIES PROGRAM, 2013). This program proposes a relatively simple methodology to support municipalities considering: the strategic mapping of the municipality, prioritization of indicators, the future vision of the cities and the development of the plan targets. For each thematic axis to be worked is suggested the application of this facilitator method. Program details can be found in the GPS Guide, Sustainable Public Management (SUSTAINABLE CITIES PROGRAM, 2013).

Front of the level of complexity that the problems arise in cities and in society on our postmodern context – pressed by advanced technologies and media influence, and many of them being instigators of the unconscious consumption – it is up to the individual to organize himself internally, filter information and maintain the balance between reason and emotion, because life prompts you constantly fast

performances (whether they be personal or professional decisions) where these aspects need to be harmonized for living (and survive) with quality and sustainability.

The individual into society needs and requires mobilize himself and act exercising their citizenship, performing public roles or only the role of conscientious citizen, able to react critically to the manipulations of the ruling elites, if he wishes indeed a prosperous, happy and sustainable future.

3.2 Intelligence and emotion in Liquid Modernity

Postmodern context, suggests the diagnosis of Bauman (2001), hypertrophy in the dimension of the work at the expense of the personal dimension. To the liquid modernity and its ideologues interests we become workers zero drag, i.e., no weight and with remarkable (because up to date!) technical knowledge. Instead of large families, we should be free and “un-family” so that we have time and space to develop our technical skills. Education is for life, they insist. To become a valuable workforce in the job market, we must invest our time and money on endless training courses under penalty of obsolescence – fast and cruel on the horizon of a society where the technique endeavors to overlap to knowledge. Knowledge, on the postmodern context, is restricted only to what can be translated into information bits, according to the diagnosis of Lyotard (1979).

The search desirably solitary for knowledge – which is summarized to what can be converted into information bits and which validity is brief or very brief –, falsely locates us in the middle of the society. Education for life is restricted, on the horizon of this model, to the formal education that has nothing to do with moral education or the development of emotional competencies that, we contend, must be developed according to a new perspective of reason and rationality.

Reason and emotion are both important dimensions for life in society and for the construction of a community experience happier and more harmonious.

Traditionally, intelligence is limited to intelligence quotient (IQ) of a person. Each of us would have been bequeathed by nature a certain amount of intellectual force or power, that we would be able to mobilize in order to know the world around us and/or concretize our daily tasks on personal and professional sphere. The identification between intelligence and intelligence quotient, which could even be measured by IQ tests, has been broken by current studies on cognition, intelligence and emotion on different areas of knowledge.

What does it mean to be intelligent? Why do we say about some people that these are intelligent people? According to Goleman (2007), the measure of intelligence is much more complex than an IQ test is potentially capable of measuring. The measurement of the intelligence cannot be measured, if it can, without taking into consideration the following competencies: empathy, self-control, zeal, persistence and self-motivation (GOLEMAN, 2007). These skills, which according to the author can be shaped from childhood (GOLEMAN, 2007, p. 24), are related to emotional intelligence or EQ, constitutive dimension of intelligence.

On Pouso Alegre (MG) there is a project on civic education conducted by the Legislative’s School, focused on students from public and private. In this project, policy issues, citizenship and balance between reason and emotion are worked on your route, contributing to future generations of people more conscious about the issues of citizenship, with active political participation and sustainable. Being a good manager and a responsible citizen is not only know the laws of the city. Surely, this is an important and fundamental dimension to the citizen experience and responsible citizenship. However, what it means, concretely, the fair on the city skyline? This answer is complex, but we should not exclude the question due to its complexity. The fair in the city cannot be achieved authoritatively, but only in the light of important social emotions such as compassion. Being compassionate, enlighten us Martha Nussbaum, is not have pity or empathy. Compassion does not presuppose the belief that the person suffering does not deserve the bad which weighs on his shoulders (piety), nor similarity that approaches us (empathy), but the simple and crude fact that the suffering, experienced by the others, is a human suffering and even in power, could be experienced by me or someone else I hold dear (NUSSBAUM, 1995).

The intelligence that is expected from the manager is technical-scientific-emotional-empathic, i.e., it is not just technical and scientific knowledge, but demand, in addition, the emotional perception, rooted in compassion, of his responsibility. The Legislative’s school does not care only about providing and disseminating information to their students about the procedures and legislative processes, about the routine of city councilors and mayor, on the cold dynamics of the city laws, but assumes a much more complex and fascinating task as the holistic education of their students-people.

Below we present this project as well as discuss about results of a research conducted about it.

4 The Legislative's School at Pouso Alegre (MG)

The current political context of Brazil does not create expectations of popular participation in politics due to factors of corruption, discredit regarding the implementation of public policies and the unsustainability present in cities, as evidenced by the lack of management and valuation on sustainable development guided by the organization and planning. It is also emphasized the inefficiency for the accomplishment of social rights and public services in general.

Before many factors, it is observed a large population disinterest in following and actually effect the political participation. And to minimize this situation of political disinterest and lead the population, especially young people, to participate and monitor the national policy, recognizing themselves as true political actors, rights holders, doing justice to the sovereign power of the people based on the preamble of the Federal Constitution, was created on Pouso Alegre the Junior Parliament aiming the political education and awakening the experience of citizenship for students from 6th to 9th grade of elementary school II.

The Junior Parliament provides students with an opportunity to really know the policy, the forms of participation and know the importance of being active on the political events of our country. The space for debate and voice for participating students of the Junior Parliament puts them in a scenario of real experience of democratic practice and leads them to a conscious formation of the citizen's role and the work of management and leadership in environments where are present.

For the development of civic and political education, the Junior Parliament also encourages the exchange of experiences and knowledge among participants from different contexts and realities. The work takes place holistically considering the political, citizenship, sustainability, among others aspects. A complex set embraces citizenship education while considering adherence to values, knowledge acquisition and learning practices in public life. "It cannot therefore be regarded as neutral in terms of ideological". (DELORS, 1996, p.62).

The citizenship education becomes a fundamental requirement for the formation of sustainable cities in all aspects, relating the political, social, economic and especially revealing values and rescuing them for strengthening ethics and the common good in society. To verify the results obtained with the program Junior Parliament, coordinated by Maria do Carmo Freitas Macedo, was held in 2008, a research of exploratory character with the Junior Parliament of Pouso Alegre, with full details in Macedo and Cols. (2013).

The research investigated the function, structure, organization and difficulties to implement the program, the procedure for choosing students, and participation and evaluation of society in general, especially of those involved directly in the program, such as parents, teachers and city councilors junior.

This space puts students in direct contact with policy, makes them feel responsible and committed to representing your school. By Transversal Themes (MEC 2000), teaching ethics can encourage students to many understandings such as concepts of justice based on equity and may also sensitize themselves to the necessity of building a just society, when they adopt attitudes of solidarity, cooperation and social injustice repudiation, with discussion of existing moral and trying to understand the current values of this society, well as to understand the extent to which they can and must be changed.

The interview was done with 10 teachers, 10 parents of teenagers who participate in the Junior Parliament and/or its projects, 05 authorities of the Education System of Pouso Alegre: representative of the Superintendence of Education, municipal secretary of education, school principal, pedagogical mentor – inspector of students, 05 tutelary counselors of Pouso Alegre and 15 city councilors junior, from a total of 24 (twenty four).

The research results suggests that the student introduced on the procedures and workings of the Legislative comes to understand politics differently that previously envisaged.

For parents, the changing behavior of youth became a reality for the better. They emphasize it is clear the enthusiasm on the participation of the Junior Parliament and share new information with colleagues, friends and family. This movement suggests that the participation of the students on the Junior Parliament not produced effects only to the acquisition of knowledge about the legislative, but had interesting and desirable emotional consequences as the approach of the elements of the family, the approach of student with others members of his environment, the pride and recognition of his value and importance, among others. The civic education, in addition to influencing the construction of citizens more aware and potentially active culminated also in pride, recognition, otherness and openness.

An interesting fact was observed on the evaluation of the project by schools of traditional teaching, in which there were little prominence. Analysis made by the researchers indicated that schools are not

ready to welcome these youths more politically aware, especially considering the performance spaces offered to them in these institutions, so that are practiced the different knowledge and with it this development is enhanced through multiplier agents. However, schools have not created spaces for inclusion of these political knowledge and citizenship in daily didactic teaching. It is observed perhaps the need for a transversal and interdisciplinary work linking spaces and knowledge among traditional schools of basic education and the design of the Legislative's School.

The real process of formation and constitution of the citizen takes place on the pedagogical space, according to Arroyo (2002), by the struggle of citizenship, by the legitimate and by the rights. "Education is not a precondition of democracy and participation, but is part, the fruit and expression of the process of its constitution" (ARROYO, 2002, p.79)

Dowbor in Toledo expresses (2012), that the appropriation of citizenship is needed so that changes happen with balance between rational and emotional aspects, promoting the common good. Think the common good and act through activities that stimulate debate, respect, and group work, arousing young people for the political monitoring, are aspects that develop innovative and conscious management. These characteristics are stimulated at Legislative's School of Pouso Alegre, through several projects developed at Junior Parliament, such as The Great Debate, The Gymkhana of Knowledge, The Educator of the Year Award and the Urn of the Citizenship.

Currently thinking of a structure that provides activities and initiatives for the sustainable future of our communities, is optimal to achieve the formation of inclusive cities, prosperous, creative, educators, healthy and democratic, that provide a good quality of life for citizens and which allow the participation of society on all aspects of public life.(SUSTAINABLE CITIES PROGRAM, 2013)

5 Conclusion

Nowadays, human being comes across major technological advances facilitators to their existence in society, but these advances come with high costs, such as lack of time, affecting their quality of life.

Research points to a growing urbanization tending to lack of control, generating drastic consequences if they do not take care of issues that are tangent to the mobility, the safety, the infrastructure of cities, the urban space, the environment and others, and for this is needed adequate policies and a greater citizen awareness, greater engagement in collective issues and greater participation of local and global policies.

It is necessary the development of sustainable leadership committed to the common good acting in an engaging way and with a conscious community, engaged and articulated.

To have sustainability in cities we must develop persons acting in a balanced way at times to opine, analyze, criticize and decide, not shirking, without omitting and without acting choleric and irresponsible. For such, an active civic education that empowers through political awareness is needed. The research has brought the experience of the Legislative's School of Pouso Alegre (MG), which observed that the root of the apathy and political indifference of society comes from the disillusionment and silent outrage on the political framework in which corruption and inefficiency are highlighted. Erroneously, to get away from this reality, the individual started believing he could live better on the margins of political and public life, establishing an illusory chasm between him and the political decisions, as if they could be immune to these.

The Legislative's School, through its programs, demonstrates the impossibility of this rupture. Explains to students that there is no way to separate the search of the good life of the policy decisions that directly affect people's everyday lives. The school values and develops the perception of young man to get out of your reality (self-centered and ego narcissistic) experiences the feeling of belonging and strengthening on the corporate experience. He lets from feeling the part and becomes part, i.e., realize very clearly that he can act beyond his personal boundaries, transcend his condition of individual to achieve the status of a citizen committed to community.

The practice reported on the Legislative's School brings confidence, develops emotional skills and promotes citizen refinement. Students members of the project come to know more and better about their rights and duties objectively, but also due to the holistic perception that integrate a society which should be mutually responsible for.

To build a common life unity (community) where sustainability is present is not enough to know and enforce laws, regulations, rules and procedures. You need to go beyond, generating reflections and evaluations about yourself, about governances and what are intended to do now, to ensure the existence of future generations more conscious, active and engaged in more sustainable cities.

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Chasing Eco-Advantage: What Drives Eco-Innovations in Brazil

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Abstract: This paper presents an unprecedented survey of Brazilian firms mapping their eco-innovative patterns. This paper draws special attention to the group of firms that have achieved the stage of “eco-advantage”, in order to find out what drives radical innovation and what are the main characteristics of this group. The results show that the main innovation determinant influencing radical outcomes regards market-driven factors, specially the purpose of creating new market segments. Moreover, this result corroborates with theoretical observations suggesting that spurring green innovation can be seized as opportunities, instead of mere constraints to economic activity. These opportunities are both to fulfill the existing demands of consumers for environmentally friendly products (and services), as well as to emulate preferences while creating new market segments.

Key words: Eco-Innovative patterns; Eco-Advantage; Radical innovation; Market-Driven factors; market segments

1 Introduction

The recognition of global-scale environmental threats gained room into international discussions since the second half of the 20th century. Awareness came up with the somewhat recent scientific observation that “the rapid and accelerating technologically driven modification of our natural surroundings has changed them beyond the wildest Neolithic dreams” (Grey, 1993:464). These risks stimulated consciousness about the necessity of transitioning towards more sustainable use of natural resources.

Light has been shed on the environmental capacity to resist to our patterns of development, creating skepticism over utilitarian frameworks in which natural resources are 'taken for granted'. Environmental responsibility consequently contrasts with previous understandings of progress as inevitable marches forward, assuring mastery over natural resources (Cohen, 1997). Instead of exogenous to human activities, natural systems are complex and co-evolving dynamics, directly affected by technological trajectories and social behavior.

Effects of technologies towards nature consequently raised questions about whether past trends of prosperity can be broadened (or even sustained) in future (Clark *et al.*, 2005). The need for a better harmonization between economic development and the nature calls for a drastic change in the ways that businesses impact the environment. For this to take place, a new paradigm for production, consumption and disposal is required. However, changing paradigms is never an easy task. It demands innovative efforts to bring up alternatives that combine the needs of the economy, society and environment.

Innovations are, therefore, central to this debate. They are concomitantly sources of environmental threats and mechanisms for finding a way out, for escaping from a potential unwanted future (Zizek, 2011). The last feature is represented by what has been labeled as eco-innovations: novelties in processes, products, services and business models that can reduce man-induced environmental impacts. The imperative here, according to Jacobs (1997: 9), is shifting “onto a new path of economic development in which technological advances and social changes combine to reduce, by an order of magnitude, the environmental impacts of economic activity”. This path should be pursued through exploiting opportunities for innovation that concomitantly enhance environmental and economic performance.

Eco-innovations are thus a tool with which firms engage in the shift to a new paradigm of capitalism production. Despite its importance, little is known about the subject, especially in an emerging country such as Brazil. In order to contribute for a better understanding of the Brazilian “eco-innovative” landscape, this paper draws a map of eco-innovative activities within Brazilian firms, unraveling their motivations, processes and results. We present data from a recent and unprecedented survey carried out with 98 Brazilian firms in 2012. The purpose of this paper is to provide an overview of how Brazilian firms are tackling environmental issues related to their businesses and whether they are seizing the opportunity to make such issues a source of competitive advantage. We pay special attention to the group of firms that perform radical eco-innovations. These firms are the ones that will make possible the transition towards a new paradigm of production, in a greener economy.

The remainder of this paper presents, at first, the theoretical background concerning innovation for sustainability and conceptualizes eco-innovations. Later we present our database and research methods. We run a probabilistic regression to find out what factors contribute to the occurrence of radical eco-innovations among Brazilian firms. We conclude with some reflections on the findings of the econometric exercise while linking them with theoretical frameworks.

2 Theoretical Framework

2.1 Innovation for sustainability

Written by a commission convened by the United Nations, the Brundtland Report was as a milestone for the institutionalization of the term 'sustainable development' and its further integration into political agendas (Sachs, 2000). Sustainability here brings in its core the idea of satisfying current needs without jeopardizing needs of future generations (WCDE, 1987). This term mingles together concerns that are not necessarily new, such as poverty, disruption of livelihoods, and threats to 'survival of mankind'. In fact, much of this discussion has been casted in terms of a balanced integration between social, economic and environmental dimensions – the so-called triple bottom line (Elkington, 1998).

Sustainable development as a concept has spread quickly and became central in political agendas, strategies of firms, and agreements conducted by international organisations. Indeed, the concept raised by the Brundtland Report was further reinforced and specified by international meetings. Rio-92 stated principles on forests, climate change, biodiversity and issued the Agenda 21, mobilizing the establishment of blueprints of desired actions (UNCED, 1992). Meetings conducted ten and twenty years later, namely the Johannesburg World Summit, and the Rio+20, reaffirmed commitments in pursuing sustainable alternatives through the engagement of nations, firms and civil society (Kates *et al.*, 2005).

The role played by innovation to chase sustainable pathways has varied between scepticism and optimism, both among scholars and political representatives. In several international discussions, such as Rio-92, Johannesburg Summit, and Rio+20, the tone has been of harnessing innovation so to achieve the goals linked to an environmentally sustainable human development. Indeed, with the rapid spread of sustainability throughout political agendas, efforts to implement sustainable development have emphasized the lack of technical knowledge, rather than social and political mobilization (Clark *et al.*, 2005). Other organisations, such as NRC (1999:7), bring a different perception, stressing that a successful transition towards sustainability "could be achieved without miraculous technologies or drastic transformation of human societies"; requiring, on the other hand, capabilities, social learning and political will to shift to alternatives that are already viable with existent technologies.

Though with distinct emphasis on the relevance of radical technologies to leapfrog unsustainable trajectories, it seems clear that innovation, in its broad meaning, occupies a central place in these discussions. This is because innovation is linked to *change*, and sustainability discourses made clear that society cannot follow the same behavioural and technological tracks pursued in the last centuries.

In order to better understand the role played by innovation in discussions around sustainability, it is important to conceptualize what innovation means, according to evolutionary economic theories. It can be characterized as a continuous, cumulative, systemic, non-linear, path-dependent and generally chaotic process (Van De Ven, 1986; Tidd, 2001). Innovation consists not only in commercializing new products, services or technologies, neither only in generating new processes or business models. It also aggregates processes of market diffusion, as well as absorption and imitation of novelties created somewhere else – as long as they bring an underlying learning process, which stimulates new dynamic capabilities (Tece, 1998). Moreover, they can be classified in terms of impacts they generate – can be engendered as radical (disruptive) or incremental (Freeman and Perez, 1988; Christensen, 2000).

Innovation for sustainability thus includes new services, products, processes, technologies, business models, as well as diffusion of existing novelties, as long as they help shifting towards the new paradigm of sustainable development. They can be essentially different to each other, having different impacts and targeting different objectives. However, to be qualified as 'sustainable', it is essential that these novelties – combined with change in social behavior – contribute to a future in which environmental responsiveness, social inclusiveness and economic performance are better harmonized.

In this context, innovation with a positive environmental impact became a specific field of investigation, and the term eco-innovation became disseminated. Next section presents the conceptualization of the term and a review of the literature on the types and determinants of eco-innovation.

2.2 Eco-innovations: concepts and determinants

Innovation is a critical concept for dealing with environmental vulnerabilities and strengthening the resilience of nature towards possible disruptions within its boundaries. The Stockholm Resilience Centre is one among a handful of organizations investigating “biophysical boundaries at the planetary scale within which humanity has the flexibility to choose a myriad of pathways for human well-being and development” (Rockström, 2009:6). In its preliminary analysis, humanity has transgressed three boundaries (namely climate change, biodiversity loss and nitrogen cycle). Despite knowing what the boundaries are (and impacts of human activities upon them), the study recognized significant uncertainty about thresholds for environmental change beyond return; duration over which system's boundaries can be transgressed; and nature's ability to return to safe levels (Rockström, 2009). The search for solutions to such threats demands finding new relationship patterns between society and the nature, which will ultimately drive the economic actors towards a new paradigm of production, consumption and disposal.

These environmental burdens are, in fact, not seen exclusively as constraints to human activities, but also as opportunities for economic and social prosperity. Environmental harm by industrial operations can be seen as “unnecessary waste, inelegant design, and longer-term comparative disadvantage” (Cohen, 2006:41). These win-win situations – both for economic and environmental performances – have been described, for instance, by Hart (1997) and Porter & Van de Linde (1995).

While Hart presented opportunities for firms to drive innovation and to crystalize a growth trajectory through the internalization of environmental concerns, Porter and Van de Linde postulated (and confirmed) a hypothesis that environmental regulations foster efficiency and innovativeness – and, accordingly, are not constraints to economic activities, as commonly presented in political discourses, but rather opportunities for driving competitiveness. Indeed, previous works corroborate the importance of environmental regulations for the occurrence of eco-innovations in German (Horbach *et al.*, 2012) and English companies (Demirel and Kesidou, 2011).

Similarly, authors from the self-nominated 'ecological modernization' challenged the trade-offs between economic activity and the sake of nature, focusing on simultaneous improvements in human welfare and environmental stewardship. Initially proposed by Huber, this theory describes a hyper-rational strategy for correcting ecological harms of contemporary practices (Cohen, 1997). By encouraging flexible and precautionary governmental and industrial strategies, society is able to spur green innovations and continuous improvements towards environmentally-friendly technological trajectories. These new technological paths should be pursued through exploiting opportunities for innovation to enhance environmental performance of industrial processes, and modernity is seen as a new phase of civilization, in which a super-industrialization is organized around sophisticated environmental technologies (Cohen, 2006).

Following this optimistic perspectives towards technical solutions to environmental hazards, several studies dating from the 2000s have embarked in the task of conceptualising eco-innovations, which can be synthesized in the following: *Eco-innovation is the production, assimilation or exploitation of a product, production process, service or management or manner of doing business that is new for the organization (developing or adopting these) and that results, through the life cycle, in a reduction of environmental risks, pollution and other negative impacts of the use of resources (including the use of energy) compared to relevant alternatives* (Kemp and Pearson, 2007: 7).¹

When dealing with eco-innovation, the gain can be translated as environmental benefit attained (cleaner air, more available water, etc.), as well as economic outcome for the firm. Innovations can be essentially radical or incremental; the radical ones being discoveries that completely disrupt with the current course of things, the incremental ones adding significant improvements to the already existing products or processes. Besides that, eco-innovations can fit into different categories, described on Table 1.

The first category covers the environmental technologies. These may be remedial (end-of-pipe), which seek to reduce the impact caused by an existing technology; or they can also be clean alternatives to the usually more polluting technologies. The second category covers the methods of organizational management that incorporate environmental issues. This includes the strategies applied to production processes and the whole infrastructure and logistics of companies for the reduction of environmental impacts. Internal audits, staff training and even waste and pollution prevention schemes are examples of this category (Kemp and Foxon, 2007).

¹ By relevant alternatives is understood the technologies and/or processes in use in organizations at the moment of implementation of the innovation (Kemp and Pearson, 2007)

Table 1 Taxonomy of Environmental Innovations

Innovation	Examples
Environmental Technology	<ul style="list-style-type: none"> - Technology of pollution control - Clean technologies - Technology of green energy
Organizational Innovation	<ul style="list-style-type: none"> - Schemes of pollution prevention - Environmental management - Management of the value chain
Innovation of Product and Service	<ul style="list-style-type: none"> - Ecologically beneficial products - Ecological and/or less resource intensive services
Green Innovation of the System	<ul style="list-style-type: none"> - More ecologically beneficial alternative systems of consumption and production

Source: adapted from Kemp and Foxon, 2007.

In third place come the environmentally beneficial products and services, such as green certifications or biodegradable products. As regards services, these can include works of waste and pollution management, environmental consultancy, among other services that seek to reduce the environmental impact resulting from productive activities. The last category covers the innovations of systems, which “involve a wide range of changes in technological production, knowledge, organization, institutions and infrastructures and possibly changes in the behaviour of consumers.” (Kemp and Foxon, 2007: 9). It covers alternative systems of production and consumption that are more environmentally beneficial than existing systems. An example of a system innovation is organic agriculture and renewable energy systems (like the one required for electric cars). Such innovations act comprehensively, reaching a wide range of actors and reverberating in various sectors of economic activity.

The definition of eco-innovation prioritizes the result over the motivation of the firm to innovate. If the environmental result was intentionally reached or if it occurred by chance, little is known by the current literature. Learning about the determinants of eco-innovations, however, is central if eco-innovations are to be systematically fostered.

Four factors can be considered the main drivers of eco-innovations, according to the literature (Belin *et al.*, 2009; Horbach and Rennings, 2012). These are: regulations, market factors, firm-specific factors and environmental concerns. They are presented on Table 2.

Table 2 Main Drivers of Eco- Innovation

1.Regulatory push/pull (R)	<ul style="list-style-type: none"> - implementation of environmental policies - anticipation of environmental regulations
2.Technology & factors internal to the firm (I)	<ul style="list-style-type: none"> - cost economies - better productivity - innovation in organizational management systems - R&D activities - networks, cooperation
3. Market determinants (M)	<ul style="list-style-type: none"> - growing awareness of consumers about environmental issues - expectation of increase of participation in new market segments
4. Environmental Concerns (E)	<ul style="list-style-type: none"> - environmental concerns from the company

Source: based on Belin, Horbach & Oltra (2009) and Horbach and Rennings (2012).

Environmental regulations are viewed as a way to induce firms to internalize the externalities created by their activities. As such, they would impose extra costs for firms and act as constraints for competitiveness. Porter and van der Linde (1995), however, introduced a different perspective to this matter by claiming that environmental regulations force firms to innovate and improve resource efficiency and productivity. Regulations would therefore increase turnover and profits (Porter and Linde; 1995; Bernauer *et al.*; 2006; Belin *et al.*; 2009).

Market factors are the pressures on companies brought by consumers and competitors. Customer demands are proven to be a strong driver of firm behaviour. In regard to environmental concerns,

consumers are increasingly aware of threats, and equally interested in knowing what firms are doing about it. Therefore, there are several opportunities for creating new products and services that better suit to these new market demands.

Factors internal to the firm, on the other hand, are mainly its technological and innovative capacities, its strategies, key-competencies, as well as the search for higher productivity, eco-efficiency and other cost reduction benefits (Bernauer *et al.*, 2006).

Pure environmental motivations are those based on strong ethical values driving firms to do the right thing, regardless of regulations or consumer pressure. It is strongly built on the top management values that encourages the firm to take their role in society very seriously (Bansal and Roth, 2000).

3 Method

3.1 Sample and data collection

The present study is based on an unprecedented survey carried out with Brazilian companies in manufacturing and services sectors. The survey was conducted between May and July, 2012. A stratified random sample was utilized, with companies of different sizes. Ninety-eight (98) companies replied to the questionnaire. Such a sample is within the 95% reliability interval with significance of 10% expected for populations between 50 and 100 thousand, the approximate number of companies existing in Brazil (Rea and Parker, 2005).

The survey design was based on an extensive literature research on similar surveys carried out earlier; also, the Brazilian Innovation Survey (PINTEC) questionnaire design was used as a base when similar questions were applied.

The main purpose of the survey was to provide a broader understanding of eco-innovation in Brazilian firms. For that purpose, the questionnaire is divided into five sections: A- general company data; B- general information on the innovative activities of the company; C- objectives of the environmental innovations; D- processes of the environmental innovations; E- results of the environmental innovations.

Section A contains questions regarding capital ownership, revenues, share of revenues obtained from exports. Firms were also questioned about the importance of environmental issues for the business, as well as about the existence of initiatives related to environmental management (ISO 14001, sustainability report, among others). Section B presents questions regarding their innovative activities, the amount invested, the occurrence of R&D activities and the sources of funds intended for innovation. Section C inquires more specifically about the occurrence of eco-innovations and their nature. Section D deals with the processes involved in the innovation activity; in special, the sources of external knowledge used and whether cooperative arrangements for innovation had taken place. Finally, section E enquires about the results of the eco-innovation, as well as the possible obstacles faced in its realization or which prevented it from being successfully implemented.

3.2 Categorizing firms according to their eco-innovative drive

Our quantitative analysis departs from an earlier categorisations of firms proposed by the MEI Project, according to their innovative approach to eco-innovation, which can be essentially passive or proactive (Kemp and Foxon, 2007). We consider that the decision to eco-innovate or not reflects the firm's engagement with environmental issues, that can also be categorised from denial to strong commitment. This engagement evolves with time, as firms matures or forcedly complies with environmental concerns. It is also significantly affected by the capability of firms to foresee competitive advantages from a more responsible, "green-wise" strategy. We merge Kemp and Foxon (2007)'s categories of eco-innovativeness of firms with a 4-stage taxonomy proposed by Esty and Winston (2009) to classify firms according to their environmental strategy:

(1)Eco-resistance: firms that have no eco-innovative activities and no environmental strategy, simply ignoring the environmental concerns around them;

(2)Eco-compliance: a second stage in which firms tackle environmental issues due to regulatory pressure by implementing or developing eco-innovations but with no specific strategy for such;

(3)Eco-efficiency: firms that intentionally implement eco-innovations, either developed in-house or acquired from others with the purpose of achieving better performance, especially better efficiency in the use of resources;

(4)Eco-advantage: firms that undertake eco-innovations strategically, developing green products, services or technologies as their core business, or as a significant share of their activities. This group of

firms most often undertakes radical innovations that modify the way things are done or replaces products or processes that are environmentally prejudicial.

Stages 1 and 2 represent a reactive approach to environmental issues, whereas stages 3 and 4 reflect a proactive positioning of firms. Firms on stages 3 and 4 are working with two important aspects of the environmental impact in their businesses: the downside and the upside. Firms on stage 3 are most focused on reducing the downside, notably reducing costs and keeping risks at the lower possible level. Stage 4 is achieved when firms try to enhance the possibilities on the upside of the environmental issue: generating revenues from creating and exploring new market niches (Esty and Winston, 2009).

The four categories establish a relationship between the environmental commitment of firms, their eco-innovative efforts and the potential of value generation present in each level of commitment and innovativeness. As the firm's eco-innovative effort increases, so does the possible value generation obtained from the result of the innovation. In other words, it means that, the more strategically firms undertake innovation for the environment, the more it translates into economic (above all, but not restricted to) benefits of this effort.

This categorisation will later in the paper be applied to our sample of Brazilian firms in order to provide us an overview of the current engagement of firms to the environmental issues and how passive or proactively they are positioning in this regard.

3.3 Research questions and hypothesis

This work aims at investigating the following research questions:

- ✧ What are the drivers of radical eco-innovations among Brazilian firms?
- ✧ What is the profile of firms that are bringing radical eco-innovations to the market?

In order to trace the profile of radical eco-innovative firms we run an econometric model that tests the following hypotheses:

H1: Firms that carry out R&D activities with the specific purpose of generating environmentally beneficial products have a higher propensity to generate radical eco-innovations

It is widely acknowledged that companies with internal R&D activities achieve better results in science-based innovation (Pavitt, 1984), generating novelties with higher impact. Earlier studies have established a relationship between the presence of R&D activities and the occurrence of eco-innovations both in Brazilian (Young *et al.*, 2007) in German and French firms (BELIN *et al.*, 2011). Nevertheless, no studies were found relating the existence of environmental R&D to the occurrence of specific types of eco-innovations. It seems reasonable to expect that such strong and targeted effort of R&D is related to radical innovations.

H2: Firms driven by market determinants have a higher propensity to generate radical eco-innovations.

It seems reasonable to expect that firms driven by market determinants, in special the purpose of creating new market segments, will generate more radical innovations than other determinants – whereas regulatory policies tend to drive firms to adopt innovations in specific areas, such as waste and recycling.

H3: firms that establish partnerships for innovation have a higher propensity to generate radical eco-innovations.

The literature on eco-innovations tells us that firms have much to benefit from the establishment of cooperative arrangements (Belin *et al.*, 2011; Hart, 1997). A variety of actors/stakeholders involved in the innovation process brings different knowledge and reduces risk, costs and uncertainty. Previous studies have observed that the establishment of cooperation influences positively the probability of occurrence of eco-innovations (Belin *et al.*, 2011; Arruda *et al.*, 2012). Moreover, since eco-innovations are often linked to knowledge that is at the frontier – facing higher uncertainty and requiring more complexity than business-as-usual – those would be most benefited by cooperative arrangements in the innovation process. External partnerships increase the range of knowledge and capabilities available in the innovative process.

Next section presents the general descriptive findings as well as the results of the probabilistic regression, so to test the three above-mentioned hypotheses.

3.4 Econometric model

The dependent variable of our model is *radical innovation*. It assumes value 1 ($Y=1$) when firms report that the outcomes of their innovation process were new to the world; it assumes value 0 otherwise ($Y=0$). Due to the binary character of the dependent variable we use a probabilistic regression that can be briefly described as follows: the occurrence of a radical eco-innovation is influenced by several factors that are summarized by a vector x . Therefore, we need to estimate the following probability:

$$\text{Prob}(Y=1|x) = F(x, \beta)$$

We assume that the sample has a normal distribution: $\text{Prob}(Y=1|x) = \Phi(x'\beta)$. The parameters β reflect the impact of marginal changes in x on the probability (Greene, 2008: 772).

The variable describing the *determinants* of eco-innovation can be classified into the following categories: regulatory push/pull; technology & factors internal to the firm; market determinants; environmental concerns. It assumes value 1 when the firm reports each of the determinants as their main motivation to eco-innovate.

The variable *size* is obtained from the natural logarithm of the firm's net revenues. The variable *cooperation* is binary and takes value 1 when a firm reports having established cooperative arrangements for innovation, and value 0 otherwise. The variable *age* is the natural logarithm of the number of years of the firm's foundation. The variable *EMS* is binary and assumes value 1 when firms have adopted environmental management systems, and 0 otherwise. The variable *foreign* is binary and assumes value 1 when the firm is mostly owned by foreign capital, and 0 otherwise.

4 Results

4.1 General Results of the Survey

In general terms, we can say that Brazilian firms from our sample are aware of environmental issues that affect their businesses. They are addressing these issues through a series of initiatives (waste management programs, energy consumption reduction plans, EMS, creation of a "sustainability team" within the firm, among others). Innovative approaches, in special the more radical and disruptive innovations, are nevertheless limited to a specific group of firms.

From the 98 firms that replied to the survey, 47% reported having carried out eco-innovations in 2011. One third of such were organisational innovations mostly referring to waste recycling or energy reduction initiatives. New environmentally beneficial products or processes represent 38% of the innovations carried out among the sample. The creation of cleaner technologies was reported only by 28% of the sample.

When we asked about the determinants for carrying out eco-innovation, we were surprised to acknowledge that environmental concerns were the key determinant for only 13% of eco-innovative firms. The creation of new businesses was alone the main determinant – 28% of firms reported this as their key driver to eco-innovate. Cost reduction was the third most important factor (22%), followed by the search for brand reputation/image improvement (20%). Regulation was only mentioned as the central determinant for 13% of firms.

Such results seem to suggest that in Brazil there are some key aspects to be observed: regulatory policies seem not to be signalling to the market in regard to potential market creation, or do not exist sufficient regulations to generate market shifts. The fact that a good share (a third) of eco-innovations relate to waste recycling is evidence that one important governmental policy – the Solid Waste National Program (PNRS, in Portuguese) – is moving firms to action, but still limits to compliance.

Other important (and quite surprising) aspect is that approximately a quarter of eco-innovative firms have the purpose of creating new markets and/or expanding to new business niches. This group is of special interest due to the fact that their products – mostly technologies, but possibly also management systems – when disseminated in the economy, will enable other firms to perform their productive activities in a more environmentally positive way. This niche of firms has eco-innovations as their core business and has a strategic approach to the environmental concerns.

We now shift our attention to the kinds of eco-innovation the firms in our sample have undertaken, according to the categories presented in the Method section. First, there is the group of non eco-innovators, that we named "eco-resistance". Such firms opt for turning a blind eye to the environmental issue. This is our largest group, comprising 54% of firms.

The second category, representing a stage ahead in the firm's responsiveness to environmental issues, "eco-compliance", has 16% of firms. Many of these firms are driven by regulations recently established in Brazil and are acting in order to comply with these requirements. Most eco-innovations reported by this group of firms refer to incremental innovations aimed at reducing waste generation, water consumption or energy expenditures.

"Eco-efficiency" is the stage where 20% of the sample stands. The search for better performance while saving natural (non-renewable) resources is the determinant of this group's approach to the environment. Firms at this stage are one step ahead of the earlier stage, as their eco-innovations have a characteristic of concerning with cost reduction.

The “eco-advantage” stage has only been achieved by 10% of the sample. Most firms at this stage are generating knowledge and launching innovations that are radically changing markets and production processes. Unfortunately this is the smallest group, but a central one, as these companies are leading the “green competitive wave”. Among this group are technology-based firms that have an eco-innovation as their main product, setting the environment at their core business.

The distribution of firms from the sample in the four categories proposed in the paper is presented on Figure 1.

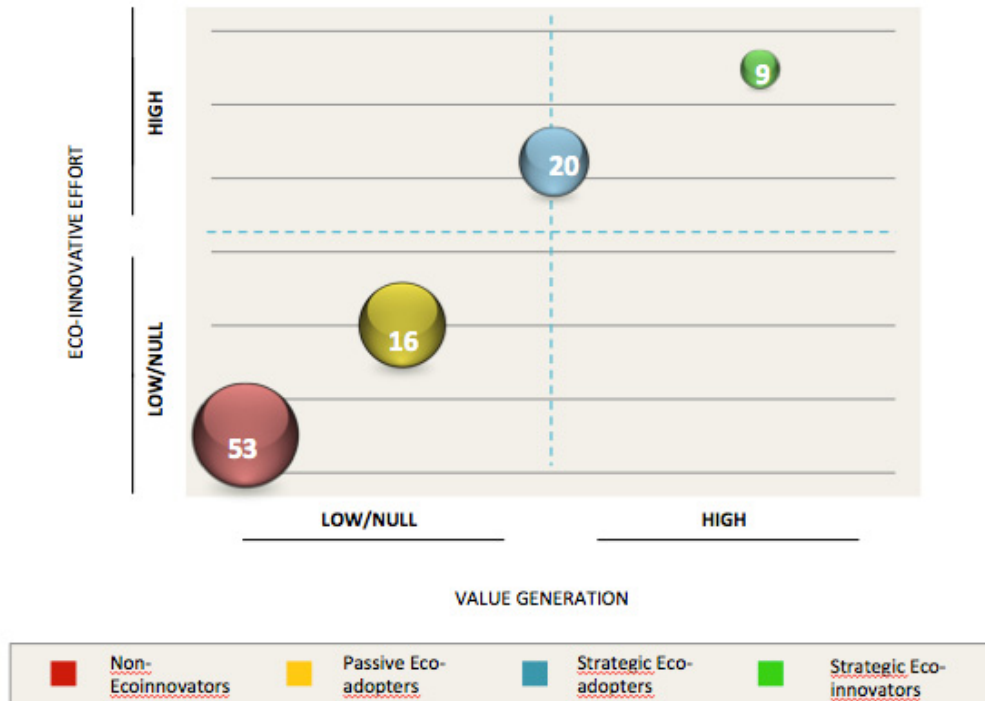


Figure 1 Distribution of Firms From the Sample in the Proposed Categories

In order to have a better understanding of the profile of firms within this last group and what drives their radical eco-innovative behaviour, the results of the probabilistic regression (whose model was previously described in this work) is elucidated in the next section.

4.2 Probabilistic regression

Table 3 brings the results of our probabilistic regression, which had a (binary) dependent variable: the occurrence of radical innovations (taking value 1 for yes, 0 for no). Explanatory variables were those mentioned in the hypotheses raised: the different motivations reported by firms to eco-innovate; the existence of R&D activities specially focused on environmentally positive outcomes; the establishment of cooperative arrangements for innovation.

We also asked firms about their age, capital ownership, revenues (in order to measure firm size) and whether they have environmental management systems (EMS), used as control variables.

As expected, the existence of R&D activities specifically oriented to the achievement of environmental outcomes proved to have a positive effect on the occurrence of radical eco-innovations. Once more it became evident that radical outcomes usually demand considerable investments in research and development. In the case of eco-innovations, this tends to be even more important. Indeed, eco-innovations are often more science-based than the ones emerging within traditional systems, as a shift to environmentally friendly alternatives sometimes diverges from the prevailing sociotechnical regimes. We therefore accept hypothesis 1.

Regarding hypothesis 2, two different results came out. First, we corroborated our hypothesis that firms driven by market determinants, and in special those in search of new market segments, have radical innovations as an outcome. We expected that firms driven by compliance motivations would not generate radical innovations, as they mostly adopt innovations developed elsewhere, or lead to end-of-pipe innovations (Horbach *et al.*, 2012). Nevertheless, results have shown that, differently from expected, regulatory determinants also have a positive effect on the occurrence of radical innovations, though not so intensively as market determinants.

A possible explanation for that is the fact that, once recent policies are driving firms to adopt cleaner production processes, some firms are benefiting from this new demand by providing firms with technologies that enable them to adopt cleaner production methods. In this case, some of the radical innovative firms would be operating exactly in the sectors that regulations have already been established. The solid waste program, as earlier mentioned, has boosted firms and raised numerous innovative initiatives among Brazilian firms. Hypothesis 2 is therefore accepted, but the positive effect is extended to the regulatory determinant.

Furthermore, cooperative arrangements for innovation had a positive sign in our model. However, results are non significant in the model. We cannot draw any strong conclusion in this regard, and therefore hypothesis 3 cannot be accepted. The control variables used in our model did not show either significant results and, therefore, conclusions cannot be drawn in this regard. Only the variable referring to firm age had a positive and significant result, suggesting that firms already established in the market have a stronger propensity to develop radical innovations. It seems reasonable to relate such positive effect to the accumulation of experience and knowledge by the firm, contributing to more successful innovative efforts.

Table 3 Results of the Probit regression

	Dependent Eco-innovation (yes=1; no=0)	Variable: Radical
size	-0.118 (0.0987)	
E_R&D	1.719*** (0.578)	
market	1.760** (0.858)	
Environment	1.007 (1.009)	
Internal	1.294 (0.823)	
Regulation	1.725* (1.009)	
COOP	0.00755 (0.572)	
EMS	-0.702 (1.214)	
age	0.0144* (0.00809)	
foreign	0.146 (0.656)	
Constant	-0.1 (2.06)	
N	56	
Prob> Chi2	0.0006	
Pseudo R2	0.4376	
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

5 Concluding Remarks

The purpose of this paper is to present data from an unprecedented survey of Brazilian firms mapping their eco-innovative patterns. We draw special attention to the group of firms that have

achieved the stage of “eco-advantage”, in order to find out what drives radical innovation and what are the main characteristics of this group.

Our results show that the main innovation determinant influencing radical outcomes regards market-driven factors, specially the purpose of creating new market segments. This result corroborates with theoretical observations suggesting that spurring green innovation can be seized as opportunities, instead of mere constraints to economic activity. These opportunities are both to fulfill the existing demands of consumers for environmentally friendly products (and services), as well as to emulate preferences while creating new market segments. The later tends to be potentially disruptive, as it generates new technological trajectories, business models, products and services.

Other important determinant of radical eco-innovation consists on regulations, due to the imperatives of complying with environmental policies. This observation supports the Porter hypothesis and the perception that environmental regulations can stimulate competitiveness of firms by forcing them to invest on energy efficiency and waste reduction, pay greater attention on their product's life cycle, and so forth. This result in the Brazilian scenario is similar to the findings in other countries, such as England and Germany, and diverges to the widespread idea that weak environmental laws have positive impact on competitiveness of countries. Although weak laws might attract multinationals unwilling to cope with high environmental standards, strong laws are capable of crystalizing a growth trajectory through stimulus to innovative behaviour.

It is also important to bring to attention the fact that regulatory policies, though not yet a main driver of eco-innovations in Brazilian firms, already show its power in creating market for specific technologies and environmental solutions, such as waste management. It signalizes the strength that policies have to shape environmental impacts of businesses.

Performing R&D activities oriented to environmental outcomes, as expected, has also proved to have positive effect on the occurrence of radical eco-innovations. This goes along with the widely acknowledged theoretical description that internal R&D achieves better results in science-based innovation (Pavitt, 1984), such as disruptive novelties involving environmental stewardship. It is interesting to observe, though, that R&D activities are usually tagged to technology-pull (sometimes mission-oriented) initiatives, while this study has shown that market pressures are among the most important determinants to generate eco-innovations.

Furthermore, the descriptive results presented in the previous section stressed the existence of this special group of radical eco-innovators in our sample of Brazilian firms. Even though they exist, their size is still rather limited. It means that there are few firms seizing the opportunities raised by deliberately increasing environmental concerns into their strategies. On the positive side, the existence of the group *per se* means that the opportunities do exist and could be seized by many other firms.

Finally, it is important to stress that this study was limited to 98 enterprises. Although the sample includes enterprises from different sizes and sectors, it is not representative of the Brazilian landscape. Enterprises were targeted according to their potential to contribute to the understanding of determinants and profiles of eco-innovators, not aiming to characterise or generalise the findings to the whole population of Brazilian firms. This work also focused on testing specific hypothesis through the use of econometric tools and descriptive statistics, and, therefore, a later qualitative in-depth study would contribute to better understand the variables and their interconnection.

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Research on Evaluation Index of Commercial Bank Knowledge Management Based on AHP

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Abstract: With the arriving of knowledge economy era, knowledge has become a key factor in competition between enterprises. Effective knowledge management could enhance the core competitiveness of enterprises. As a typical knowledge-intensive financial firm, the knowledge composition and management emphasis of commercial bank are very different. This paper establishes evaluation indexes system of commercial bank knowledge management from four aspects including customer relationship, organizational knowledge, business knowledge and external knowledge, and then introduces analytic hierarchy process (AHP) to sort the evaluation indexes, so as to effectively locate the core knowledge of commercial bank and provide reference for the implementation and improvement directions of commercial bank knowledge management.

Key words: Commercial bank; Knowledge management; Evaluation index; AHP

1 Introduction

With the arriving of knowledge economy era, knowledge-intensive enterprises rise rapidly and knowledge becomes a key factor in competition. At the same time, knowledge management also emerges. The knowledge composition management emphases are different with different types of enterprises. Effective knowledge management can enhance corporate value and core competitiveness. The evaluation of knowledge management is an important part of knowledge management, which could evaluate the implementation effect of knowledge management. Compared with general enterprises, the knowledge composition and management emphasis of commercial bank is very different, but most domestic commercial banks are lack specialized knowledge management system and knowledge management evaluation is also lack of uniform standards. There are some studies about knowledge management at home and abroad, but mostly for general business and little from the perspective of commercial banks. Therefore, this paper will focus on commercial bank knowledge management and establish evaluation indexes system from customer relationship, organizational knowledge, business knowledge and external knowledge the four aspects for knowledge management of commercial bank. And then the AHP is introduced for further analysis of the evaluation indexes. The purpose of this paper is to provide the basis for positioning core knowledge of commercial bank and give references for implementation and improvement directions of commercial bank knowledge management.

2 Literature Review

Research on knowledge management started in 1980s. Dr Karl E. Sveiby published the book "knowledge-based enterprises" in 1986 with Swedish, which made him the ideas source of knowledge management theory and practice. In 1990, Swaziland published the book "knowledge management" that was the fist work to with knowledge management as theme. Management scholar Peter Drucker predicted as early as 1965 that knowledge would become the most important product factor replacing land, labor, capital, and machinery equipment^[1]. Management master Peter Drucker (1993) said: "The most valuable asset in 21st century organizations is the organization's knowledge workers and their productivity." Enterprise knowledge includes tacit knowledge and explicit knowledge. According to Delphi Group survey, the largest part of the enterprise knowledge is tacit knowledge exists in minds of employees. Japanese knowledge management expert Nonaka (1995) presented conversion model between explicit knowledge and tacit knowledge and the four basic modes of knowledge conversion. He though it was the intersection between tacit knowledge and explicit knowledge that created learning.

About studies of knowledge management evaluation, Kaplan and Norton (1993) proposed the Balance Score Card and respectively from the financial, customer, internal operations and learning and growth the major four aspects evaluated enterprise intellectual capital; Quitas^[2] etc. proposed evaluation index system including business-oriented development, acquisition and sharing knowledge strategic policy, knowledge strategy implementation and testing and evaluation management activities related to knowledge; Andersen^[3]proposed knowledge management assessment tools including sense of leadership,

corporate culture, technology, assessment and learning behavior change; Domestic scholar Liao Kaiji^[4] measured knowledge management performance from the enterprise knowledge management capability, internal structure, external structure and personnel competitiveness; Ma Xiaoyong^[5] set up measure card as assessment tool of corporate knowledge management capability and used it in corporate real evaluation; Xu Ning^[6] presented commercial banks diagnostic model of knowledge management from culture, management and technology three point of view.

In summary, researches about knowledge management and its evaluation index are very much which could help the construction of knowledge management evaluation indexes of commercial bank.

3 Commercial Bank Knowledge Management

3.1 Knowledge management

APCQ (American Productivity and Quality Center) defines knowledge management as: knowledge management is a conscious adopted strategy of organization, which can guarantee that most needed knowledge is transmitted to those most in need in the most needed time. This can help people share information, and thus put it into practice through different ways so as to achieve the purpose of improving organizational performance.

Classic SECI knowledge transformation model can be further elaborate knowledge management connotation. The model is shown in Figure 1.

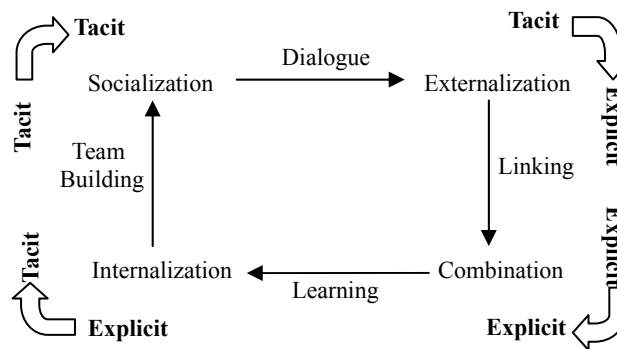


Figure 1 SECI Model

The model assumes that knowledge accumulation and innovation experience four stages of conversion: socialization (tacit knowledge transforms into tacit knowledge and new tacit knowledge is generated by sharing) ---- externalization (tacit knowledge transforms into explicit knowledge through communication) ---- combination (explicit knowledge transforms into explicit knowledge, that means explicit knowledge is combined into more complex and systematic explicit knowledge by consolidation) ---- internalization (explicit knowledge transforms into new tacit knowledge of enterprise through learning). The knowledge of individuals and enterprises is used and developed effectively by the way.

SECI model reveals the starting point for knowledge management or creation source of knowledge to some extent. According to the model we can further define knowledge management as: constructing perfect knowledge organization system that allows continued knowledge innovation through acquisition, creation, sharing, integration, record, access, update and other processes. And the innovation knowledge can go back into the system so as to make individual and organizational knowledge accumulation.

3.2 The characteristics and significance of commercial bank knowledge management

3.2.1 The characteristics of commercial bank knowledge management

Knowledge management always starts in knowledge-based enterprises. Knowledge of general enterprise includes business knowledge, staff knowledge, process knowledge, customer knowledge, product and service knowledge and so on. Bank is a typical knowledge-based industry with no specific physical products, which must belongs to knowledge management industry. The business operations, management coordination and information communication are carriers of knowledge management reflecting the value of intellectual capital. Main body of knowledge in commercial bank could be employees, managers, functional units or business units; knowledge sharing refers to common usage of certain knowledge capital. Specifically, as a special financial services industry, the core of commercial bank knowledge management is intellectual capital management, including customer relationship, organizational knowledge, business knowledge and external knowledge management, among which customer relationship is more important then others relatively.

3.2.1 The significance of commercial bank knowledge management

The success of enterprises increasingly depends on the quality of owned knowledge in 21st century. As a commercial bank, the implementation of knowledge management is significant.

1) The implementation of knowledge management can improve the core competitiveness of commercial banks. The knowledge level is a part of core competitiveness in commercial bank, and knowledge management is the core source of competitive advantage which is a key factor to promote the growth of the core competitiveness;

2) Knowledge management can guard against financial risks effectively. There are various financial risks in bank such as credit risk, liquidity risk, interest rate risk and market risk. For instance, the credit risk can be prevented through grasping the customer's credit information;

3) Knowledge management is the inevitable trend of economic globalization. In the case of economic globalization, knowledge management has been the strategic choice of enterprises and banks. Therefore, commercial bank should put knowledge management as a strategic goal in order to improve the core competitiveness.

4 Evaluation Index Construction of Commercial Bank Knowledge Management

Evaluation of knowledge management is an important part of knowledge management, through which the bank will grasp implementation situation of knowledge management and find out problems and improvement direction. This section describes the elements of commercial bank knowledge management and establishes evaluation indexes system. The system concludes first-level indexes and second-level indexes. The first-level indexes are composed of four aspects: customer relationship management, organizational knowledge management, business knowledge management and external knowledge management. The second-level indexes are subdivision of first-level indexes. According to the characteristics of commercial banks, its knowledge management evaluation index system is shown in Table 1.

Table 1 Evaluation Index System of Commercial Bank Knowledge Management

	First-level index(B)	Second-level index (C)
Knowledge management evaluation of commercial bank (A)	Customer relationship management(X ₁)	<ul style="list-style-type: none"> • Ability to maintain customer relationships(X₁₁) • Customer satisfaction and loyalty(X₁₂) • Development of new customers(X₁₃) • Establishment of customer information database(X₁₄)
	Organizational knowledge management(X ₂)	<ul style="list-style-type: none"> • Learning ability and experience of employees(X₂₁) • The establishment of learning organization in bank(X₂₂) • The establishment of sharing incentives(X₂₃) • Explicit knowledge management targets(X₂₄)
	Business knowledge management(X ₃)	<ul style="list-style-type: none"> • Development capabilities of financial products(X₃₁) • Profitability of commercial bank(X₃₂) • Market share(X₃₃) • Level of customer service(X₃₄)
	External knowledge management(X ₄)	<ul style="list-style-type: none"> • Monetary policy study(X₄₁) • Analysis of market environment(X₄₂) • Competitors awareness(X₄₃) • Brand construction investment(X₄₄)

5 Analyses of Evaluation Indexes Based on AHP

AHP (analytic hierarchy process) is proposed by Saaty in 1970s. It is an analysis method combining qualitative and quantitative analysis, which can quantify experience judgments of decision makers and has rapid development in practical applications. This section will introduce AHP to sort for each level index, so as to determine the key knowledge in knowledge management. The application of AHP to solve problems is generally divided into four steps: 1) establish hierarchies; 2) construct pairwise comparison judgment matrix; 3) calculate index weights; 4) consistency test.

5.1 Hierarchy analysis

Specific issue is generally divided into target layer and restrictive factor layer. In the table 1, knowledge management evaluation of commercial bank is set as target layer expressed by A. First-level index expressed by B is restrictive factors layer composed of X₁, X₂, X₃ and X₄; and second-level index is restrictive sub-factors layer expressed by C. The expression way of sub-factors is shown in table 1. For example, the sub-factors of factor X₁ are expressed with X₁₁, X₁₂, X₁₃ and X₁₄.

5.2 Comparison judgment matrix

In order to obtain quantitative judgment matrix through pairwise comparison between factors, the 1~9 scales are introduced, which is shown in table 2:

Table 2 Definition of Scale 1~9

Scale	Definition
1	Factor X_i and factor X_j are equally important
3	Factor X_i is slightly important compared with factor X_j
5	Factor X_i is more important compared with factor X_j
7	Factor X_i is very important compared with factor X_j
9	Factor X_i is absolutely important compared with factor X_j
2,3,6,8	The correspond scales of intermediate state between two judgments
Reciprocal	If factor X_j is compared with X_i , judgment value is $a_{ji}=1/a_{ij}$, $a_{ii} = 1$

According to the requirements of the above scales, the judgment matrix of each index can be derived through questionnaire survey to experts. Therefore, the judgment matrix expressed as A- X_i of factors in restrictive factors layer B of table 1 is shown in table 3:

Table 3 Comparison Judgment Matrix A- X_i

A	X_1	X_2	X_3	X_4
X_1	a_{11}	a_{12}	a_{13}	a_{14}
X_2	a_{21}	a_{22}	a_{23}	a_{24}
X_3	a_{31}	a_{32}	a_{33}	a_{34}
X_4	a_{41}	a_{42}	a_{43}	a_{44}

Where, a_{ij} represents the scale of X_i compared with X_j , $a_{ji}=1/a_{ij}$ and $a_{ii} = 1$, $i=1,2,3,4$, $j=1,2,3,4$. Similarly, the judgment matrix of factors in restrictive sub-factors layer C could be constructed, which is expressed as X_i - X_{ik} , and k is the number of evaluation indexes of factor X_i .

5.3 Index weight calculation

After constructing judgment matrix, we need to calculate the maximum eigenvalue and eigenvector of the matrix. The calculation steps are as follows:

- 1) Calculate geometric mean of all elements in each row of the judgment matrix. The formula is:

$$\bar{w}_i = \sqrt[4]{\prod_{j=1}^4 a_{ij}} \quad i = 1, 2, 3, 4 \tag{1}$$

Then the vector $\bar{w} = (\bar{w}_1, \bar{w}_2, \bar{w}_3, \bar{w}_4)^T$ is obtained.

- 2) Normalize \bar{w}_i , the formula is:

$$w_i = \frac{\bar{w}_i}{\sum_{i=1}^4 \bar{w}_i} \quad i = 1, 2, 3, 4 \tag{2}$$

So as to get the vector $w = (w_1, w_2, w_3, w_4)^T$, that is approximate eigenvector of judgment matrix, and w_i is the relative weight of factor X_i .

5.4 Consistency test

Consistency test is used to test the validity of the judgment matrix. The steps are as follows:

- 1) Calculate the maximum eigenvalue λ_{max} of the matrix

Expressing the judgment matrix in table 3 as $D = (a_{ij})_{4 \times 4}$, then the calculation formula of maximum eigenvalue λ_{max} of matrix D is:

$$\lambda_{max} = \sum_{i=1}^4 \frac{(Dw)_i}{nw_i} \quad i = 1, 2, 3, 4 \tag{3}$$

Where $(Dw)_i$ is the i element of the vector Dw .

2) Calculation of consistency index CI

The consistency index of judgment matrix is $CI = \frac{\lambda_{max} - n}{n - 1}$, where n is dimension of the matrix.

3) Calculation of consistency ratio CR

Generally, we use consistency ratio $CR = CI/RI$ to measure the consistency of judgment matrix, where RI is the correction value and it is fixed as following table 4:

Table 4 Correction Value RI

Dimension	1	2	3	4	5	6	7	8	9
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45

The larger the CR is, the worse the consistency of the matrix is. Generally as long as $CR \leq 0.1$, it is thought that judgment matrix has satisfactory consistency, or building judgment matrix again.

Through the above calculation process, we can get the relative weights of restrictive factors layer B, and by the same way the weights of restrictive sub-factors layer C also could be obtained. Then through the combination weight calculation, the final weights of evaluation factors could be identified. Compared with the weights, the evaluation factors can be sorted. The index weights derived from AHP have certain accuracy and scientificity, which could locate core knowledge of commercial bank.

6 Conclusions

In this paper, evaluation index system of commercial bank knowledge management is discussed. Some conclusions can be drawn.

Firstly, knowledge management is very important for commercial bank and the emphasis of knowledge management is different in different industries.

Secondly, the evaluation index construction of commercial bank knowledge management includes two levels, and AHP can be applied to locate core knowledge of commercial banks which will help to enhance management efficiency and provide improvement directions of commercial bank.

Finally, the weights of evaluation indexes identified through AHP can be used to evaluate the overall level of knowledge management combined with DEA or other evaluation models.

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An Empirical Investigation into the Relationship Between Knowledge Management and Innovation Performance of Virtual Enterprise*

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Abstract: This paper analyzes the knowledge management activities in virtual enterprise, and makes an empirical investigation about the relationship between knowledge management and management innovation and technological innovation of virtual enterprise from three aspects: knowledge creation, knowledge transfer and knowledge storage. Then it obtains the conclusion that there is a positive, weak linear relationship between knowledge management activities and innovation performance in virtual enterprise. This provides useful reference in future research of knowledge management, management innovation and technological innovation of virtual enterprise.

Key words: Knowledge management; Virtual Enterprise; Management innovation; Technological innovation; Multiple Linear Regression Model

1 Introduction

Most scholars share a common understanding about the definition of innovation that knowledge can be turned into new ideas, new products, new processes and new services to increase competitive advantage, meet the changing needs of customers, and create new values. Virtual enterprise is a network-based and resource-cored dynamic alliance. Grasp of market and control of resources is an important source of competitive advantage, which requires unique innovate ability, and allocates resources effectively and reasonably by technical innovation, and enhances market understanding and positioning by management innovation.

As the basic unit of strategic analysis and the main source of competitive advantage, knowledge is essential to virtual enterprise. In the era of knowledge economy, rapid development of technology shorten the knowledge's life cycle, which has a profound impact on the survival, growth and adaptability of virtual enterprise. Many cases and research have shown that the effective implementation of knowledge management plays a very important role to organization's innovation. As a key segment of knowledge network, the transparency, liquidity and effectiveness of knowledge management in virtual enterprise is the foundation of resources optimal allocation and market information acquisition. It can greatly enhance the dynamic capabilities, bring dynamic competitive advantage. Different from general business, virtual enterprises more rely on network technology which has a series of new characteristics such as larger radiation, stronger stealthiness and higher risk. This means that knowledge management and innovation behavior has greater variability and flexibility, and the sources and direction of knowledge acquiring can not be judged accurately and the knowledge loss rate is high. Thus innovation activities of virtual enterprise demand higher identify ability and sensitivity of acquire technical.

A growing number of virtual enterprises begin to focus on the impact of optimization of knowledge asset allocation to competitive advantage in innovation of management and technology, and work a sound knowledge management system into strategic objectives, the understanding of knowledge management as a new element to support business innovation is strengthen. So the study of knowledge management activities of virtual enterprise can helps managers to absorb and use new knowledge effectively, adapt the virtualization, knowledgeable, networking and informational of virtual enterprise quickly, and thus enhance the innovative capability and performance of virtual enterprise greatly. This paper discusses the relationship between knowledge management and innovation performance of virtual enterprise basing on theoretical achievements and empirical analysis.

2 Conceptual Model and Hypotheses

The knowledge management process is divided into three sections: knowledge creation, transfer and storage. To achieve management and technology innovation, virtual enterprises must create new knowledge associated with innovation activities, then transfer between members and departments, and store them in an easy-to extract and modify way. Virtual enterprises should strive to establish a

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knowledge base on innovative behavior and achieve scientific and rational knowledge management to promote management and technology innovation in order to provide better products and services. Based on this, a conceptual model is built to describe the relationship between knowledge management and innovation performance in virtual enterprise, shown in Figure 1:

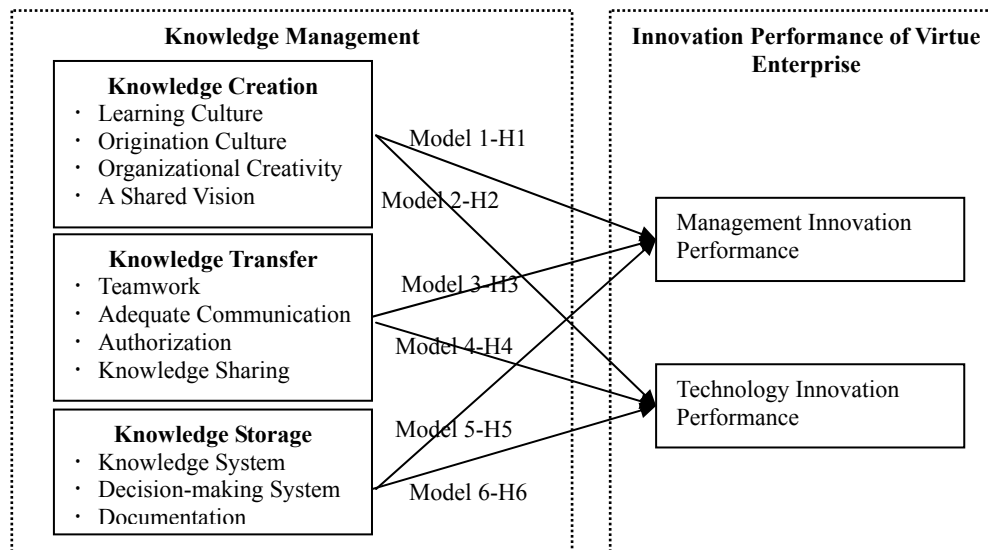


Figure 1 Relationship Between Knowledge Management and Innovation Performance in Virtue Enterprise

Knowledge creation requires organizational members to learn the existing knowledge, transform them through effective channels, and apply them to create new value. The cooperation between member companies provides a convenient environment and basis supports for individuals to create new knowledge and innovation activity. Continuous innovation in virtual work team requires internal learning and communication. Based on this, it proposes two hypotheses for model 1 and 2:

H1: Knowledge creation in virtual enterprise has a positive influence on management innovation performance

H2: Knowledge creation in virtual enterprise has a positive influence on technology innovation performance

With the increase of decentralization, the team’s shared thinking model in innovative behavior has become unified, and the multilevel understanding and cooperation has been strengthened, and then it can urge the timely and effective costs decisions to improve the short-term financial performance. However, the high fragmentation of knowledge may reduce the variation of organizations and restrict competitions which can promote innovation behaviors, so it may bring a negative impact on innovation in virtual enterprise. Based on this, it proposes two hypotheses for model 3 and 4:

H3: Knowledge transfer in virtual enterprise has a positive influence on management innovation performance

H4: Knowledge transfer in virtual enterprise has a positive influence on technology innovation performance

Once knowledge is created and transferred, it should be stored for subsequent use of each member in organization, thus the value of knowledge could be maintained and improved. The storage of knowledge is to make tacit knowledge specific and apply them effectively to achieve "organizational memory", which can play a more important role when they could be recognized more easily by employees and managers who need them. Once the individual’s information is standardized or transmitted into a file or other entities substances, knowledge will spread faster. Based on this, it proposes two hypotheses for model 5 and 6:

H5: Knowledge storage in virtual enterprise has a positive influence on management innovation performance

H6: Knowledge storage in virtual enterprise has a positive influence on technology innovation performance

3 Method Design and Model Testing

3.1 Questionnaire design and sample collection

The questionnaire includes five parts: knowledge creation, knowledge transfer, knowledge storage, innovation performance and the respondents' basic information. This paper chooses 11 items to evaluate the knowledge creation, transfer and storage: learning culture, corporate culture, organizational creativity, shared vision, teamwork, adequate communication, authorization, knowledge sharing, knowledge systems, decision-making system and documentation in virtual enterprise, While 2 items for innovation performance of virtual enterprise: management and technological innovation performance, 4 items for respondents' basic information: gender, age, name of the working company and position. 56 e-business alliances in Wuhan East Lake High-tech Zone are selected as the sampling objectives. To improve the convenience and validity, this paper makes a non-probability sampling, distribute 300 questionnaires to employees of the 56 companies, and reclaim 268 valid questionnaires after screening.

3.2 Sample descriptive statistics

This paper applies SPSS statistical software for data processing and analysis. It makes a descriptive statistics on the main characteristics of respondents, including gender, age, and firm size, in order to understand the sample distribution of these characteristics. There are 268 valid questionnaires returned, the valid recovery rate is 86.67%. Statistics result shows that the male proportion is 69.4%, the employee's age between 20 and 25 accounted for 4.5%, 25-35 accounted for 28%, 35-40 accounted for 33.3%, 40-45 accounted for 18.9%, 45-50 accounted for 11.7 %, and 50-55 accounted for 3.6%. The distribution of employees amount of virtual enterprises investigated in the research is as below: 50-100, 16.4%; 100-150, 27.3%; 150-200, 22%; 200-250, 21.3%; 250-300, 13%.

3.3 Reliability and validity testing

This paper uses Cronbach's alpha coefficient to make reliability test. The delete standard of questionnaire items is as below: if the Cronbach's α coefficients of the questionnaire item and the measured variables are less than 0.4, and the overall Cronbach's α coefficient increases after deleting the item, then this item should be deleted (Churchill, 1979). Test results shows that the Cronbach's α of each variable is higher than 0.70, which indicates that the reliability of this questionnaire is acceptable, and each variable has a good internal consistency; Meanwhile, this paper applies factor analysis to examine the structure validity of the questionnaire. Test results show that the factor loading of each questionnaire item is higher than 0.5, which indicates that the overall quality of the questionnaire is high and the structure validity is good.

4 Solution and Results Analysis

4.1 Correlation analysis

This paper uses the Pearson correlation coefficient to make a twenty-two correlation analysis of the four variables: knowledge creation, knowledge transfer, knowledge storage, and innovation performance, then it obtains the results in table 1:

Table 1 Correlation Analysis Results

Innovation Performance Dimensions		Management Innovation Performance	Technology Innovation Performance
Knowledge Management Dimensions			
Knowledge Creation	Learning Culture	-0.358**	-0.372**
	Origination Culture	0.112	0.100
	Organizational Creativity	-0.434**	-0.281**
	A Shared Vision	0.175**	0.282**
Knowledge Transfer	Teamwork	0.603**	0.566**
	Adequate Communication	-0.453**	-0.325**
	Authorization	0.487**	0.387**
	Knowledge Sharing	0.422**	0.355**
Knowledge Storage	Knowledge System	0.465**	0.378**
	Decision-making System	-0.454**	-0.332**
	Documentation	0.593**	0.656**

* $p < 0.05$ (two tailed test); ** $p < 0.01$ (two tailed test)

Data in table 1 shows that there is a correlation relationship between the variables in the present study. Among them, there is a significantly and weak negatively correlation between the four dimensions of knowledge management (learning culture, organizational creativity, adequate communication and decision-making system) and the two dimensions of innovation performance (management & technology) respectively, while there is a weak and significantly positive correlation between the three dimensions of knowledge management (shared vision, teamwork and authorization) and the two dimensions of innovation performance (management & technology) respectively.

4.2 Regression analysis

Based on the regression analysis, this paper examines the relationship between knowledge creation, knowledge transfer, knowledge storage and innovation performance in virtual enterprise, and confirms whether the dimensions of knowledge management can enter the regression equation of innovation performance.

Table 2 Overall Parameters of Regression Model

Dimensions	R	R ²	Adj. R ²	SEE.	F	Sig.
1	0.605	0.367	0.364	0.79266951	150.467	0.000
2	0.665	0.442	0.438	0.75120505	100.989	0.000
3	0.686	0.465	0.461	0.73349134	75.101	0.000
4	0.696	0.484	0.475	0.72159324	60.529	0.000
5	0.714	0.511	0.505	0.70549014	53.269	0.000
6	0.726	0.528	0.511	0.69878912	46.241	0.000

The stepwise multiple regression analysis results of each dimension of knowledge management and management innovation performance are showed in table 2. Only six factors could be introduced into the regression model: teamwork, documentation, organizational creativity, shared vision, authorization and decision-making system. The adj. determination coefficient indicates that the regression equation can explain 51.2% of the total variance. And the significant probability of F statistic of each dimension is all 0.000, which indicates that the overall regression effect is significant. Teamwork is the first variable into the regression model, which indicates that partial regression variation (the contribution to management innovation performance) is the maximum, followed by documented, organizational creativity, shared vision and authorization, the last one is decision-making system, which indicates that the influence of decision-making system to management innovation performance is relatively minimal.

Table 3 Regression Analysis Results

Variables	Non-std. Coefficients		Std. Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant	-1.61E-015	0.44		0.000	1.000
Teamwork	0.136	0.72	0.136	1.901	0.000
Documentation	0.292	0.65	0.292	4.622	0.000
Organization Creativity	-0.165	0.62	-0.165	-2.927	0.004
Shared Vision	0.226	0.48	0.226	4.634	0.000
Authorization	0.169	0.56	0.169	2.943	0.004
Decision-making System	-0.132	0.56	-0.132	-2.427	0.000

The regression analysis results in table 3 show that: Knowledge management has a significant influence on management innovation performance. The regression equation is as follows:

Management Innovation Performance=-1.61+0.136*Teamwork+0.292*Documentation-0.165*Organization Creativity+0.226*Shared Vision+0.169*Authorization-0.132*Decision-making System

Table 4 Overall Parameters of Regression Model

Dimensions	R	R ²	Adj. R ²	SEE.	F	Sig.
1	0.661	0.429	0.428	0.75502987	195.991	0.000
2	0.689	0.481	0.471	0.72491846	117.918	0.000
3	0.714	0.509	0.498	0.70365198	89.152	0.000
4	0.723	0.523	0.521	0.69265501	70.629	0.000

The stepwise multiple regression analysis results of each dimension of knowledge management and technology innovation performance are showed in table 4. Only four factors could be introduced into the regression model: documentation, shared vision, learning culture and teamwork. The adj. determination coefficient indicates that the regression equation can explain 51.8% of the total variance. And the significant probability of F statistic of each model is all 0.000, which indicates that the overall regression effect is significant. Documentation is the first variable into the regression model, which indicates that partial regression variation (the contribution to technology innovation performance) is the maximum, followed by shared vision and learning culture and the last one is teamwork, which indicates that the influence of teamwork to technology innovation performance is relatively minimal.

Table 5 Regression Analysis Results

Variables	Non-std. Coefficients		Std. Coefficients	T	Sig.
	B	Std. error	Beta		
Constant	-1.76E-015	0.041		0.000	1.000
Documentation	0.287	0.056	0.492	8.641	0.000
Shared Vision	-0.173	0.042	0.191	4.315	0.000
Learning Culture	0.232	0.044	-0.148	-3.188	0.002
Teamwork	0.169	0.062	0.169	2.809	0.005

The regression analysis results in table 5 show that: Knowledge management has a significant influence on technology innovation performance. The regression equation is as follows:

$$\text{Technological Innovation Performance} = -1.76 + 0.492 * \text{Documentation} + 0.191 * \text{Shared Vision} - 0.148 * \text{Learning Culture} + 0.169 * \text{Teamwork}$$

4.3 Result analysis

Based on above analysis, the hypotheses are basically supported by data testing: there is a linear relationship between knowledge management activities and innovation performance of virtual enterprises, and the following factors have a significant impact on innovation performance: learning culture, organization creativity and a shared vision of knowledge creation, teamwork and authorization of knowledge transfer and documentation and decision-making systems of knowledge storage.

It is indicated that building the right atmosphere and system is effective for encouraging knowledge creation, transfer, sharing and maintaining in virtual enterprise, thus it can improve the management and technological innovation performance. The establishment of learning-virtual enterprise can enhance the sharing of information among departments and employees; Organization creativity will reduce the motivation for translating new ideas into new management model and systems to some extent, and then it has a negative impact on the management innovation; A shared vision could make the innovative ideas and behaviors of member companies, departments and staffs consistent with the unified organizational objective; While cooperation between departments and employees brings more new and original ideas to solve specific problems, thus it could promote more innovation; A reasonable authorization could make employees bear responsibility for improving the way of service, and then encourage them to innovate more actively in daily work; Documentation and decision-making system could ensure knowledge sharing and innovation in virtual enterprise from the perspective of organization and technology.

5 Conclusion

As a resource-cored, market-oriented, information-critical network-based dynamic alliance which is established for the implementation of specific corporate strategic objectives, virtual enterprise aims to achieve the best combination of resources and the rapid development. This paper provides some useful references about knowledge management in the virtual enterprise through an empirical analysis into the relationship between knowledge management activities such as knowledge creation, knowledge transfer and knowledge storage and management innovation and technological innovation performance in virtual enterprise. However, the specific quantitative and segmentation of innovation performance of virtual enterprise remains to be further in-depth research.

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Patents Forecasting Based on Combination Regression Analysis

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Abstract: Patent is one of the core competences to a company. Patents forecasting is an important aspect for the patents decision and R&D strategy selection. This paper employs combination regression method to the patents forecasting and proposes the algorithm of combination regression analysis. The paper takes KE Furniture Company as an example, based on 34 kinds of hard-core patent technologies to conduct the empiric analysis, and comes to the conclusion that the combination regression method is effective in patents forecasting practice.

Key words: Patents forecasting; Combination regression analysis; Furniture industry

1 Introduction

Patent is one of the core competences to a company. Patents forecasting is an important aspect for the patents decision making and R&D strategy selection of a company. So it is necessary to conduct the study of patents forecasting models and algorithm. There are many mathematic models in technological and economic forecasting, whereas each model has its limitation, so combination forecasting can make up the shortcomings of the single model and help improve the patents forecasting validity.

There are many scholars who did study on the patents forecasting. S. Champbell indicates that patent trends analysis is a technological forecasting tool. H. Ernst uses patent data to conduct technological forecasting: on the diffusion of CNC-technology in the machine tool industry. C.V. Trappey et. al. conduct an analysis about China's RFID patent. Aive Segev and Jussi Kantola. use self-organizing maps to the identification of trends from patents

2 Algorithm of Combination Regression Analysis

2.1 Trend Prediction of patent

It has been figured out through analyzing questionnaires that there are altogether 34 kinds of KE Furniture Company's hard-core patent technologies available to export to Home Furnishings Alliance in Shenyang. Then according to IPC (International Patent Classification), we can classify the different technologies as follows:

Table 1 Example Data from 2004-2011 Which is a Part of Full Data 1980-2012

Year	2004	2005	2006	2007	2008	2009	2010	2011
A	0	3	9	5	6	7	10	24
B	10	8	13	11	22	21	30	45
C	1	1	2	0	1	0	2	7
D	35	26	34	45	53	53	99	86
E	83	112	176	228	270	291	366	675
F	9	6	4	11	11	13	10	206
G	12	11	16	7	148	23	27	52

- (1) Modern training in web-based system for education of CAD, CAM and CNC related skills over distance learning :
G09I G06R H04Q
- (2) 3D CAD design and development software :
G06B B23A A61A G01A G05A
- (3) 3D printing technology :
B29S B41V A61B B22E C08L
- (4) Work with robotics and automation in furniture industry:
B25M G05R B23E F16A G01B B65E
- (5) Laser marking technology:
B23C H01L A61C G02K H05T G01C

- (6) Surface finishing:
A47Q B27B E04C B32D F16B
- (7) Decoration/fittings:
B60R B32B B44C F21V

After the classification, the time-series of the distribution of patent applications referring to the seven technology types are checked on the website of China's State Intellectual Property Office (SIPO). The data gathered are listed at table 1.

2.1 Choosing the method to predict

(1) Time Series Forecasting Method

Time series, also called as time sequence, plural of history or dynamic sequence. It is a sequence which is formed by arranging the statistical indexes chronologically. [1] Through working out and analyzing time series, Time Series Forecasting Method is used to predict the possible development level in a certain time or in certain years based on the analogy or extension of the process, direction and trend reflected in time series. The whole process includes: collect and collate of historical materials of certain social phenomenon; check and identify all those materials and to put them into series; analyze time series to figure out the development patterns of this social phenomenon concerning the change of time; apply this development pattern to predict the future of that social phenomenon.

(2) Regression Analysis Prediction Method

Regression Analysis Prediction Method refers to establishing the regression equation between the variables based on the analysis of the relationship between independent variable and dependent variable in market phenomenon. Later, the regression equation will be used as the predicted model to predict the correlation between the dependent variable and the independent variable in a prediction period. [2] Therefore, Regression Analysis Prediction Method is an important method to predict the market. So if we can find out the main factor that influences the market prediction and gather its quantitative data at the same time, then we can apply Regression Analysis Prediction Method to predict the future development and its level in certain social phenomenon. So Regression Analysis Prediction Method is a method to predict the market which is specific, effective and with high practical value.

Time Series Forecasting Method shows some defects in prediction error due to the fact that it focuses on time series leaving out the influences of external factors. Usually, the greater influence of external factors will result in larger deviations. So Time Series Forecasting Method does better in mid-short term predictions rather than in long term ones. Objective things, especially economic phenomena, are probably under a greater external influence in a long time. So certainly they have great impact on economic phenomena. If that happens, and we only take time element rather than external factors in to consideration, then the prediction will be quite different from the reality. [3] As for this prediction, the application and development of patents are under great influences of external factors such as economical ones and social ones, so Time Series Forecasting Method is not suitable. However, Multiple regression analysis is quite applicable in dealing with real economical problems under the influences of multiple factors. So Multiple regression analysis will be used in this patent prediction.

3 Patent Trend Prediction by Using Multiple Regression Analysis

After analyzing the scatter diagrams of annual patent applications for several patents, it can be found out that the scatter diagrams are often in line with the linear model, quadratic curve model and power function model and so on. So here comes the multiple regression curves which reflects the majority of trends:

$$\hat{y} = b_0 + b_1\hat{x}^1 + b_2\hat{x}^2 + b_3\hat{x}^3 + \frac{b_4}{\hat{x}^4} + b_b \ln \hat{x}^5$$

The patent application numbers are closely related to the popularity of certain technology. If a technology is quite prevalent in several years, then the number of newly applied patents which are relevant to this technology enjoys a significant gradually increase, vice versa. Usually, excessive volatility is rather rare. Consequently, we think patent application numbers in recent years are more valuable than those in a long time ago. When using the last squares method to estimate the parameters, I place a parameter φ_i before each square residual ($\varphi_1 \dots \varphi_n$). Since there are n parameters in the whole process of sum of square residual, so we have n parameters from φ_1 to φ_n . All the φ_i are defaulted

as 1. Then the φ_i added to the last few square residual will be gradually increased more quickly than other items. This process increases the proportion of last few items which represent for the data in recent years. It will satisfies the condition in which Goodness of Fit of corrected curves cannot surpass the original one.

Figure 1 is the flowchart of patents forecasting algorithm..

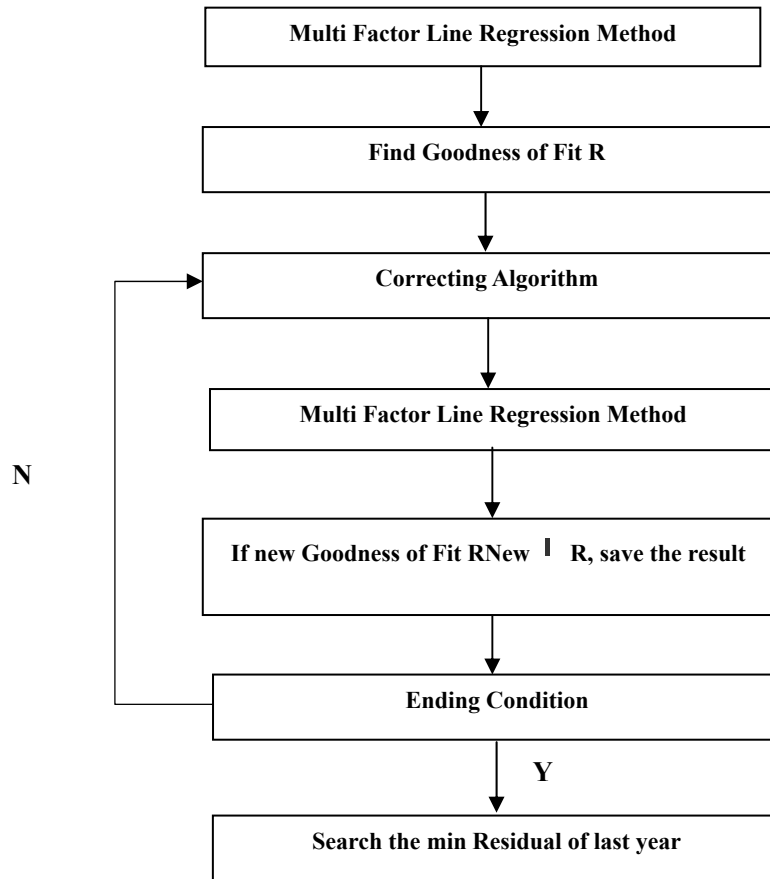


Figure 1 Flowchart for the algorithm

4 Experimental Result

My algorithm has aberration: 16
 Time Series Forecasting Method has aberration: 28
 The future Predictions 2013: 700
 The future Predictions 2014: 1051
 Time = 28.1114s
 Therefore the forecasting is shown at figure 2.

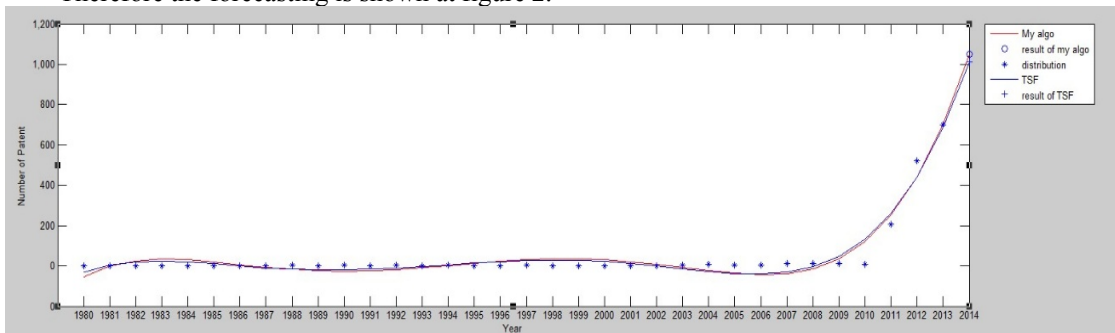


Figure 2 The forecasting outcome

5 Conclusion

After the realization through MATLAB, we randomly carry out the detection of prediction accuracy for 6th technology. Then we choose to compare the known results in 2012, the red line represents for the prediction got through multivariate nonlinear regression prediction, while the red line indicates the results obtained through time series prediction. Among them, the prediction error of multivariate nonlinear regression prediction is only 16, on the contrary, that of time series prediction turns out to be 28. After that we test all of the technology by using this programmer, all of the prediction error of multivariate nonlinear regression prediction was less than that of time series. The different results prove that multivariate nonlinear regression prediction can obtain more accurate results for patent prediction. Thereafter, multivariate nonlinear regression prediction is used to predict the patents application number of patents in the seven technological fields in China from 2013 to 2014.

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Research on Operation Mode and Risk Pre-Control Path of Technology-Finance Collaboration

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Abstract: Science and technology are primary productive forces. To achieve fundamental change in economic development, combination of technology and finance is an inevitable choice. How to achieve the organic integration of science and finance? In this paper, we explored the risk factors of operation projects of technology-finance collaboration, and put forward the collaborative risk pre-control paths from perspective of the government according to different characteristics in different life cycle stages of operation projects of technology-finance collaboration.

Key words: Technology-finance; Project risk; Collaborative operation; Pre-control path

1 Introduction

Science and technology are primary productive forces and finance is the core of modern economy. The organic integration of technology and finance will greatly enhance the speed and efficiency in transferring technological achievements into practical productive forces. In order to study the mode of technology-finance collaboration, scholars have put forward ideas about its concept. One of the concepts which is defined by Zhao Wenchang, Chen Chunfa, Tang Yinkai is widely accepted now. They think technology and finance is not only a systematic and innovative arrangement to promote the development of science, the transferring of technological achievements and the development of high-tech industries with a range of financial tools, financial system, financial policy and financial services, but also a system composed of government which provides financial resources, enterprise, market, social intermediary organizations and other scientific entities as well as activities in technological financing process. Technology and finance is an important part of the national science innovation system and the national financial system.

The development of technology and finance has brought new vitality for the development of financial institutions and high-tech enterprises. High-tech SMEs and financial institutions have urgent needs in operation projects of technology-finance collaboration. But the life cycle of these projects is long and it always involves multiple subjects. Meanwhile, there is an obvious cyclical characteristic, and uncertainties in process of these projects. Thus, the risk of the projects should not be underestimated. Should it fail, it will cause huge losses to all participants. Therefore, it has very important significance to enhance risk identification and pre-control in operation projects of technology-finance collaboration.

2 Full Life Cycle Risk Analysis in Operation Mode of Technology-Finance Collaboration

Since the cyclical formative of high-tech enterprises, technology-finance projects also have significant cyclical characteristics, and have its own special risks in every stage of development. Therefore, only in different periods can we analyze different risks and clarify the whole picture of technology-finance projects.

Haier (1959) pointed out that the development of high-tech enterprises can be divided into the seed stage, pioneering stage, formative stage, maturity stage and recession stage, which is the life cycle of technology-finance projects. Seed stage is the period when ideas develop into fruit. In the pioneering stage, the product has been developed successfully, but only for trial production and market test. A commercial scale is not formed yet, so it's difficult to get economic benefits. In the formative stage, products have been accepted by the market with certain market share and series production. The product achieved cash flow breakeven point, but has not yet reached the breakeven point, and in order to expand production capacity, more funds needed to purchase equipment, facilities. In maturity stage, the projects supported by the product already have a stable market with matured technology. At this point, companies already have strong profitability to generate more internal funds, but financing has become diversified. Meanwhile, management problems may occur because of more complicated organizational structure and bigger scale when expanding. In the recession stage, high-tech companies often can't adapt to changes in the industry and technology. As a result the product gradually eliminated, and a rapid

decline occurs in corporate performance, this time, technology-finance project mainly supports enterprises to have a second venture and begin a new round of circulation.

Through analysis of the characteristics at different stages of life cycle in technology-finance project, we can draw out main risk factors, as shown in Table 1. From Table 1, it could be seen that in the seed stage, technology-finance project is very risky due to technical, scientific and technological unknowns. In this case, financial institutions reluctant to get involved which limited financing channels for enterprises. In the pioneering stage, technology risk is still great, and demand for funds also began to increase, and the funding is difficult to bring economic benefits timely. At this time, financial institutions are still reluctant to get involved, adding risk to the project. In the formative stage, financial institutions are willing to get involved, but their investment is difficult to fully meet the needs of high-tech enterprises due to the great demand of capital for expansion of production. And although technical risks are small at this time, market risks and management risks have begun to highlight with bring greatest risk to whole project. At maturity stage, the market has stabilized, together with enhancement in company's hematopoietic capacity and increase of financing channels, the overall risk is minimized in this phase. And in the recession stage, the product is weed out of the market because technology has lagged behind which result in declining of the company's profitability. Meanwhile, technological upgrading and introduction of new products require significant financial support. Then financing risks of enterprise will increase. Therefore, the overall risk level at recession stage increases again. Risk level of technology-finance projects at various stages of the life cycle is shown in Figure 1.

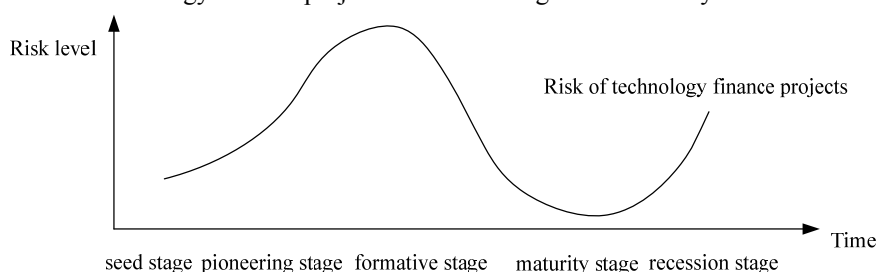


Figure 1 Risk Level of Technology-Finance Projects in Whole Life Cycle

Table 1 Sequencing and Analysis of Risk Factors in Life Cycle of Technology-Finance Projects

Life cycle stages	Risk factors Importance sequencing	Description
Seed Stage	Technical risk	Lack of predictability in technical difficulty and inaccuracies estimation of their own skills. Failed in archiving a technical breakthrough.
	Financing risk	Too many uncertainties, Far from profitable, Lack of financing channels
	Management risk	Small scale and entrepreneur's spirit make management risk minimal.
	Market risk	Market demand of research outcome will decide whether to enter the venture period.
Pioneering Stage	Financing risk	Increasing demand for funds, Lack of revenue. A lot of uncertainty and financial institutions reluctant to get involved make financing risk increases
	Technical risk	Test of large-scale production, stability, technological advance, sufficient technical support after pumping. These are all technical risks in this stage.
	Market risk	products cannot be accepted by the market, or acceptance lower than the original investment plan
	Management risk	Management risk is minimal.
Formative Stage	Financing risk	Serial production, expanding of production capacity, great capital demand to purchase equipment, facilities. Increasing marketing and selling expenses.
	Market risk	Accuracy in market demand predicting, exploring of new markets, increasing of market share, as well as big uncertainty in dealing with competitors
	Management risk	Increase in scale of production and product management, personnel management problems began to emerge. Management risk increase.
	Technical risk	Products have been developed, and have passed the test, the technical risk is small.
Maturity	Management risk	Together with increase of scale, management risk is also growing.

Stage	Market risk	How to deal with competitors and maintain market share is now a major market risk.
	Technical risk	Technical risk is not high any more. Risk mainly comes from the new technology and new outcomes. Because they can leads to the rapid depreciation of old product.
	Financing risk	Financing risk is not high at this time because of enterprise's hematopoietic ability, lots of financing channels
Recession Stage	Technical risk	Enterprise is no longer a leading the technology anymore, enterprises are facing the pressure of technological innovation.
	Market risk	Products have been weeded out of the market at this time. Enterprises are facing the problem of introducing new products. Market risk is very high.
	Management risk	Enterprises may dismiss employees at this time, management risk is high.
	Financing risk	Even though there are certain financing channels, great demand in capital make financing risks high.

It can be concluded from Figure 1 that at the seed stage, pioneering stage, formative stage the project risk is rising, and the lowest risk occurs at maturity stage but at recession stage the risk increases again.

3 The Government Role in Operation Mode and Risk Pre-control of Technology-Finance Collaboration

To guard against financial risk of the technology-finance projects effectively, a trinity collaborative pre-control system composed of enterprise, governments and financial institutions must be established. To achieve a synergistic effect of those three, the government should play a core role in the following reasons: First, before maturity, the projects have high technology risks and serious market failures, so financial institutions are generally reluctant to contribute. Therefore, there is an urgent need for government to solve the problem of market failure in a variety of ways. Second, at this stage, Chinese science and technology incubator still need government support. Third, the government can exert a great influence on technology financial institutions because of their state-owned properties. Fourth, the government needs to finance projects to promote scientific and technological innovation as a demand-side, but also the supply side of technology-finance projects because Government will directly fund scientific and technological innovation, while the government also plays the role of regulator in technology-finance projects, all of the instant institutions and high-tech enterprises will be subject to government regulation. In short, the government is a bridge to contact the financial institutions and high-tech enterprises. Only through the government's lead, parties involved in technology-finance project can achieve synergistic corporation effects.

Currently, on one hand, the government hopes to solve the bottleneck problem of technology innovation by funding technology incubators and participation in technology financial projects in different ways. And gradually form a demonstration effect, to promote the participation of financial institutions, thereby reducing the risk. On the other hand, government intervention may deviate technological innovation from the laws of the market, resulting in the lack of risk control ability in high-tech enterprises and financial institutions, it will not only lead to inefficient investment, but also produce a certain “crowding out” effect on the market, which is not conducive to the development of scientific and technological innovation. To solve this problem it is necessary to define the Role of Government clearly for risk pre-control in technology financial project.

As can be seen from Figure 1, in the seed stage, pioneering stage, formative stage, due to great technical and financing risks as well as market failure, the government must be directly involved in technology-finance project. In maturity stage, because the risk is small, the government should withdraw direct investor role, handover to market. In recession stage, although the risk of technology-finance projects become larger again, but ruled by the market mechanism of survival of the fittest, therefore, the government should not intervene. In short, technology-finance project risk pre-control requires both the government as a “visible hand” and the market as a “invisible hand” function together. Government should be more “at the helm” and less “paddling” in technology-finance projects.

4 Risk Pre-control Path Analysis in Operation of Technology-Finance Collaboration

At present, the Chinese government has taken various measures to pre-control risk in technological finance projects. In May 1999, China's establishment of a "SME Technology Innovation Fund", which is

a discount through loans, grants to support high-tech SMEs. In 2003, it adopted the "SME Promotion Law", and further intensifies efforts to support by fiscal and taxation policy. These measures have played a positive role in creating a favorable financial environment for science and technology, reducing financial technology risks. But there is need for improvement for our government in risk control of venture capital finance project. The author believes that the government should adopt a different policy according to characteristics of each risk, mobilize various positive factors, and achieve a collaborative risk pre-control mode for technology financial projects.

4.1 Technical risk pre-control path: developing science and technology incubator

Technical risk is the main risk factors at the seed stage and pioneering stage of technology-finance projects, but also underlying causes for small and medium sized high-tech enterprises. For technical risks, the government can accelerate the construction of science and technology incubator.

Normally, High-tech companies should go through the incubation process. Technology Incubator has played a big role in the risk control of technology-finance projects. First, the incubator can create an expert database to provide project feasibility studies, technical consulting services for the incubated enterprises. Second, the incubator can not only provide the required test equipment, test equipment and other infrastructure for research and development for the incubated enterprises, but also provide the test base to improve the product gradually. Third, it is difficult to fully grasp all the key technologies for products; it's a trend for high-tech enterprises to establish technological cooperation, technology incubators are in great favor of integration of technology patents. Fourth, technology incubator can become a bridge between research institutions and incubated enterprises, to promote cooperation between them. Therefore, the Government should vigorously develop science and technology incubators. The Government should not only provide preferential policies and financial support for the development of science and technology incubators, but also encourage technology incubators to become allies with more research institutes and high-tech companies, in collaborative incubation, thereby greatly reducing technology-finance project's technical risk, the support network from government for Technology Incubator shown in Figure 2.

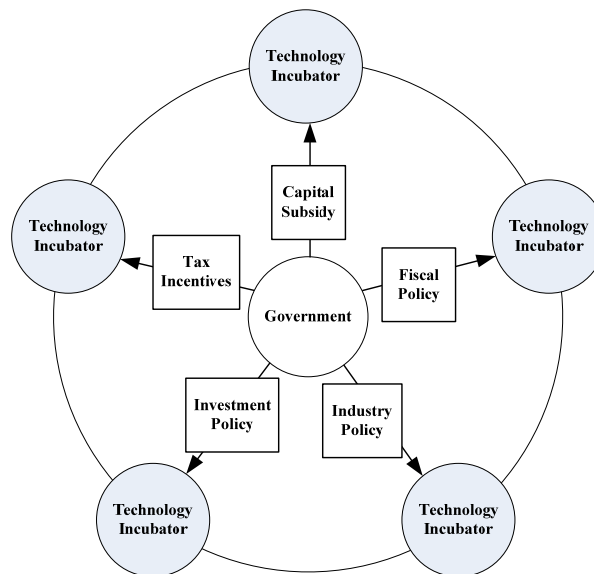


Figure 2 The Government Support Network for Incubators

4.2 Financing risk pre-control path: innovation fund, technology venture and investment bank

Financing risk is the major risk of technology-finance projects, the government should improve the innovation fund system, the development of venture capital and technology bank, so that financing risk can be reduced by the formation of synergies corporation between these three complementary.

First, accelerate innovation fund reform. Innovation Fund is an important method for our government to solve the problem that high-tech financing is difficult. At present, Chinese Innovation Fund has showed a good development trend, but there are still some problems. On the one hand, support for innovation fund is far from need, can not meet the needs of the technology-finance project. According to statistics, in 2011, Chinese SME Innovation Fund has funded 3827 projects, a total amount of 2.4 billion Yuan subsidy, which is totally inadequate for so many high-tech enterprises. On the other

hand, support method is too single. At present, Chinese Innovation Fund only support in three ways including free financing, loan interest and capital investment, these three methods do not effectively mobilize the enthusiasm of high-tech enterprises, prone to moral hazard problem. Therefore, it's in urgent need to broaden the methods of capital investment.

For the first question, I believe that the U.S. Small Business Administration (referred to SBA) and it's "SME investment plans" have a lot of experience worth learning from. "SME Investment Company" is actually a fund, its source of funds is divided into two parts, the direct investment by private capital and the SBA guaranteed bonds, the two types of guaranteed bonds are ordinary bonds and dividends bonds, available for institutional investors. SME investment companies invest high-tech enterprises in equity, debt and other forms, the whole operation mode of shown in Figure 3. Innovation Fund could set up an investment company, and provide guarantees for investment companies to attract organizational capital and private capital to solve the problem of insufficient amount of funds effectively. For the second question, I believe that Innovation Fund should change from direct funding to Warranty. Innovation Fund may invest part of the funds to establish a Warranty Company, and the remaining funds can be raised from public, and then, Warranty Company provides a guarantee for high-tech enterprises which develop well. To reduce the risk of warranty, so Innovation Fund can take part of Warranty risk to the lender, so that both banks and venture capital will be carefully screen technology projects. This risk-sharing approach reduces the financing risk for high-tech enterprises.

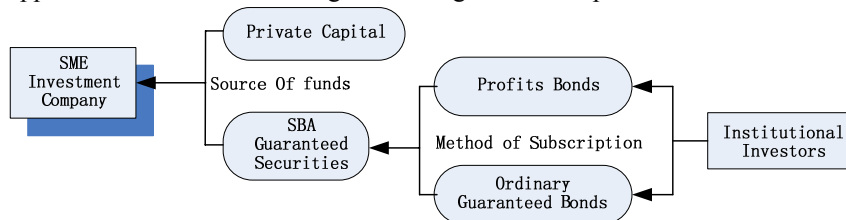


Figure 3 U.S. Small Business Investment Company Funding Sources

Second, give efforts to improve risk investment mechanism. Venture capital is a major source of financing at early stage of technology-finance projects, plays a significant role financing activities in the projects. However, Chinese venture capital firms are generally in small scale, there is not enough funding to ensure investment in multiple projects simultaneously, without achieving dispersion of risks. And because of small-scale and underfunded follow-up, many venture capital firms put money into the real estate market and the stock market, and only willing to invest in mature companies, contrary to the original intention of the establishment of these institutions. To solve this problem, we must further improve risk investment mechanism to allow venture capital enterprises become bigger and stronger so that they can play risk-sharing function in Risk Investment. Meanwhile, fully learn experience from abroad, improve the incentive mechanism, and explore limited partnership mode in venture capital, and to strengthen the supervision of risk investment institutions to ensure that risk capital into technological financial projects.

Third, carefully handle regeneration of technology banking risks. Due to high-risk feature of technology-finance projects, it is difficult to obtain loans from traditional commercial banks. In 2008, Ministry of Science and the CBRC set out to design Technology bank embodiment plan. At present, Beijing, Shanghai, Hangzhou and Chengdu have set up technology banking, technology banks appear to solve the problem of financing difficulty for high-tech enterprises. Currently, Chinese technology banks have learned from mode of Silicon Valley Bank (referred to SVB). SVB mainly earn spreads through absorbing customer deposits and putting up loans for high-tech enterprises. SVB mainly support SMEs in two ways, first loans, the second is direct investment. However, due to Chinese "Commercial Bank Law" prohibits direct investment from banks to enterprises, many of commercial banks began to explore the so-called "Option Loan" mode, that is, banks provide a stable and quality credit services to high-tech enterprises, and agreed with enterprises to get a certain percentage of equity subscription rights, the equity subscription rights are obtained by the private equity fund who have cooperation relationship with the bank, the banks and private equity funds share the investment gains in accordance with a certain percentage. Although the model can reduce the financing risks of technology-finance project, but I believe that in the case of imperfect condition of Chinese private equity fund industry nowadays, the risk of this mode cannot be ignored. The Government should carefully develop this mode, start with a small scale pilot, repeatedly implemented nationwide when time is ripe.

4.3 Market risk pre-control path: project selection and technology insurance

With the deepening of technological development, risk of the technical project gradually shift from a technical risk to market risk. To reduce market risk, we should pay attention to market-oriented selection of projects, but also attach importance to the role of insurance technology.

First, carry out a project selection carefully. High-tech business entrepreneurs are generally born engineer or scientist, because of restrictions in professional background, compared with a strong interest in high-tech, and the concern on products' utility and market appeal is not enough, and also lack of relevant expertise. If the market outlook is not optimistic about the project, the possibility of failure is undoubtedly great. Therefore, the market risk should be pre-controlled, we must start from the source, a serious evaluating on outcomes of technological innovation is demand from the view of the market, forecast the market prospect of products, invest only in projects which have good market prospect. Once the investment decision is made, it is necessary to help companies develop plans according to the market and provide advisory services to control market risks.

Second, accelerate the development of technology insurance. The Government should learn from foreign advanced experience in related fields, through financial subsidies etc., to encourage insurance companies to accelerate development speed, so that the insurance company can develop technology insurance to fulfill the needs of insurance for technology financial projects, providing more complete risk protection system.

4.4 Management risk pre-control path: personnel training and strengthen supervision

Technology-finance projects with serious information asymmetry, and with the increasing size of organizations, will have principal-agent problem. Therefore, the Government should strengthen cooperation with research institutes and high-tech enterprises, pay close attention to the introduction and training of a large number of professionals who not only understands technology but also understands finance, accelerate improvements of professional and risk control ability of related practitioners to reduce information asymmetry. At the same time, strengthen supervision of high-tech enterprises according to the rule of technological innovation activities, standardize enterprise behavior, and create a favorable environment for innovation.

5 Conclusions

Government is both main participant and main supplier of technology-finance projects. Meanwhile, a lot of government-affiliated institutions and state-owned enterprises are intermediary organizations of technology-finance projects. Therefore, the Government is a bridge to connect important parties involved in technology-finance projects. In this paper, from perspective of the government, we proposed a collaborative risk pre-control path for technology-finance projects based on analyzing the basic risk factors during different life cycle stages. We think that there mainly exist technical risk, financing risk, market risk and management risk during technology-finance projects' life cycle from seed stage to recession stage. We can pre-control technical risk through developing science and technology incubator, financing risk through the using of innovation fund, technology venture and investment bank, market risk through project selection and technology insurance and management risk through personnel training and strengthen supervision. There are more risk categories waiting to be researched and need more pre-control path to deal with different types of technology-finance projects.

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Analysis on the Constraints of the Voluntary Food Safety Regulations on the SMEs

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Abstract: Food safety regulations have already been an important approach to provide adequate protection for consumers, mandatory or voluntarily. Under the framework of analysis of benefit and cost of food safety regulations, the scale of food producers plays a very important role. Based on the analysis of the incentives for the voluntary adoption and the effects of the scale of the firms on the motivations, this paper compares the equilibrium condition and constraints of voluntary regulations for SMEs with that of large firms. It concludes that for the imperfect product social liability and penalty compensation system in China, voluntary food safety measures are much less likely to be adopted by SMEs. And due to insufficient market incentives of voluntary regulations for small firms, the mandatory regulations are indispensable for safety assurance. And then it recommends that SMEs in China can be motivated for voluntary adoption by the government intervention and supervision, fund encouragement, and through consumer education and cultivation as well.

Key words: Voluntary regulations; Food safety; Small and medium entrepreneurs (SMEs); Benefit and cost; Game theory

1 Introduction

Due to the imperfection and asymmetry of food safety information, market failure exists all the time, and as a result that in that the supply of food safety is always lower than the social optimum. Food safety regulations have already become an important approach to provide adequate different types of protection for consumers, such as in terms of voluntary and mandatory regulations. For consumers' concerns on food safety are more than ever before, their expectation for safety tends to be as adequate as possible. But food producers have always worried about the higher and higher cost caused by the overprotected safety regulations. How to improve the efficiency of food safety regulations is always the goal of government and the food producers as well.

Most research focused on the comparison on the mandatory and voluntary food safety regulations. Kathleen Segerson(1999) discussed the conditions of voluntary adoption of food safety regulations, and concluded that market forces were insufficient to provide adequate consumer protection. M'hand Fares (etc. 2010) investigated the complementarities between public and private systems undertaken by food firms based on the nature of contamination risk. Private regulations has played more and more important role in the food safety improvement. The empirical research of Ollinger (2008) found that the contribution of government mandatory accounted only 20% while the voluntary adoption of food firms contributed 80% of the safety improvement.

However, little research has focused on the distinguished performance of different food producers of different scale when imposing the safety regulations. The frequency of fake and inferior products would be negatively related with the increase in the degree of monopoly and concentration of industries (Ping, 2002). The expectation and benefits from voluntary regulations usually differ in the firms of different scale which then affect their motivation in adoption. It is the novelty of this paper which aims to discuss the constraints of voluntary adoption of food safety regulations on the small and medium entrepreneurs (SMEs) comparing with large firms. Based on the analysis of the incentives for the voluntary adoption and the effects of the scale of the firms on the motivations, this paper compares the equilibrium condition and constraints of voluntary regulations for SMEs and large firms. It concludes that for the imperfect product liability and penalty compensation system in China, voluntary food safety measures are much less likely to be adopted by SMEs. And then it recommends that SMEs in China can be motivated for voluntary adoption by the government intervention and supervision and fund encouragement, and consumer education and cultivation as well.

2 Different Types of Regulations and Incentives for Voluntary Adoption

2.1 Different types of food safety regulations

Food safety regulations could be set and enforced by government or by private producers and the third party. Based on the different level of government intervention, there are different types of regulating model. The least intervention by government is no intervention at all and the supply of food safety is determined by the market itself. It would usually result in market failure for the insufficient protection of consumers. And the strongest intervention is direct regulation which takes the form of prohibition and requirement of certain actions, direct food safety standards or production process control by function mechanism and regulators, even including some penalty prescriptions. Every food producer should comply with these mandatory rules under the threat from government, and nowadays they are indispensable due to the insufficient market forces. Meanwhile, producers and sellers can also take measures to improve food safety voluntarily, or without any food safety control unless being confined by the government or other public policy. This can be called as self-regulation or voluntary regulation. Those third party certification and label are voluntary food safety regulation, which will be devoted to get more market share and reputation of specific producers not just for safety assurance.

Mandatory regulation is a kind of public safety assurance with the advantage of its strict constraint and uniform standard, while voluntary regulation is of private rules which provide efficient safety protection for its flexibility and adaptability. Both of them are complementary to each other. Normally, these two forms of regulations may have the same effect on the food safety of producers. However, for firms with different size, the benefit and cost may be different and the constraints of the voluntary adoption could be distinguished from each other.

Facing the increasing seriously food safety situation, government has been bearing much heavier burden than ever before to provide adequate protection for consumers. In order to take the advantage of both regulations, there is a trend to choose the mix of public and private regulations that is called co-regulation. So, to investigate the effect of the features of food producers, especially the scale, on the incentives and constraints for voluntary adoption will help to design the best co-regulation mechanism.

2.2 Incentives for voluntary adoption

2.2.1 The availability of the food safety information

The availability of the safety information distinguishes in search goods, experience goods and credence goods. For search and experience goods, enough information can be provided by producers in terms of label and certification system to demonstrate their safety features, or it is easy for consumers to judge through their own experience. However, for credence goods, safety cannot be easily discerned by consumers even after they have already consumed them. Food is more of experience and credence product. Just because of inadequate and asymmetry information, producers are weakly motivated to take safety measures voluntarily, unless they can signal to consumers that their products are safer than those of others. For individual consumer, it is actually hard to identify those special and safer information, so mandatory regulations have been imposed on food producers to provide the basic safety information. However, those firms undertaking voluntary regulations intend to provide consumers with additional safety information as much as possible, and try to become famous for their higher safety food than the average, and then gain more confidence from consumers. It is the voluntary regulation that offsets the information asymmetry and inadequacy and obtains the credence of consumers in some degree. So to supplement safety information becomes one of the motivations of voluntary adoption.

2.2.2 The efficiency of strategy of higher food price

Comparing with mandatory regulations, voluntary regulations usually needs more fund spending for its additional capital input. So, the voluntary adoption is always encouraged by the higher pricing strategy while mandatory regulations couldn't make any difference in the price for the food of the same standard. Consumers' assessment on the risk and their self-protection decision would affect the success of the strategy of higher price. Consumers may overestimate or underestimate the risk of food. When consumers are risk averse who can estimate the risk objectively or overestimate food risk, their willingness to pay (WTP) for safer goods would be positively related with the safety status quo. So the safer goods could be priced higher successfully in the market and food producers might be motivated by voluntary adoption. However, among the people who are unaware of or even underestimate potential damage, high-price strategy would run counter to firms' desire rather than attract them. If it is common in the market, not only high pricing strategy does not make any sense, but also will it lead to the adverse selection, like a "lemon" market. So the high pricing strategy accepted by both the consumers and the market is critical for the voluntary adoption.

2.2.3 Subsidy from government and loss from safety scandals

In front of the increasing difficulties in solving the food safety issues, more and more governments have resorted to co-regulation through subsidy for food producers and the third party to design and

implement voluntary regulations. Adoption of food safety regulations always works upon production cost while direct subsidy may encourage food producers to undertake them voluntarily. At the same time, implementing additional safety control is likely to reduce the probability of occurrence of contamination episodes which will avoid serious damage for those contamination firms. If it is we can detect those peculiar firms that are related to the specific food contamination and impose penalty on them effectively, food producers would be motivated to implement overall safety control. So subsidy together with strict supervision and penalty will be one of the motivations for voluntary adoption.

3 Effects of the Scale of Firms on Voluntary Adoption

Comparing with the large size firms, small and medium size food firms are those economy units with smaller number of employee, amount of registered capital and production scale. In China, most of them are private enterprises or farmers with relative lower capital labor ratio. Take the milk production as an example, 70% of domestic milk supplied by scattered farmers and producers. For the rapid growth of the demand for milk and milk products, the expansion of milk production has already challenged the development of Chinese glazier industry. Small-scale peasant economy is one of the significant features of Chinese food production, especially in most poultry breeding whose quality is critical to the safety of the final food products. Under the framework of analysis of benefit and cost of food safety regulations, the scale of food producers plays a very important role that results in the motivation for voluntary adoption is distinct for large and small firms.

3.1 Difference in cost of regulations

Constant and variable cost of production after undertaking safety regulations by large and small firms could be different. Firstly, the constant cost may be larger for small and medium enterprises than that of large ones. Maybe most of large firms have already been equipped with testing machine and lab and professional staffs, but for most of SMEs, to implement a new safety control might be a huge cost burden for them. It usually needs a totally new input through new machinery purchasing and staff training. In addition, the variable cost would be larger for small firms too. This additional cost could be shared by larger output of large firms at a lower average cost while it is impossible to be diluted for SMEs with smaller amount of output. So, SMEs usually have little motivation for voluntary adoption of safety control under the heavy cost pressure.

3.2 Difference in market benefit

The benefits from food safety regulations are composed of direct benefit from greater market share which comes from significant sale increase of safer food, and indirect benefit that is in terms of both price premium caused by rising in WTP and market reputation accumulation effect or public relationship improvement for firms with higher food safety standard. Usually, large firms gain more from voluntary regulations, especially in the direct benefit of the reputation and public relationship improvement. However, they also suffer more with occurrence of contamination episodes for losing confidence of consumers. But it is not the case for SMEs. Many smaller size firms can't achieve the same benefit as the large ones, not only the increase in the market share but also the indirect market reputations. Meanwhile, the loss from contamination episodes will also be smaller for SMEs than large firms because they could often be hidden behind large firms for their dangerous production if without strict supervision. Hard to ascertain the causation relationship with small contamination producers and trace back to the source of small suppliers in China make them avoid the loss of market reputation much easier than most developed countries. Considering the less benefit from voluntary adoption and the less loss caused by scandal as well, there must be weaker motivation for SMEs to implement regulations voluntarily.

3.3 Difference in compensation payment

Penalty compensation is an important part of product liability system and food safety regulations. How much a producer should pay for its damage depends on its faultiness, the enforcement strength of food safety laws and victims' awareness on self-protection. However, the amount of judicial proceedings that a producer could pay is more or less constrained by the size of firms. Generally speaking, it is more difficult for small firms than large ones to execute the payment. So large firms will be more likely to adopt food safety regulations voluntarily to accumulate more market reputation and avoid large amount of damage payment. At the same time, for lacking of consciousness of litigation of most Chinese consumers, many SMEs firms have the fluke mind of escaping from punishment and pay less attention to product liability system. In China, the light sentence even no punishment on small contamination producers have already formed a bad demonstration effect for all the SMEs which has weakened their

motivation for voluntary adoption.

4 Constrains of Voluntary Adoption for SMEs

Firstly, the safety episode occurs or not will alter the benefits of different firms in scale with voluntary adoption obviously, so there are two cases to be discussed: no contamination episode occurring and after contamination episode. Secondly, there would be different equilibrium conditions for SMEs whether the threat of food safety regulation imposed by government is strong or not, then it will examine the constraints of voluntary food safety regulation on SMEs in terms of with or without the mandatory requisition for food safety regulations.

4.1 Parameters explanation

The parameters and their definition are presented in the Table 1.

Table 1 Parameters Explanation

Parameter	Definition
r	Mandatory requirements from government, $r \in (0,1)$. 0: without any mandatory threat; 1: strongest mandatory threat of regulations implementation
p	Probability of occurrence of safety episodes without any safety regulations, $p \in (0,1)$
q	Probability of occurrence of safety episodes with implementation of safety regulations voluntarily or mandatorily, $q \in (0,1)$ and $p > q$
B_S, B_L	Benefits from voluntary regulations of SMEs and large firms respectively, $B_L > B_S$
B_{S0}, B_{L0}	Benefits for SMEs and large firms without any safety regulations, respectively
B_{S1}, B_{L1}	Benefits for SMEs and large firms after occurrence of contamination episodes, respectively
C_S, C_L	Cost of regulations for SMEs and large firms respectively, $C_S > C_L$
L_S, L_L	The compensation payment for victims by SMEs and large firms after safety events, $L_S < L_L$

4.2 Incentives on SMEs for voluntary adoption with occurrence of episodes or not

The final payoffs for food firms different in scale with or without the contamination episodes are presented in the Table 2. According to Table 2, with voluntary food safety regulations and no contamination episode, the payoffs of two kinds of firms are $B_S - C_S$ and $B_L - C_L$ respectively. Based on the previous analysis, if there are not any contamination episodes, the large ones could get more market benefits in reputation and price premium than small ones, that is $B_L > B_S$. And regarding the cost, C_L might be smaller than C_S . Even as some scholars postulates that the cost difference is not very obvious and it is supposed that they equal to each other, the net benefit for large firms is larger than that of small ones if no contamination episodes, that is $B_L - C_L > B_S - C_S$. As a result, those measures could decrease the probability of the occurrence of incidents are more likely to be implemented in the large firms voluntarily than in small firms.

In contrast, when a contamination episode occurs with a probability q , the SMEs and large firms will get the payoff as $B_{S1} - C_S - qL_S$ and $B_{L1} - C_L - qL_L$ respectively. For those firms with confirmed causation relationship, the loss in reputation and market share must be considerably serious, while SMEs might suffer less. And the benefit change with occurrence of episodes might be $B_L - B_{L1} > B_S - B_{S1}$, and even with the result of $B_{S1} > B_{L1}$ if without clear causation relationship with SMEs. When the loss of large firms is so huge to surpass their cost difference, the final outcome will be $B_{S1} - C_S > B_{L1} - C_L$. At the same time, for lacking of perfect liability system and penalty compensation system in China, L_S usually is smaller than L_L . In the end, the result is more likely to be $B_{S1} - C_S - qL_S > B_{L1} - C_L - qL_L$, so it is to maintain net benefit that provide incentive of voluntary adoption for both large firms, while it is much weaker for SMEs especially without any mandatory threat from government.

Table 2 Payoff Matrix of Voluntary Adoption with Occurrence of Episodes or not

	No contamination episodes	After contamination episodes
Large firms	$B_L - C_L$	$B_{L1} - C_L - qL_L$
SMEs	$B_S - C_S$	$B_{S1} - C_S - qL_S$

4.3 Constraints on SMEs for voluntary adoption

The equilibrium for voluntary adoption for SMEs refers to the conditions under which firms would voluntarily implement safety regulations without any threat from government. If food could be sold in the market without any safety regulations control, the equilibrium condition for voluntary adoption of SMEs is $B_S - C_S - qL_S \geq r(B_S - C_S - qL_S) + (B_{S_0} - pL_S)$. Here, B_{S_0} represents the direct benefit only from market share other than benefit of reputation and price premium due to voluntary regulations. Similarly, the equilibrium condition for large firms is $B_L - C_L - qL_L \geq r(B_L - C_L - qL_L) + (B_{L_0} - pL_L)$. So, whether the government imposes mandatory threat or not, the constraints of voluntary adoption for producers might be different.

1) Strong mandatory threat ($r = 1$)

As in Table 3, if the threat of imposing a mandatory program is strong, that is $r = 1$, the brief equilibrium condition shifts to $B_{S_0} - pL_S \leq 0$, which means when benefit is smaller than compensation payment for the victims, SMEs will plan to undertake safety measures. In the same way, the brief equilibrium for large firms can be simplified as $B_{L_0} - pL_L \leq 0$. Without any safety measures it could be supposed that the benefits for every producers is same that means B_{S_0} equals B_{L_0} . And then, if $L_S < L_L$, the equilibrium condition for SMEs is more difficult to be satisfied than for large ones.

Table 3 Constraints of Voluntary Adoption with Mandatory Threat or not

	Strong mandatory threat ($r = 1$)	No mandatory threat ($r = 0$)
Large firms	$B_{L_0} - pL_L \leq 0$	$(p - q)L_L + (B_L - B_{L_0}) - C_L \geq 0$
SMEs	$B_{S_0} - pL_S \leq 0$	$(p - q)L_S + (B_S - B_{S_0}) - C_S \geq 0$

2) No mandatory threat ($r = 0$)

When the threat is very weak, that is $r = 0$, the brief equilibrium condition for SMEs and large firms is $(p - q)L_S + (B_S - B_{S_0}) - C_S \geq 0$ and $(p - q)L_L + (B_L - B_{L_0}) - C_L \geq 0$ respectively. Based on the previous analysis, if $L_S < L_L$ and $B_L > B_S$, the net payoffs of large firms are more than SMEs. It concludes that without government threat, large firms will be encouraged to adopt the safety system voluntarily, while incentives from market for SMEs are insufficient.

4.4 Findings

The scale of food producers is a very important factor which will affect the benefit and cost of food safety regulations adoption, so firms with different size have distinguished incentives and constraints for voluntary adoption.

The market benefit due to voluntary safety regulations is more attractive for large firms than for SMEs if there is no safety scandal, while the loss from the occurrence of contamination episodes for large firms is also bigger than that for small ones. Both of them explain why large firms have always been more active in investing in safety regulations voluntarily than small ones. However, for the uncertainty of the occurrence of the contamination episodes and the possibility to escape from being punished, SMEs are of weak incentives for voluntary adoption of safety regulations.

Comparing the equilibrium condition of voluntary adoption for large firms and SMEs, it concludes that when the government threat is weak, it is more difficult to be satisfied for small ones. It is the credence feature of food and lack of strict supervision that let the large amount of food from those producers that haven't implemented any safety regulations, especially from SMEs, still show up in the market. Nevertheless, even when the mandatory threat from government is strong, SMEs have also been less motivated to implement safety regulations voluntarily because of the unclear causation relationship with those safety scandals and weak penalty system.

5 Conclusion

For market forces for voluntary adoption by SMEs is not enough so the mandatory threat by the government is indispensable to ensure the adequate supply of food safety. The stronger the mandatory threat by government, the more likely is the safety regulations to be implemented by small firms. And imperfection in both penalty compensation and social liability system on the contaminating firms for SMEs in China has also weakened their motivations for voluntary adoption.

To encourage SMEs to undertake voluntary food safety measure, the government direct intervention, fund support and strict penalty are all necessary. Firstly, it is the strong threat from the

government that can provide the basic safety assurance for all the people. Secondly, subsidy on those SMEs with voluntary adoption is a useful encouragement. Finally, imposing strict supervision in terms of penalty compensation and product liability system is a good way to eliminate the opportunity for SMEs to escape from being punished. In addition, through the consumers' education and cultivation to increasing their willingness to pay the price premium for safer food and let SMEs achieve more indirect benefits will also consolidate their motivations for voluntary adoption of safety regulations.

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Research on Enterprise Information Security Risk Management*

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Abstract: In the information age, confidential or key information of the enterprise (such as corporate strategic planning information, core technology information, customer information, etc.) has become an important strategic asset. And information access, treatment, and security have become an important component of overall enterprise strength. This paper focuses on the research of “enterprise information security risk management”, and proposed the Enterprise Information Security Risk Cause Model, Risk Calculation Model, as well as the Enterprise Information Security Risk “Four Whole” Management Model (whole staff, whole risk, whole process and whole methods).

Key words: Enterprise information asset; Enterprise information security; Risk management; “Four Whole” management Model

1 Introduction

The twenty-first Century is the era of information. Human society, from a society mainly depending on the material and energy, begins to change into a society that the material, energy and information are closely connected. Information security is related to national security and social stability. Some people put forward the concept of “Information War”, and point out that following “nuclear weapon”, “biological weapon” and “chemical weapon”, “Information Weapon” is becoming as the fourth great modern weapon¹. June 7th to 8th, 2013, Xi Jinping-President of the People’s Republic of China, and Obama-President the United States, met in Annaboge Manor in California, and “cooperation on network security” is one of the main topics.

In the background of the network security risk increasingly, information security risk issues of modern enterprise has aroused great attention from all sectors of society. In information era, more and more enterprises are becoming dependent on computers and information systems. While they enjoy the huge interest access to information resources, they also face a severe test of information security risk. At present, the whole world is in the period that enterprise information security risk events spring up, and the degree of the influence is far more than ever. For example, in 2009, Rio Tinto spy gate event caused economic losses of up to about 70 billion Yuan for the steel industry in china. When the national security department checked a computer in Rio Tinto Shanghai office they found out that: the computer had stored detailed information of dozens of Chinese iron and steel production enterprises, including their procurement plans, inventory of raw materials, production arrangements, even monthly steel production, sales situation and other data. Media joked that Rio Tinto even know more about the company than some enterprises Misters. In June, 2011, a former Apple employee Paul Devine admit that during the 5 years (from 2005 to 2010) when he was employed by Apple Corp, he had sold major confidential information of Apple Corp, including new product forecasting, blueprint, price and product features. Devine admitted that the Apple Corp. lost more than 2.41 million dollars because of the information leakage.

Frequent enterprise information security risk event puts forward a challenge to the theory and practice research of enterprise information security risk management. Aiming to improve enterprises’ information security risk management abilities, to ensure their competitive advantages and long-term stable development, this paper focuses on the research of “enterprise information security risk management”, and proposed the Enterprise Information Security Risk “Four Whole” Management Model (whole staff, whole risk, whole process and whole methods).

2 Theoretical Backgrounds

2.1 The definition of enterprise information security risk

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Comprehensive consideration of many factors, such as environment, personnel, management, technology, law, economy and system, the enterprise information security risk is divided into 12 types: personnel risk, organization risk, physical risk, information confidentiality/integrity risk, system risk, operational risk, communication infrastructure risk, business continuity risk, third party risk, risk-assessment risk, legal risk and risk-decision risk (See Figure 1)².

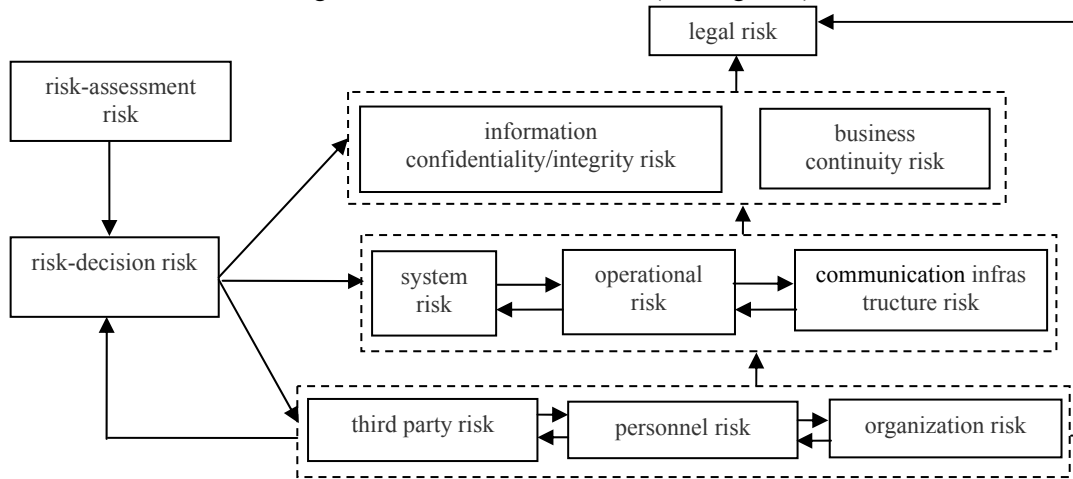


Figure 1 The 12 Types of Enterprise Information Security Risk

2.2 The Enterprise Information Security Risk Cause Model and Risk Calculation Model

Enterprise information security risk management has three main features:

(1)The importance of enterprise information assets is huge. Once the enterprise information security event happens the consequence will be very serious. The long-term development and the core competitiveness of enterprise are relying on their key information. Confidential or core information assets (such as a unique business model, the key technology information, new product information, and users information) have become an important strategic resource of the enterprise³. Once the enterprise information security event happens, it will do serious damage to the competitive advantage, profit ability, social image and the stable development of the enterprise.

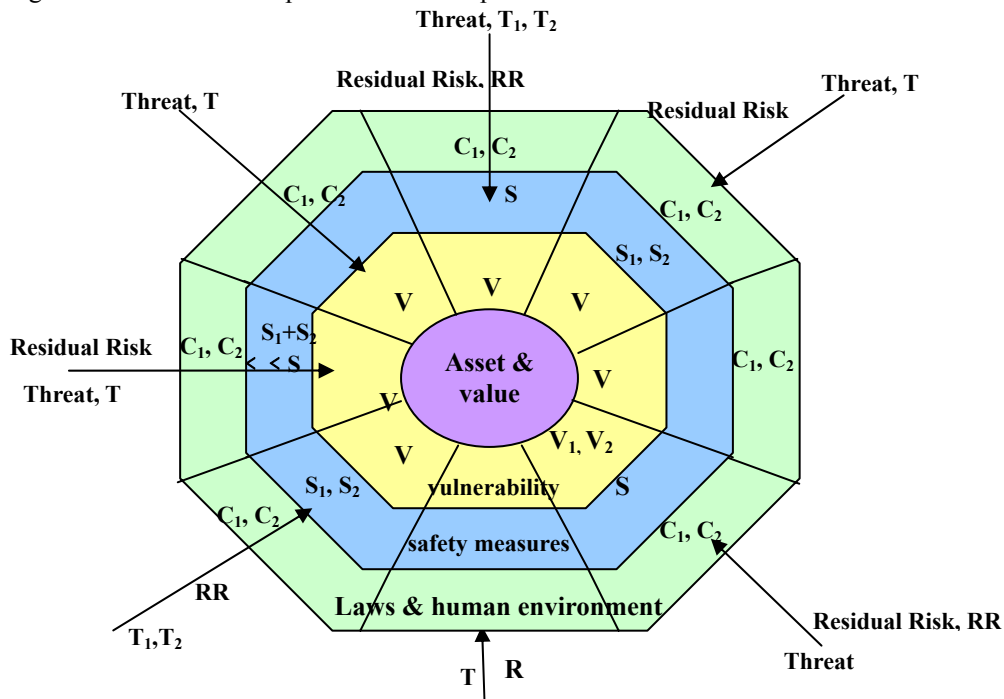


Figure 2 The Enterprise Information Security Risk Cause Model

(2)The vulnerability of enterprise information assets is obvious. The enterprise information assets are facing high threat and risk. As long as there are information assets in enterprise, it is inevitable to face the vulnerability or weakness in its objective existence. Design, management or performing defects, hardware design, equipment manufacturing flaws, operating system or application software design problems, all these features are inherent flaw or weakness of enterprise information assets. Once these flaw or weakness was used intentionally or unintentionally, serious enterprise information security risk could be caused. Enterprise information assets threat means the potential situation, event or person, which may lead to information system damage, confidential data leakage, data tampering or denial of service. Threat is the impact of external factors on the system, and it always accompanies the vulnerability or weakness in the system. The system without weakness does not exist. So the threat is everywhere. Nowadays, there are more and more commercial spies and hackers, as well as more and more advanced means to steal information. Meanwhile, the ways of the enterprise information dissemination are diverse, and the scope of the enterprise information dissemination becomes extensive. Therefore, the vulnerability of enterprise information of asset become more and more obvious, and the enterprise information security risk become higher and higher.

(3)Enterprise information security event handling is urgency. Once the information security incidents happens, enterprise should take measures very quickly, such as launching the emergency response plan, aiming to minimize the losses.

The Enterprise Information Security Risk Cause Model is as shown in figure 2. The Enterprise Information Security Risk Calculation Model is as shown in figure 3.

The Enterprise Information Security Risk Cause Model (See figure 2) shows that: key information assets are of high value for enterprises, but on one hand they have their own vulnerabilities, on the other hand there are all kinds' threats outside the business, which eventually leads to high possibility of information security risk. Information assets owner should take safety measures(S) to protect the key information assets, and find ways to compensate the vulnerability (V), which leads to reduce the risk. The relevant laws and regulations and specific human environment (C) also can play an important role to stop or reduce the threat (T) and the residual risk (RR). Through the above measures, the enterprise information security risk will be reduced, and the enterprise information assets security will be ensured⁴.

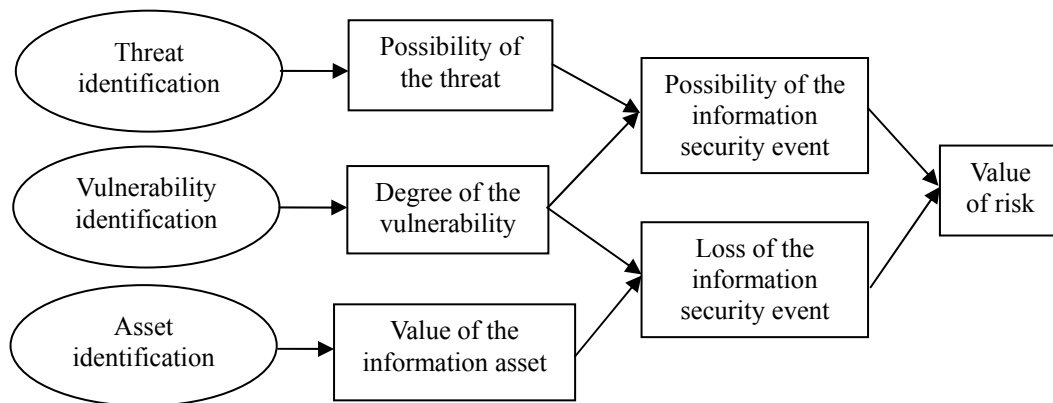


Figure 3 The Enterprise Information Security Risk Calculation Model

3 The Enterprise Information Security Risk “Four Whole” Management Model

In order to realize the comprehensive and effective management of enterprise information security risk, enterprise should accomplish "Four Whole" management Model (See Figure 4): (1) whole staff. Information security risk management is not only the business of IT department. The whole staff of the enterprise are accompanied by the responsibility of information security management. The enterprise should call for all employees participate in the information security management. (2) whole risk. All enterprise information security risk should be included in the management category, including the 12 types of the enterprise information security risks which are mentioned above. (3) whole process. Including pre-crisis risk management-enterprise information security risk early warning management, risk treatment, and the enterprise information security risk emergency disposal. (4) whole method. Including enterprise information security education & training, security system, security rewards and punishments, and other various measures or methods.

4 Conclusions

The twenty-first Century is the era of information. Information security is related to national security and social stability. In information era, more and more enterprises are becoming dependent on computers and information systems. While they enjoy the huge interest access to information resources, they also face a severe test of information security risk. This paper focuses on the research of “enterprise information security risk management”, and proposed the Enterprise Information Security Risk Cause Model, Risk Calculation Model, as well as the Enterprise Information Security Risk “Four Whole” Management Model (whole staff, whole risk, whole process and whole methods). All of there are very useful and efficient methods to improve enterprises’ information security risk management abilities, to ensure their competitive advantages and long-term stable development.

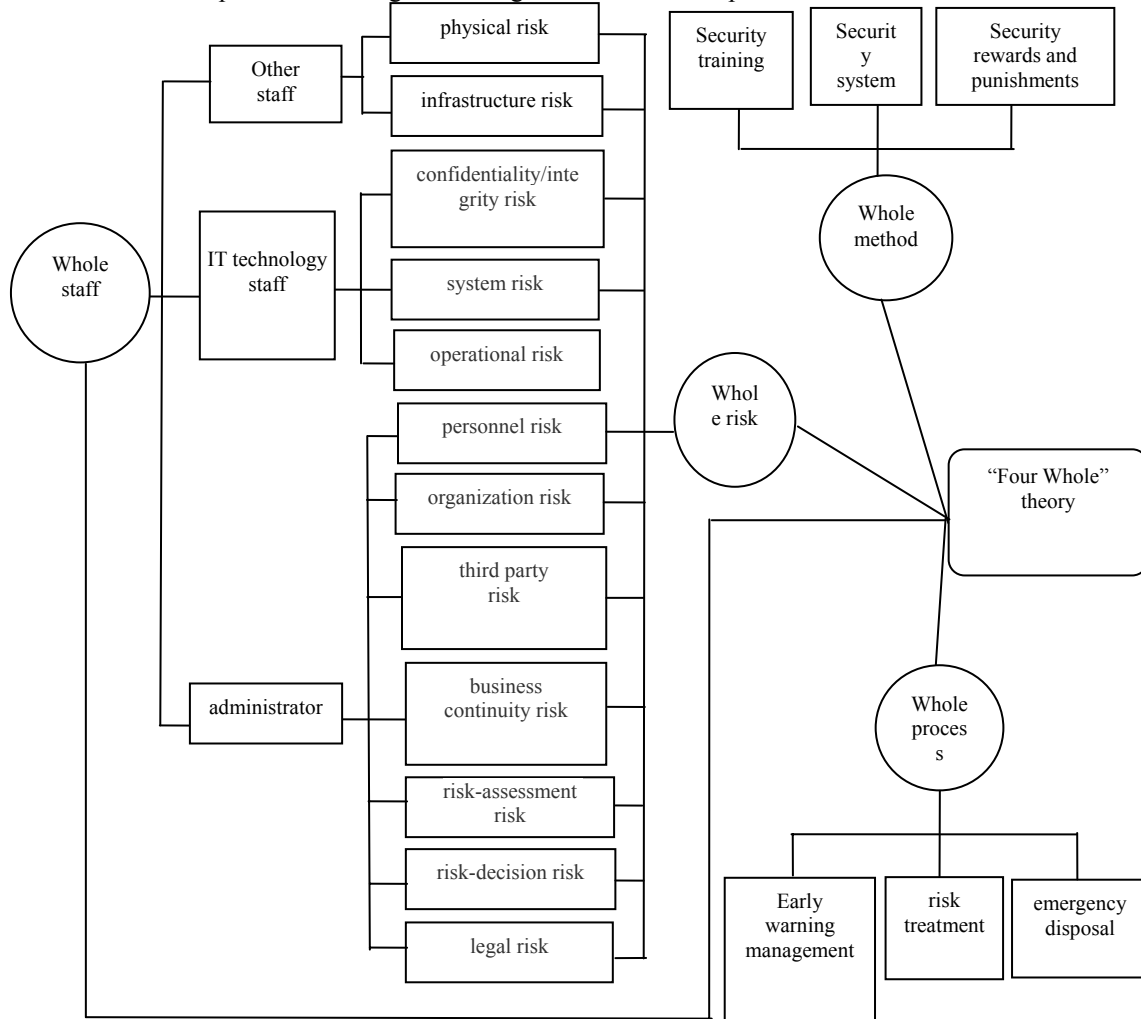


Figure 4 The Enterprise Information Security Risk “Four Whole” Management Model

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Study on Requirements of R&D Knowledge Management System of Enterprise*

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Abstract: Due to the importance of research and development for knowledge enterprise is more and more big, many enterprises began to think about how to develop their own research and development knowledge management system. This article analyses the specific needs of the development of the enterprise research and development knowledge management system from the aspects as research and development knowledge accumulation, research and development knowledge retrieval, research and development knowledge sharing, research and development knowledge reuse, and research and development knowledge innovation.

Key words: Enterprise; R&D knowledge; Management system; Study on requirements

1 Introduction

R&D knowledge for the enterprise R&D activities plays an increasingly important role, so that many enterprises begin to pay close attention to the enterprise research and development knowledge collecting and accumulation, to the R&D knowledge tidying and classification, to the R&D knowledge retrieval and sharing, reuse, and innovation, via the structural classification and development of and research and development system, to the information security of R&D knowledge.

Enterprises set up R&D knowledge management system for the purpose of shortening product development cycle, improving the enterprise research and development ability, and enhancing enterprise core competitive ability. Specific system requirements include organizes and stores enterprise R&D knowledge effectively to accumulate the enterprise R&D knowledge, provides tools to retrieve and share knowledge quickly, establishes a convenient knowledge learning and communicating platform, realizes reusing knowledge and assisting knowledge innovation, constructs knowledge security protection system.

2 Enterprise R&D Knowledge Accumulation

Enterprise R&D knowledge accumulation means the enterprise collects sorts and codes the successful experience and failure lessons of developing products in the past, and then stores those in the enterprise knowledge base according to certain rules. The basic process of knowledge accumulation is shown in figure 1.

Enterprise knowledge, on the one hand, comes from the R&D experience accumulation employees have made for a long time, can also be found and innovate through technical means, such as knowledge discovery and knowledge mining. The accumulation mainly includes the following several aspects:

(1) Personal knowledge

It refers to the personal skill improvement and experience accumulated in work. Such knowledge, which is tacit, needs employee alone or with the help of the external forces to summarize and discover, and then record it as document to make the tacit knowledge explicit.

(2) Case knowledge

It refers to data accumulated from the previous product researching and developing or competitor products analysis, it includes product design results (Drawings, d/a, all kinds of parameters, etc) , records of R&D management progress (Project planning, meeting records, work arrangement, stage summary, failure analysis, etc) and Entity model. This type of knowledge condenses a lot of experience, is the wealth of the enterprise survival, needs to be properly kept, and provides convenient query function, so that the knowledge in the new project can be effectively utilized. Before reusing, this kind of knowledge requires summing up, and then be formed as standardized document.

(3) Standard specification

It refers to the products shall comply with all standards and specifications, including international,

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national, industry and enterprise standards and specifications. This kind of knowledge usually is a standard document.

(4) All kinds of documents

It refers to various documentation involved in product research and development, besides the aforementioned knowledge, such as enterprise rules and regulations, work template (meeting minutes template, summarize the work template, fault record templates, etc.), engineer manuals, etc.

In the process of research and development of the accumulation of knowledge there are three key problems. It is tacit knowledge being made explicit problems. Second, knowledge coding issues, that is encoding the enterprise knowledge the some forms that is easy of computer to store and process. This is also known as the process of knowledge representation. Third, knowledge mining and knowledge discovery is the core problem in the artificial intelligence and decision support system, and the knowledge management system, but also a difficult point for further development and effective application of these systems.

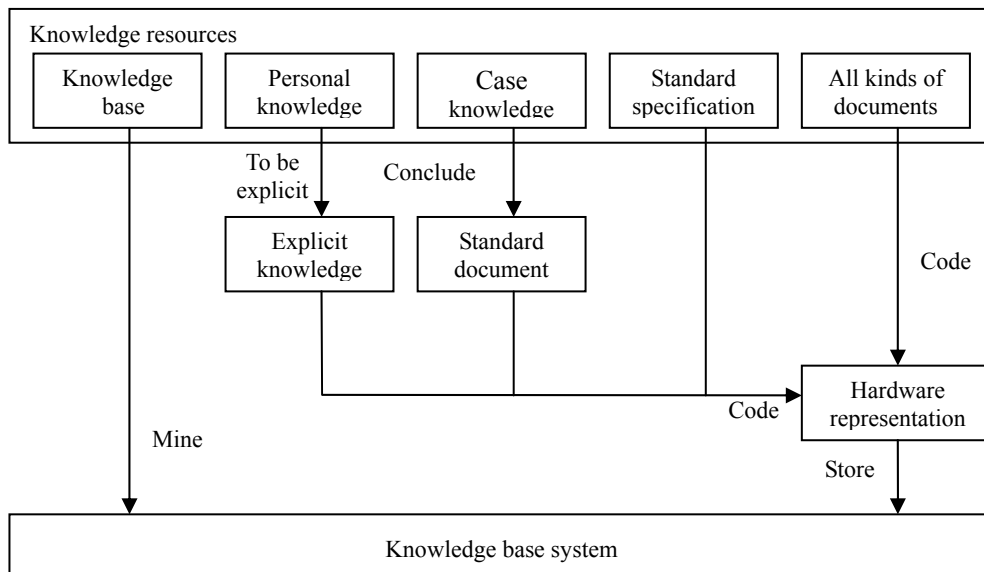


Figure 1 Knowledge Accumulation Processes

3 Retrieval and Sharing of the Enterprise R&D Knowledge

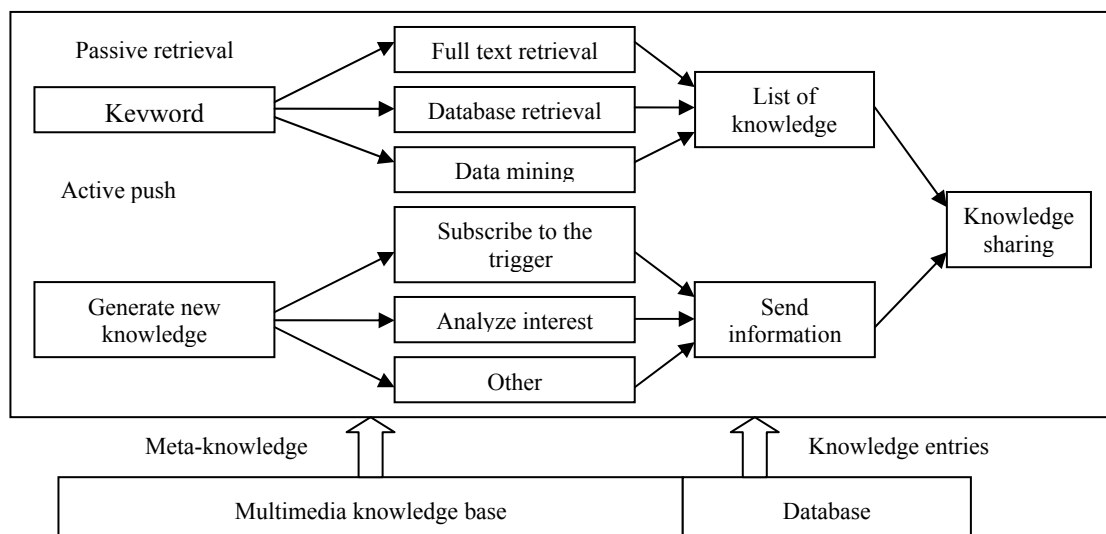


Figure 2 The Basic Needs of R&D Knowledge Retrieval

Knowledge sharing is one of the objectives of knowledge management, and is also the basic need of knowledge management system. Knowledge retrieval, which is the means and tools of realizing knowledge sharing, usually requires fast retrieval speed, high accuracy, and the good ability to reject invalid information.

Knowledge retrieval method can be divided into active push and passive retrieval. Active push refers to according to the customer subscribing, customer interest analysis, customer responsibility model send the new knowledge or message in the knowledge base to the related users on a regular basis. Passive retrieval refers to the customer put forward the keyword or key words to retrieve the knowledge needed in the knowledge base. The basic needs of knowledge retrieval are shown in figure 2.

4 Reuse and Innovation of Corporate R&D Knowledge

Knowledge reuse and knowledge innovation is one of the ultimate goals of knowledge management in enterprise, also is the important and difficult problem in the study of the knowledge management.

Knowledge reuse refers to the process of taking the advantage of the existing knowledge in the enterprise knowledge base, using the knowledge again after dealing with the parameter change etc. in new research and development program. The function implementation is focused on the accumulation of the past R&D knowledge and the reasonable use of the product or components parameters change rules. Knowledge reuse exists throughout all links of product research and development, figure 3 shows the model of knowledge reuse and knowledge innovation based on product development process.

5 Security of Enterprise R&D Knowledge

Enterprise characteristic product knowledge is enterprise's core competitiveness and proprietary technology, is an enterprise's important resources and wealth, and requires safe and reliable security. Corporate R&D knowledge security needs mainly include the following levels:

(1) Network security. It refers to provide security protection measures technically between enterprise network and the network to prevent the external personnel illegal access to the enterprise internal knowledge base system.

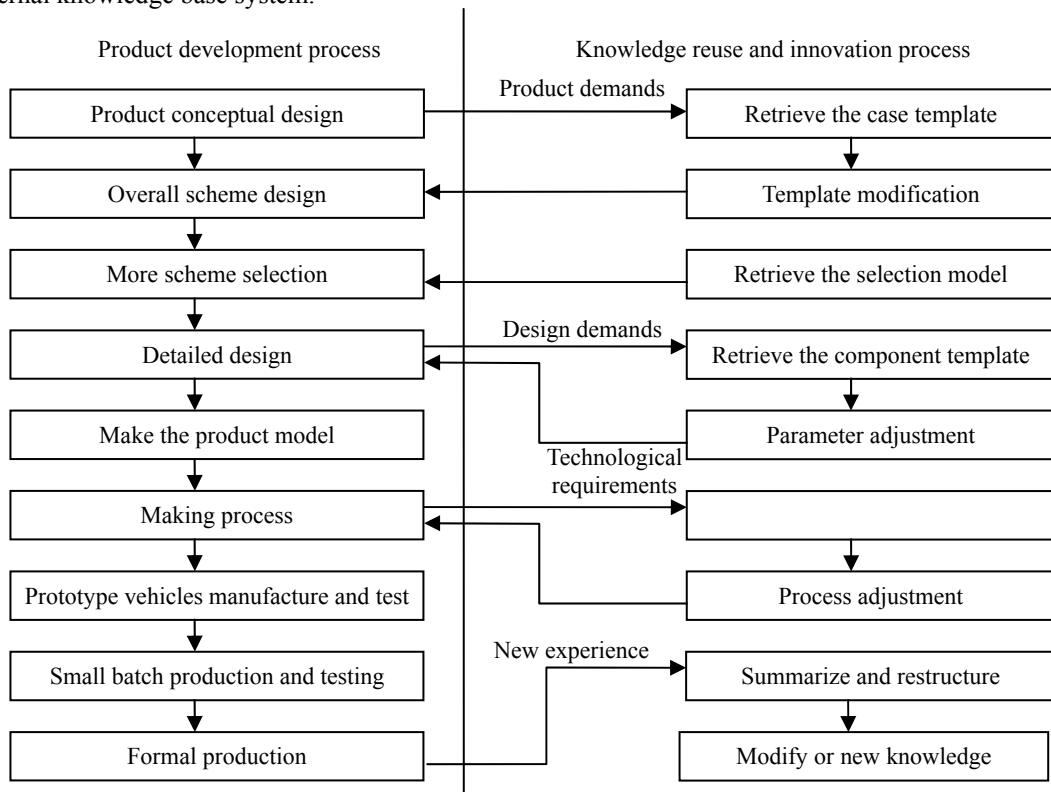


Figure 3 The Model of Knowledge Reuse and Knowledge Innovation Based on Product Development Process

(2) System security. It refers to provide safe and reliable running environment for system operation, including the stability of system operation, the disaster recovery after the system collapse, system audit, and log management and so on.

(3) Data security. It includes the secure storage of the data and safety access, the two aspects. Safety store involves data backup, backup cycle, backup location, etc. Security access refers to the process of operator accessing knowledge scope and the control of operation could be done.

Access permissions can be set up through access matrix to realize security access, including knowledge of the submission, review, read, download, print, etc. According to the organization form of enterprise research and development institutions, there are three aspects to manage the security access, namely, the knowledge level, job, operation permissions.

(1) Safety control based on the knowledge level. If the knowledge of each knowledge point is divided into KL1, KL2,..., KLn, N level, according to its confidentiality level and sorts from low to high in turn according to the confidentiality requirements. And then corresponds the confidential level of knowledge with the operator access level OL1, OL2,..., OLn. If the access level of the operator O is OLi (1≤i≤n), O can access to the knowledge level of KLi all of the following (including KLi). Usually in enterprise the knowledge access level of domain experts and department managers is higher than general employees or new employees. The level set of knowledge involves the core skills is higher, and general knowledge level is low, so that most or all employees can browse and learn.

(2) Safety control based on the work. In enterprise each department, each department, each job has its relatively independent design tasks, the scope of knowledge, staff on different posts can refer to, also will be affected by certain limitations. The control model is shown in table 1.

Table 1 Matrix of Control Scope of Knowledge Access

knowledge classification	Department 1						...
	technical office 1			technical office 2			...
	station 1	station 2	...	station 1	station 2
knowledge 1							
knowledge point 1							
knowledge point 2							
...							
knowledge 2							
knowledge point 1							
knowledge point 2							
...							
...							

Through the matrix shown in table 1, the access of the station or technical office or department to certain knowledge or knowledge point can be controlled.

(3) Access control based on the operating authority

Permissions to the operation of the knowledge in research and development of enterprise knowledge management can be divided into submission, knowledge update, knowledge audit, read, printing, download, etc. Employees of different operating authority will be different. The requirements are as follows:

1) The submitter has the right to update the knowledge he (or she) submitted.

2) Before releasing the knowledge submitted must be approved by the designated experts, and is read by permission.

3) There is an “and” relationship among the scope of knowledge access, access level and read permission.

4) Authorized operator can download and print the specified document within the prescribed reading competence.

5) Only designated personnel can set the security access system.

6 Conclusion

Through analysis, the enterprise should research when develops the research and development

knowledge management system from the aspects of R&D knowledge accumulation, R&D knowledge retrieval and sharing, R&D knowledge reuse and innovation, and the R&D knowledge safety, to improve the pertinence, operability and effectiveness of enterprise research and development knowledge management system significantly.

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A Study of Technology Trends Analysis Using Patent Search Systems

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Abstract: Patent information is effective in clarifying the research policy and strategy of a company and its competitors through the analysis of technological trends. In this study, we devised a patent analysis system that incorporates one patent search system, YUPASS (Yamaguchi University Patent Search System), and patent mapping software. In order to confirm the effectiveness of this analysis system, we focused on the differences in technological features of exposure equipment of Canon, Nikon and ASML for use in semiconductor manufacturing and their market share, and attempted to infer the technological reason for the changes in each company's market share through the analysis of patent maps. The analysis result correlated well with the market share investigation report, and we have found that it is a useful analytical tool in clarifying a company's or its competitor's research strategy and policy.

Key Words: Patent information; Patent map; IPC; FI; F term; Semiconductor; Exposure equipment

1 Introduction

Patent information is effective in clarifying the research policy and strategy of a company and its competitors through the analysis of technological trends. In the five years up to 2012, the average number of patent applications in Japan was about 354,000, which represents an enormous amount of information. Therefore, there is a demand for a highly accurate, high-speed and stable patent search system, and a variety of such systems have been proposed. Patent mapping is a technique whereby, using quantitative-, qualitative- and correlation-analysis fitted to technological information within the patent information as the search object, analysis results can be visually represented in a way that is easy to understand, and so patent information keywords are rendered visible, and invisible actualities can be grasped visually. In this study, taking up the example of exposure equipment, which is indispensable in semiconductor manufacturing, and using a patent analysis system that incorporates one patent search system, YUPASS (Yamaguchi University Patent Search System), and patent mapping software, we will investigate patent information technology trends analysis in terms of the impact of technology changes on the market.

2 Features of the Patent Analysis System

In this study, YUPASS was used as the patent search system, and Patent Map EXZ, an all-purpose patent mapping software, was used to map acquired data. YUPASS is a search system that has been being developed since 2004 by Yamaguchi University, and improvements continue to this day. Its main features are as follows:

(1) A function to collectively search all text data contained in the bibliographic items within patent publications (including weighted searches).

(2) A function to search wording from all text from start to finish (no automatic rounding off of particles and other such parts of speech in search phrases).

(3) A function to output the search results report in CSV format, a report citation display function.

(4) It is possible to search stably as it is set up on the campus server.

(5) Since 1993, there has been full text search support for utility model patents.

Among patent information search services, various systems have been released, from free, simple systems to paid-for multi-functional systems, and by employing a variety of search methods, each search system can output patents matching the search terms. In addition, by statistically processing the analysis elements such as keywords contained in patent information using mapping software, we can find out about technology trends, technology distribution, trends in new technologies, the discovery of new fields of technology, and we can grasp the differences in development between a company and its competitors.

Patent maps are well known as an example of the macro analysis of patent information. They use

sets of patent information selected and gathered by patent investigations and searches as the population, perform quantitative-, qualitative- and correlation-analysis matched to the search object on that population, and the results of that analysis are visually presented in a chart or table, which makes it possible to easily visually ascertain the realities of technological development.

There are two types of patent maps, the statistical type and the list type; a different type is used depending on the goal. Also, in order to analyse a large quantity of patent information, and to efficiently create a patent map based on it, there is a need to use mechanical information processing, not the former manual method. The flow of information for the manual and the mechanical method is shown in Figure 1.

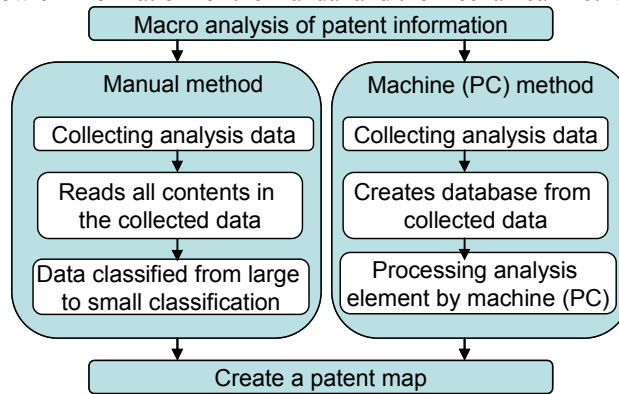


Figure 1 Macro Analysis Method in Manual and Mechanical Styles

Analysis is performed by classifying analysis element into a hierarchical structure from large to small, with the element of analysis being the content in the patent applications. Depending on how the data would be viewed, analysis element will go through various re-arrangement and process before finally rendered visually by a mapping software. One weaknesses of mechanical system is, it cannot interpret the contents of individual patent applications, which mean that, depending on the analysis element being used, the level of analysis will be easily affected. As shown in Figure 2, patent document contains the detailed description of the invention that applied to be patented. It covers the summary of the application, the scope of the invention claim, challenges and solutions, purpose/utility/operation/effect of the invention, and its implementation. Patents are classed according to the subject of the invention. Usually each patent document has a fixed format and assigned with special identification sign such as the publication, date and classification number to makes its classification more systematic. As shown in Figure 2, the content of a patent application document can be extracted into smaller elements that are:- the numbering system, date system, word system etc. These can be used as an element of analysis alongside other bibliographic items (applicant, inventor, name, and classification).

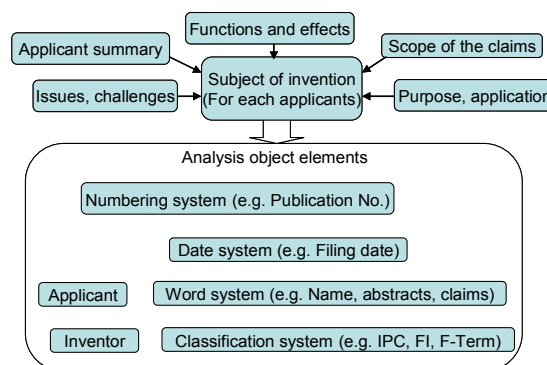


Figure 2 Elements That are the Target of Patent Information Analysis

2.1 Analysing Technological Content Using F-Terms

Because mechanical patent mapping is a method of analysis that uses only particular analysis elements, such as the applicant, IPC, or FI, compared to the manual method, whereby individual application contents are read and analysed, the lack of capability to analyse thoroughly the technological content is a problem. When classification system is used as an element of analysis, the analysis level is

determined by the type of classification, and depending on the classification there is a possibility that the information to be analysed will be analysed at a high level. As shown in Figure 3, when F-term, a technology (classification system) that was developed for mechanical searching, is used as an analysis element to efficiently conduct the prior art investigation (search) for wide-range classification, IPC main groups, IPC subgroups, FI and patent information investigations, the total number of classifications will be large, so compared to IPC classification and similar systems, when F-terms are the analysis element a higher analytical level can be expected.

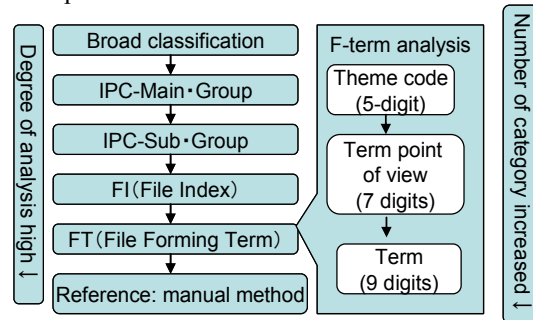


Figure 3 Evaluation of the Degree of Analysis According to the Analysis Element of the Classification System

When using only the current IPC, there is a lot of prior art literature that should be investigated; because F-terms are the product of sub-dividing and re-dividing IPC by specified technological field from various technological viewpoints (objective, utility, structure, material, method of manufacture, processing operation method, means of control), by searching for a combination of F-terms, the search can efficiently be narrowed down to relevant prior art. As shown in Figure 4, F-terms are composed of a 5-digit theme code + 2-digit viewpoint + a 2-digit number. For some themes, a one-character code called the option code is also established. The appended code adds the symbol “.” after the F-term. In F-terms many theme codes for a variety of technologies are provided, and a unique analytic viewpoint is defined for each code.

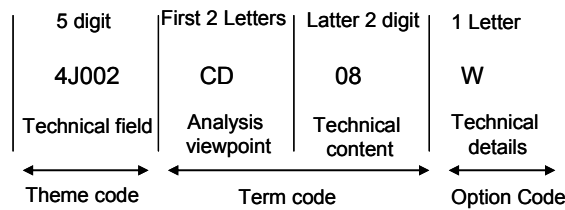


Figure 4 F-Term Structures and the Hierarchy of Digit Number by Analytical Element

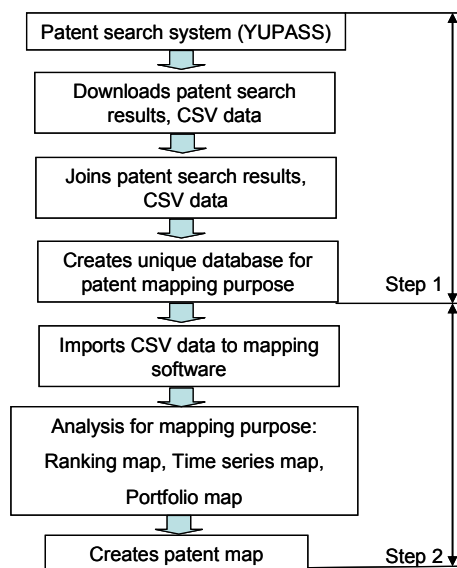


Figure 5 Overall Flow of Analysis

As the method for this study, we focused on F-terms as the element of analysis, extracted F-terms from patent information to be searched, and created patent maps. In the actual analysis, based on the fact that F-term codes are expressed as 5-digit theme codes and 4-digit term codes, a total of 9 digits (10 including the appended code), the theme code was reset as the large classification, the first two digits of the term code (analysis viewpoint) as the medium classification, and the last two digits (technological content) as the small classification; by changing the depth of the hierarchy (the number of F-terms digits) of classifications expressed as between large and small, analysis could be done from many viewpoints. The overall flow of analysis is shown in Figure 5.

2.2 Analysis Procedure

As the first step in creating each type of patent map, from the online database of patent literature, we gathered patent literature that was to be analysed, and in order to make a dedicated database, entered keywords suitable for a YUPASS detailed search, and acquired the search result electronic data as a CSV file. YUPASS can produce a search list of up to 100,000 results at a time, and because it can be outputted as CSV data 3,000 results at a time, searches can be done accurately and without omission. Also, because of the fact that literature on patent information to be analysed acquired by search is gathered and stored on each search in the CSV file format, this data could be combined using Excel or similar general-purpose software. Next, the results gathered in their own patent map database were imported into mapping software and ranking maps, chronological maps, portfolio maps and so on were created and analysed. However, because patent maps are for conducting analysis of information, in order to judge the results specialist knowledge on the target of analysis is required.

3 Analysis of Exposure Equipment Patents

In the 1990's, Canon and Nikon split the global exposure equipment market share between them. However, entering the 2000s, they surrendered the top share over to ASML, Dutch semiconductor manufacturing equipment maker. Until now, various reasons for Nikon's and Canon's exposure equipment business decline have been examined from the points of view of economics and management; in this study, in order to confirm the effectiveness of the patent information analysis system we have constructed, we focused on the differences in technological features of exposure equipment for use in semiconductor manufacturing and their market share, and attempted to infer the technological reason for the changes in each company's market share through the analysis of patent maps.

3.1 Market Share of Exposure Equipment

Figure 6 shows the changes in world market share of Nikon, Canon and ASML as shown by quantity of sales. As can be understood from the graph, in the 1990's Canon occupied 40% of the market share. In the year 1996, Nikon held 50% of the market and Canon held 25%, 75% between them. At that time, ASML's market share was around 15%. Entering the 2000s, the three companies, Nikon, Canon and ASML, started to engage in a fierce battle for market share. In 2001, the semiconductor exposure equipment market was divided between Nikon at 41.6%, Canon at 34.8% and ASML at 22.4%. However, five years later in 2006, ASML's share reached 40%, and 60% in 2010, and it established itself as the world number one semiconductor exposure equipment maker.

From an economic or management point of view, one cause of this trend is said to be that ASML was ahead of the rest of the industry in developing immersion exposure equipment. In August 2004, ASML's Twinscan AT:1150i α -machine immersion exposure equipment was delivered to New York State University's Albany NanoTech, and after that ASML continued to ship out more equipment of this type. In terms of the market for i-line steppers, the simplest lithography technology for making low-end chips, according to the "The Global Market for Equipment and Materials for IC Manufacturing" report, in 2006 Canon held 48.8% of the market, Nikon 34.9%, and ASML 16.3%. Even in 2011 the i-line market share situation hadn't changed greatly, with 52.9% of the market share going to Canon, 40.0% to Nikon and 7.7% to ASML, but the i-line exposure tool is for low end semiconductor manufacturing use, and the market price is low. In addition, ASML holds a large market share in ArF immersion exposure, a high-end type of exposure equipment. In the 2006 immersion exposure market, ASML held a 72.4% share, Nikon held 27.6%, and Canon had not expanded into the high-end market. In 2011, ASML's share expanded yet further to 82.0%, and Nikon's dropped to 18%. In this way, because, at 80%, ASML showed an extremely strong hold on the immersion exposure market share, they became the top market shareholder in the exposure equipment world market. ASML greatly increased their share to 60%, Nikon dropping to 20.5% and Canon to 10%.

From the fact that, in 2008, ASML held 40.7% of market share by number of sales, Nikon 30.2% and Canon 29%, and that in terms of sales proceeds ASML held 65.4%, Nikon 23.3% and Canon 11.3%, we can see that ASML increased its market share across all types of exposure equipment.

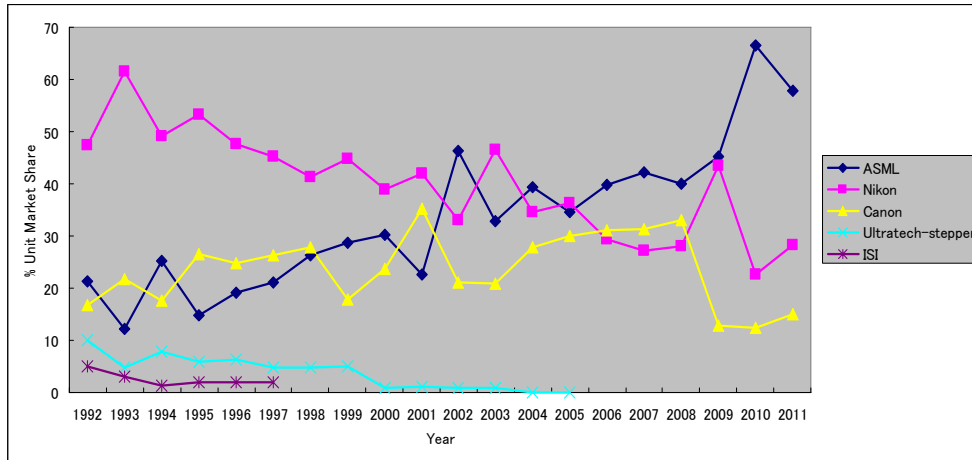


Figure 6 Semi-Conductor Exposure Apparatus Manufacturer Market Share Changes

4 Results of Analysis

4.1 Five-digit F-terms: Large Classification (Technical Field) Ranking Map Analysis

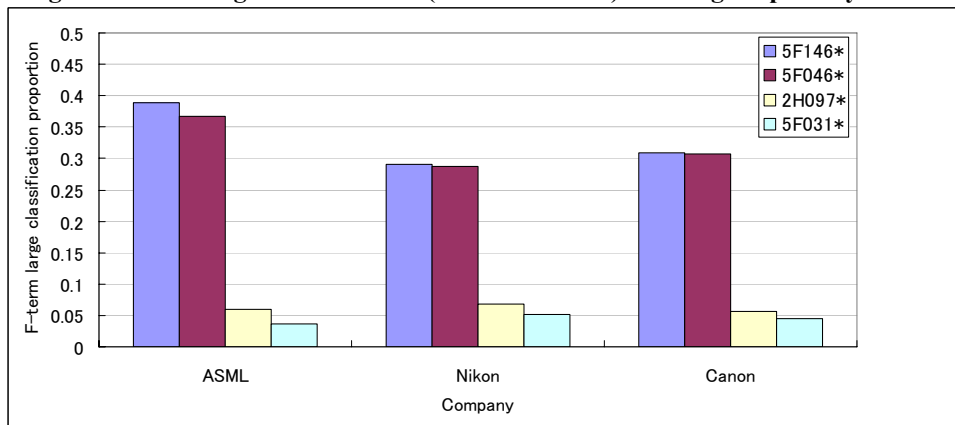


Figure 7 Ranking Map of 5-Digit F-Terms

Table 1 5-Digit F-Terms (Technical Field)

FT 5 digits (Large classification : Technical field)	
FT	Theme code
5F146	EXPOSURE OF SEMICONDUCTORS, EXCLUDING ELECTRON OR ION BEAM EXPOSURE (NEW)
5F046	EXPOSURE OF SEMICONDUCTORS, EXCLUDING ELECTRON OR ION BEAM EXPOSURE (OLD)
5F031	CONTAINERS, MOVEMENT, FIXING, AND POSITIONING OF SEMICONDUCTOR WAFERS
2H097	EXPOSURE AND POSITIONING OF PHOTSENSITIVE MATERIALS COMPRISING PHOTORESISTS

In order to analyse the technical field, we analysed the percentage of applications of each company

for inventions in exposure and lithography using ranking mapping of 5-digit F-terms (theme code). Figure 7 shows the results of analysis. As can be understood from the graph, 5-digit F-terms, 5F146 and 5F046 theme codes appeared most frequently for all three companies, ASML, Nikon and Canon, and no difference can be seen in the field of technology between the three companies, which all show the same trend. 5F146, and 5F046 are both seen as the technology field of “exposure for semiconductors (apart from electron and ion beam exposure)”. Table 1 shows the 5-digit F-terms and theme codes of the top four headings by appearance frequency.

Next, we conducted the analysis of the middle classification, to see what viewpoint each manufacturer focused on within theme code 5F146 (“exposure for semi-conductors [apart from electron and ion beam exposure]”), the field that appeared most frequently in the analysis of the large classification.

4.2 Seven-digit F-terms: Middle Classification (Viewpoint) Ranking Map Analysis

Figure 8 shows the ranking map for each company by 7-digit F-term analysis. As can be understood from the graph, ASML, Nikon and Canon shared the trend that within the technology field 5F146, “exposure for semiconductors (apart from electron and ion beam exposure)”, viewpoint BA, “type of UV light exposure”, appeared most frequently. Table 2 shows the codes of the top four viewpoint headings acquired.

Next, the analysis results of the middle classification show that viewpoint BA, “type of UV light exposure”, appeared most frequently within technology field 5S146, “exposure for semiconductors (apart from electron and ion beam exposure)”. Analysis of the small classification was then performed to determine which technology within viewpoint BA each manufacturer focused on.

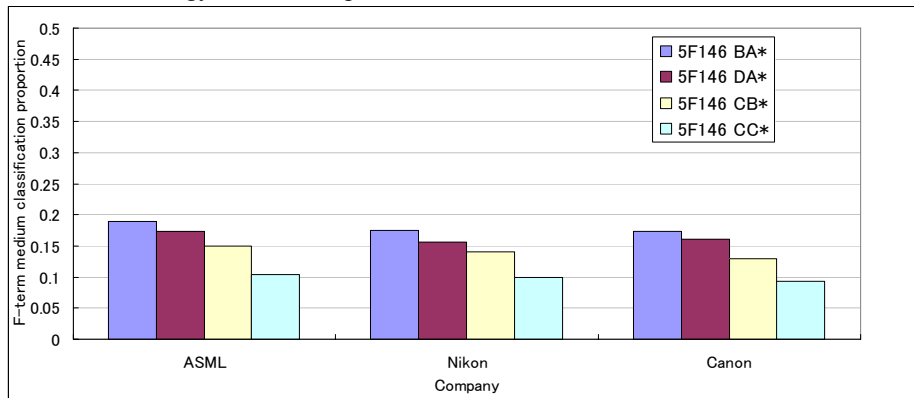


Figure 8 Ranking Map of 7-Digit F-Terms

Table 2 7-Digit F-Terms (Viewpoint)

FT 7 digits (Medium classification: Viewpoint)	
FT	Viewpoint
5F146 BA	KIND OF ULTRA-VIOLET RADIATION OR ULTRA-VIOLET LIGHT EXPOSURE
5F146 DA	OBJECT OF EXPOSURE CONTROL OR ADJUSTMENT, OR CONTENT THEREOF
5F146 CB	OPTICAL SYSTEM
5F146 CC	STAGE OR CHUCK MECHANISM AND OPERATION THEREOF

4.3 Nine-digit F-terms: Small Classification (Technological Content) Ranking Map Analysis

Figure 9 shows the analysis results of a ranking map of 9-digit F-terms. The analysis shows that while for both Canon and Nikon the heading BA05, “projection exposure: scanning projection exposure, reflection projection exposure” within BA0, “projection exposure”, appeared most frequently, for ASML

BA11, “immersion exposure” appeared most frequently.

In this way, by deepening the analysis, we can finally confirm the point of difference between Canon, Nikon and ASML. From the above results we can see that ASML focused mainly on immersion exposure as a means of making a great profit in the exposure equipment market, with this heading comprising 33.1% of the technological content, while Nikon and Canon had a greater percentage of projection exposure technology. Immersion exposure has been identified in previous studies as the cause of ASML’s success.

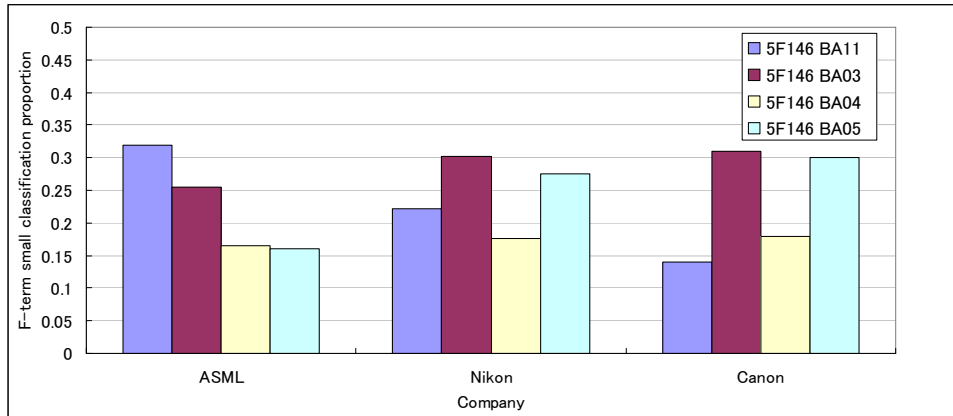


Figure 9 Ranking Map of 9-Digit F-Terms

Table 3 9-Digit F-Terms (Technical Content)

FT	All digits (Small classification: Technical contents)
FT	Technical contents
5F146BA11	· IMMERSION EXPOSURE
5F146BA03	· PROJECTION EXPOSURE
5F146BA04	· · REDUCED PROJECTION EXPOSURE
5F146BA05	· · SCANNING PROJECTION EXPOSURE OR REFLECTION PROJECTION EXPOSURE

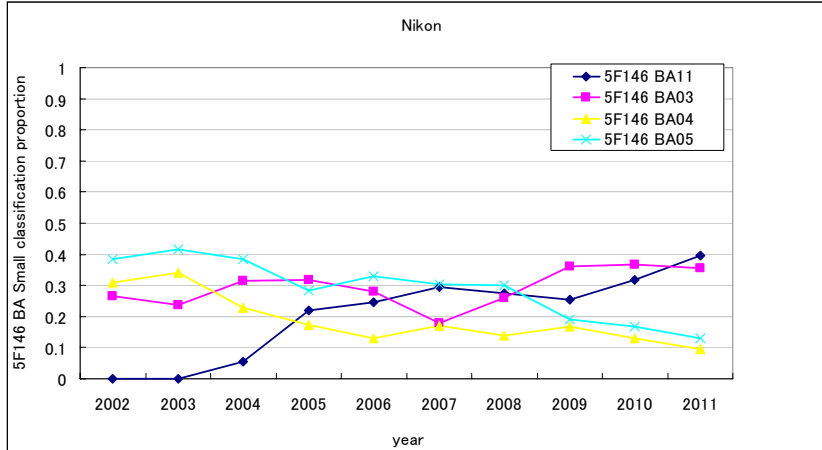
4.4 Chronological Map Analysis

We conducted analysis using chronological maps to investigate in detail the variations in each company’s exposure method technology. Figures 11(a), (b) and (c) show the changes in technological content for each company. The vertical axes show the percentage of each technological content heading, and the horizontal axis shows the year from 2002 to 2011. From Figure 10 (a) we can see that in 2002, for Nikon results were equally high for the projection exposure technology of BA05, “projection exposure: scanning projection exposure, reflection projection exposure”, BA04, “reduced projection exposure” and BA03, “projection exposure”, and thereafter the percentage of BA05 and BA03 dropped but that of BA03 levelled off and remained high. BA11 (“immersion exposure”) increased sharply in 2005 before levelling off at a high percentage.

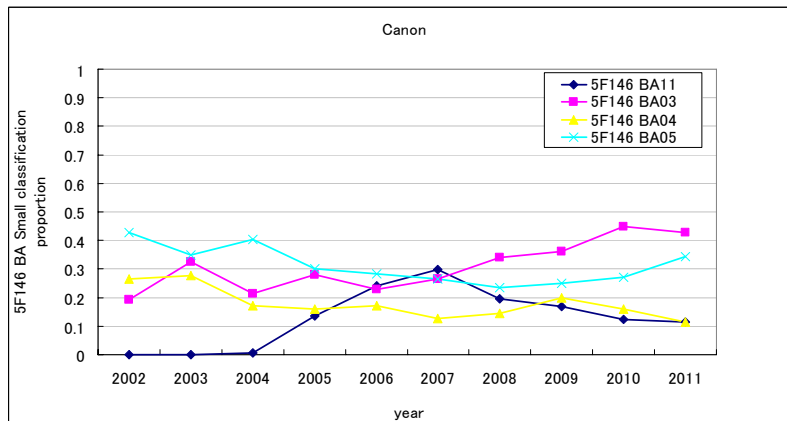
Figure 10 (b) shows the results of analysis for Canon. In the graph we can see that the percentage of BA03 and BA05 is high, and particularly BA03 shows an upward trend. BA11 peaked in 2007 and then dropped. This can be thought to be due to Canon’s focus on low-end i-line stepper over immersion exposure. Figure 10(c) shows that while in 2006 ASML’s percentage was about the same for BA11, BA03, BA04 and BA05, after that the percentage of BA03 and BA11 soared, but after 2009 only BA11 increased while all the other technologies dropped. Especially in 2011 the percentage of BA11 exceeded 50%, and all the other technologies remained low at about 15%. It is thought that this is connected to an attempt to expand market share of immersion technology applied to exposure equipment.

Figure 11 shows variations in market share along with each company’s immersion exposure equipment percentage. Regarding changes in market share relative to changes in the percentage of

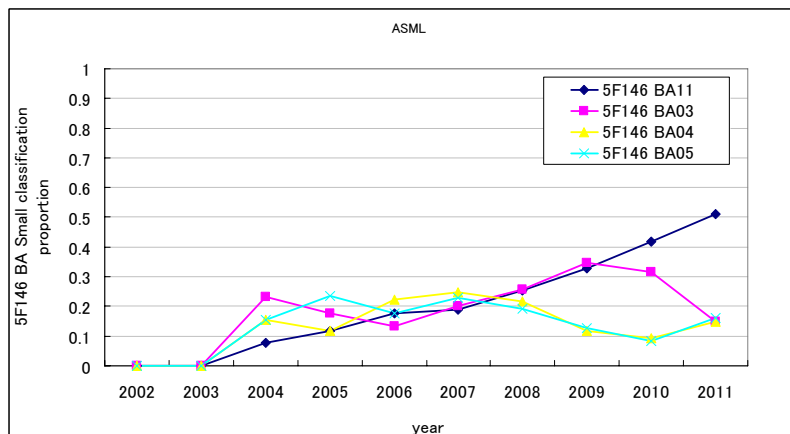
immersion exposure technology for each company, since 2006 the percentage of BA11 in ASML has been increasing continuously, and at the same time its market share has also increased. Next, looking at the changes in Nikon, up to 2010 BA11 maintained on average a high proportion, and since then there has been an upward trend, but compared to ASML's increase this upward trend is lagging. Since peaking in 2007, Canon's market share has declined along with its BA11 percentage. From these points a correlation can be observed between changes in each company's immersion exposure technology (BA11) and changes in their market share.



(a) Nikon



(b) Canon



(c) ASML

Figure 10 Chronological Maps of 9-digit F-terms (Theme Code: 5F146; Viewpoint: BA)

Table 4 9-Digit F-Terms (Theme Code: 5F146; Viewpoint: BA)

FT	Technical contents for theme code:5F146 viewpoint: BA
5F146BA01	· CONTACT EXPOSURE
5F146BA02	· PROXIMITY EXPOSURE
5F146BA03	· PROJECTION EXPOSURE
5F146BA04	· · REDUCED PROJECTION EXPOSURE
5F146BA05	· · SCANNING PROJECTION EXPOSURE OR REFLECTION PROJECTION EXPOSURE
5F146BA06	· · PATTERN GENERATORS
5F146BA07	· BEAM SCANNING EXPOSURE
5F146BA08	· INTERFERENCE EXPOSURE
5F146BA09	· HOLOGRAPHIC EXPOSURE
5F146BA10	· OTHERS
5F146BA11	· IMMERSION EXPOSURE

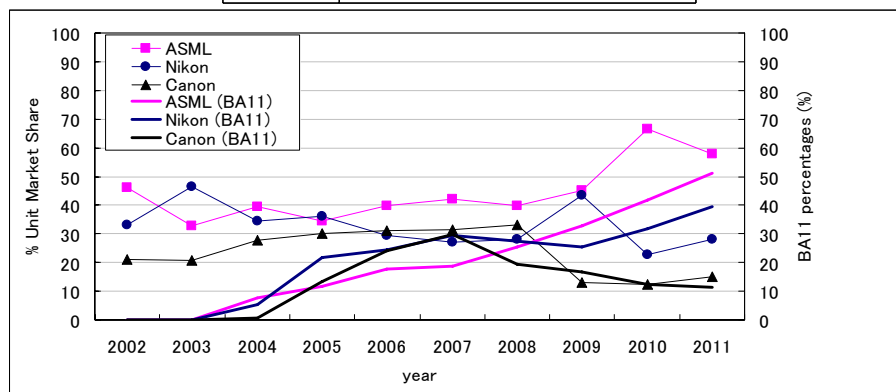


Figure 11 Changes in Immersion Exposure Percentage and Each Manufacturer’s Global Market Share

In the above way, using patent maps we can analyse changes in the technologies (in this case, exposure methods and immersion exposure) on which each manufacturer focuses. Through F-term small classification ranking maps, we can see that ASML put more emphasis on immersion exposure compared to other manufacturers, and from the immersion exposure by manufacturer chronological map we can deduce what kind of exposure technology each manufacturer is currently proactively developing based on the number and proportion of results for a given heading.

4.5 Portfolio Map Analysis

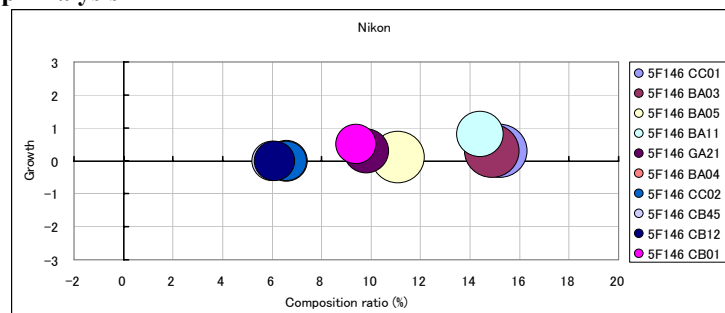


Figure 12 Nikon: Portfolio Map of 9-Digit F-Terms (Theme Code: 5F146)

We conducted analysis of the small classification of theme code 5F146, “exposure for semiconductors (apart from electron and ion-beam exposure)” using portfolio maps. Here, the vertical axes show growth, and the horizontal axes show the composition ratio. “Growth” expresses the changes in the number of applications in the target period relative to the reference period, showing the number of

applications (in this case the number of F-term small classifications) in the target period and the reference period as a logarithm. Composition ratio represents the ratio of various technological contents contained within a given technological field. The reference period for the portfolio maps was from 2002 to 2005, and the target period was from 2006 to 2011.

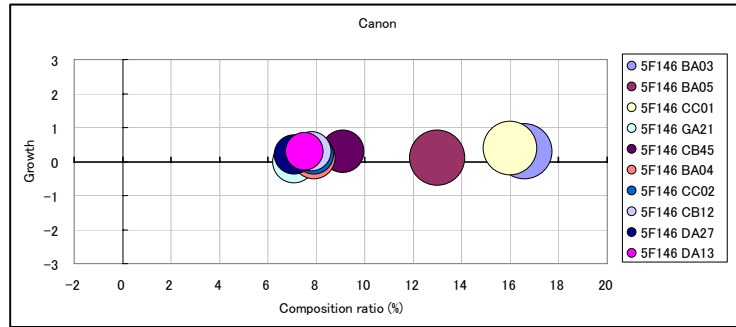


Figure 13 Canon: Portfolio Map of 9-Digit F-Terms (Theme Code: 5F146)

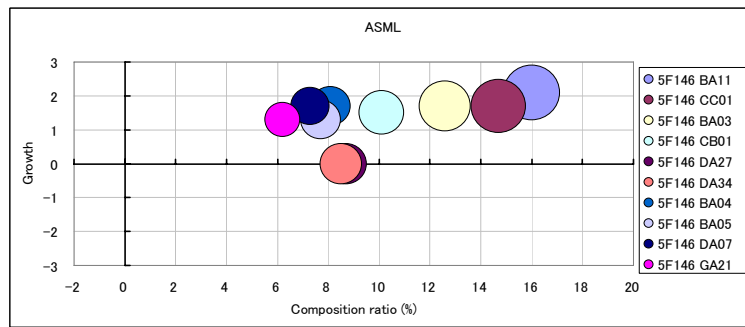


Figure 14 ASML: Portfolio Map of 9-Digit F-Terms (Theme Code: 5F146)

Table 5 F-Term Numbers and Explanations

Viewpoint	5F146BA	Kind of ultra-violet radiation or ultra-violet light exposure
Technical content	5F146BA03 5F146BA11 5F146BA04 5F146BA05	<ul style="list-style-type: none"> • Projection exposure • Immersion exposure •• Reduced projection exposure •• Scanning projection exposure or reflection-projection exposure
	5F146CC	Stage or chuck mechanism and operation thereof
	5F146CC01 5F146CC02	<ul style="list-style-type: none"> • Wafer stages • Mask stages
	5F146CB	Optical system
	5F146CB01 5F146CB12 5F146CB41 5F146CB44 5F146CB45	<ul style="list-style-type: none"> • Optical system elements •• Lenses • Position of optical system •• Between mask or reticle and wafers ••• Projection optical systems
	5F146GA	X-ray exposure or EUV exposure
	5F146GA21	• Exposure wavelength is EUV
	5F146DA	Object of exposure control or adjustment, or content thereof
	5F146DA07 5F146DA27 5F146DA34 5F146DA11 5F146DA12 5F146DA13 5F146DA11 5F146DA12 5F146DA13	<ul style="list-style-type: none"> • Wafers or vicinity of wafers • Pressure or atmospheres • Maintain performance of immersion lithography • Projection exposure •• Projection optical system ••• Magnification, optical path lengths or distortion • Projection exposure •• Projection optical system ••• Magnification, optical path lengths or distortion

Figure 14 shows ASML’s portfolio map. Table 5 describes the portfolio map’s F-term headings. As can be seen from the figure, within ASML’s F-term small classification, BA11 (immersion exposure) has

a component ratio of 16.3%, the highest in the F-term small classification, and growth is above +1. Also, in the small classification viewpoint DA (exposure control, target of adjustment, contents), the F-term with the most growth was DA34 (immersion exposure equipment performance support), with growth of ∞ . This is because it had no appearances in the reference period but it made an appearance in the target period. It is shown on the 0 axis on the map due to a limitation of the software. The fact that in ASML's portfolio map the growth of all small classification F-terms is 1 or above demonstrates how actively they have been engaged in development relative to the reference period. Also, the high component ration of BA11 (immersion exposure) and the highest growth of DA34 (immersion exposure equipment performance support), reflect the fact that ASML has been focused on and expanding development in immersion exposure methods and related technology.

Figure 12 shows Nikon's portfolio map. From the graph we can see that, as for ASML, the highest component ratio belongs to BA11 (immersion exposure), but that growth is low compared to ASML and compared as a whole to ASML, the overall growth in the appearance of small classification F-terms is not high. This indicates that compared to ASML the progress of development was lagging.

Figure 13 show Canon's portfolio map. As the graph shows, the exposure method BA03 (projection exposure) represents the highest component ratio, and as for Nikon overall growth is not high. In addition, it can be considered that much of the negative growth can be accounted for by the downward trend in technological development.

Looking at the above results, if we assess the differences and features of each manufacturer, we can see that ASML has focused on immersion exposure and related technology; many of the small classification F-terms have shown positive growth, and the company is actively pursuing development. However, the growth of Nikon and Canon is not very large, there is also some negative growth, and it can be deduced that they are not as actively engaged in development as ASML. From these results, it can also be thought that the state of development work on the particular technology each company focused on is one factor that affects the company's market share.

5 Discussion

By analysing technology trends with regard to the influence on the market of technological changes in exposure equipment used in semiconductor manufacturing, using a patent analysis system that incorporates a search system and patent mapping software, the following conclusions were reached.

(1) By analysing F-terms, it is possible to not only find out about the fields of technology, but also to attain detailed information about various viewpoints within those fields.

(2) By analysing different hierarchy depths of F-terms, it is possible to specifically analyse a variety of information in each technological field, in which the depth of the hierarchy leads to highly detailed classification. In this study, when F-term hierarchy depth was analysed in large to medium classifications, the viewpoint of the exposure method (in the field of semi-conductor exposure) upon which ASML, Nikon and Canon were focusing could be understood. When further analysis was done into small classifications, the fact that ASML focused more than Nikon and Canon on immersion exposure became clear. In other words, the greater the complexity of classification, the more the differences and features of each company can be identified.

(3) By analysing F-terms by different hierarchy depths, it can be seen that ASML's special feature was immersion exposure, which correlates well with information on market share obtained from economic investigation.

(4) Using patent maps, it is possible to analyse changes in the technology (in this case, exposure methods and immersion exposure) upon which each manufacturer focuses. Through a ranking map of F-term small classifications, it can be seen that ASML emphasized immersion exposure more than other manufacturers, and from a chronology map of immersion exposure by manufacturer, we can deduce from the number and proportion of appearances of a given heading what kind of exposure technology each manufacturer is currently proactively developing.

(5) If we assess the differences and features of each manufacturer based on portfolio maps of ASML, Nikon and Canon, we can see that ASML has focused on immersion exposure and related technology, that many of the small classification F-terms show positive growth, and that the company is actively pursuing development. On the other hand we can see that the growth of Nikon and Canon is not very large, and that there is also negative growth, and it can be deduced that they are not as actively engaged in development as ASML. From these results it can also be thought that the state of

development work on the particular technology each company focused on was one influencing factor on the company's market share.

(6) In this study, the analysis of patent maps correlated well with the market share investigation report. Accordingly, the application of the patent analysis system used in this study to analyse technology trends in patent information can be a useful analytical tool in clarifying a company's or its competitor's research strategy and policy.

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Research on Corporate Network Response after Product Harm Crisis

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Abstract: This paper constructs conceptual model that enterprise network response influences on customer brand loyalty and purchase intention. The paper analyzes network response impact on consumer brand loyalty and purchase intention through mediating variables: the brand trust and brand emotion and perceived risk by the method of the empirical research after product harm crisis. A analysis of variance showed that company online remedial response measures help reduce consumer perceived risk, increasing brand trust and brand emotion. Correlation analysis showed that perceived risk are negative related with brand loyalty and purchase intention, brand trust and brand emotion are positive related with brand loyalty and purchase intention separately.

Key word: Product harm crisis; Network response; Brand trust; Brand emotion; Perceived risk

1 Introduction

Product harm crisis is an occasionally appeared and widely published event that a product is defective or harmful to the consumer. According to whether the company can clarify and prove the product is no defect or harmless in the media or court. Smith and Larry (1991)^[1] recognize product harm crisis can be divided into indefensible type and defensible type. Fang Zheng (2007)^[2] classified product harm crisis and the styles of dealing with crisis, identified and distinguished three conceptions of product harm crisis. After Product harm crisis will not only give consumers' physical and mental cause certain damage, but also affect enterprise's brand image and business activities.

Product harm crisis occurred frequently, such as "drunkard wine" events, "KFC crash chicken" events, "Lipton tieguanyin rare earth overweight". Product harm crisis would bring enterprise multiple effects, such as product sales decline, marketing efficiency decreases, the brand assets value reduction and offset consumer's trust. With the rapid development of the Internet, the exposure amplitude of enterprise product harm crisis becomes bigger, propagation speed faster, negative effects more big. However, many enterprises all appear more panic, or flinch before, or vague answer when crisis comes. These coping styles in a certain extent affect consumer trust of enterprise and brand emotion, and then damage consumer's brand loyalty and purchase intention. Through the research this paper would find how to use the network to deal with the crisis to wine consumer trust for enterprises, in order to enrich and complement the existing theories of product damage crisis and to improve the enterprises' ability of dealing with product harm crisis.

2 Research Hypothesis and Model

When enterprise faces product harm crisis, consumers will doubt and mistrust about enterprise brand. Due to the development of the Internet, the enterprise negative information spreads quickly, the influence time will be also longer and spread range will be wider. Through the network active response enterprise can change consumer perceived risk, brand trust and brand emotion, affecting consumers' purchase invention and brand loyalty.

Laufer and Coombs (2006)^[3] point out also product harm crisis has a negative impact on the enterprise market share and stock prices ,yet threat enterprise reputation. Enterprise reputation will affect potential customers, investment income, senior talent introduction, job satisfaction and media reports. Zeng Wangming, LiWei (2008)^[4] consider from the point of perception loss, perceived loss and perceived risk is related positively in the product damage event. Perceived loss is negatively related to brand emotion and brand trust, does perceived risk; brand emotion and brand trust are positively related to brand loyalty. Peng Liang, Lu Bingxin (2009)^[5] think product damage incident will bright serious damage to consumers' physical and mental health, but also lead to significant influence on the enterprise brand management. Product damage crisis will influence consumers' brand cognition, further influence the attitude, and then affect consumption behavior, so that enterprise needs timely to make the right way to deal with. Whether the crisis is true and false, enterprise' positive response can let the consumer feel that enterprise has the ability to undertake product damage events. The present research mainly concentrated on the handling ways of different subjects such as the enterprise, government, experts and

so on, but related researches of dealing with product harm crisis reported are less from the angle of network. Therefore, this article mainly discusses how the enterprise online coping styles affect brand trust and brand emotion as well as consumer perceived risk. Based on this, we put forward the following hypothesis:

H1: After product harm crisis happens, network positive response can enhance consumers' trust to enterprise brand.

H2: After product harm crisis happens, network positive response can deepen the consumer emotional experience to the enterprise brand.

H3: After product harm crisis happens, network positive response can reduce consumer perceived risk.

Zeng Wangming, Li Wei (2008) [4] put forward after product harm incident, the best approach is to make consumers feel the company to be worthy of trust using all possible measures. Consumers believe that the company can avoid such events happen again to ensure their interests in the future, thus reducing consumers' doubts about the brand, weakening their perceived risk. Chaudhuri and Holbrook (2001) [6] also put forward the hypothesis that brand emotion has positive influence on brand loyalty. These were verified in empirical research.

H4: After product harm crisis happens, enhancing consumer trust for enterprise brand has positive influence on cultivating consumer's brand loyalty.

H6: After product harm crisis happens, deepening consumer brand emotion has positive influence on cultivating consumer's brand loyalty.

H8: After product harm crisis happens, to reduce consumers' perceived risk has positive influence on cultivating consumer's brand loyalty.

Howard and Sheth put forward brand trust that is one of the decisive factors to purchase intention for the first time in 1969. Similarly, Bennett and Harrell thought trust played an important role in predicting buying intention. After product harm crisis the enterprise brand image would be damaged. Consumer trust may fell sharply to buy the competitor's products, threatening the development of the enterprise. Wang Xingdong, Jing Fengjie (2011) [7] take field experimental method to verify when the crisis enterprise took network media communication timely, positive network response can reduce the customer's perception of risk, to maintain the customer's purchase intention. During the process of researching, enterprise ability and enterprise social responsibility influenced on purchase intention, Chieh-Peng Lin, Shwu-Chuan Chen (2011) [8] thought that owing certain feelings for enterprise brand will affect the purchase intention. Bhattacharya and Sen (2003) [9] also said brand emotions can make consumer psychological more attach on and focus on the company, which actively arouse their purchase intention.

H5: After product harm crisis happens, enhancing consumer trust for enterprise brand has positive influence on consumers' purchase intention.

H7: After product harm crisis happens, deepening consumer brand emotion has positive influence on consumers' purchase intention.

H9: After product harm crisis happens, to reduce consumers' perceived risk can strengthen consumers' purchase intention.

To sum up, this research model is shown in figure 1.

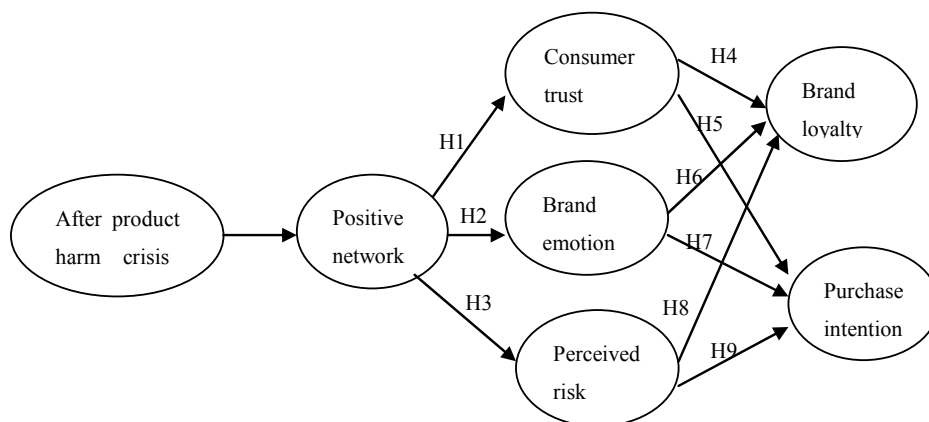


Figure 1 Research Model

3 Research Design

3.1 Questionnaire design

This research explores that how positive network responses influence the brand loyalty and the purchase intention. The answer to the questionnaire rates with 5 level Likert scale, because most scholars believe that 5 level Likert scale is more reliable, it can reflect the differences of respondents' mild opinions and strong opinions. The five point scale is easy to judge, so as to ensure the accuracy of the data. The involved problems of each dimension in the questionnaire were measured by 5 level Likert scale. 1 = "strongly disagree", 2 = "disagree", 3 = "not sure"; 4 = "agree"; 5 = "very agree". The higher the score, the higher the degree of the agreement; the lower the score, the lower the degree of the agreement. Perceived risk is measured as 1 = "very dangerous", 2 = "dangerous", 3 = "not sure"; 4 = "no risk"; 5 = "completely without risk". The higher the score, the lower perceived risk; The lower the score, the higher perceived risk. The study involved five test variables of brand trust and brand emotion, perceived risk and brand loyalty and purchase intention. The test variables of purchase intention refers to Pavlou (2003) ^[10] measurement scale; the test variables of brand loyalty refer to Aaker (1996) ^[11] measurement scale; the test variables of brand trust refer to sirdeshmukh^[12] and Jin Yufang measurement scale; the test variables of perceived risk refer to Jocoby (1972) and Simokos measurement scale; the test variables of brand emotion refer to Keh and Xie (2009) ^[13] and Chaudhuri, A., & Holbrook measurement scale.

Table 1 Measurement Scale of Five Variables

Variables	Research problem	source
Brand trust	I believe that the enterprise has the ability to manage current business.	Sirdeshmukh,2002 Jin Yufang, 2005
	I think XX brand is worth trusting.	
	I think XX brand is very honesty and integrity.	
	When appearing the crisis, I think the enterprise took positive measures.	
Brand emotion	I like company image of XX company.	Keh and Xie,2009 Chaudhuri, A., & Holbrook, M. B. (2001)
	I think XX company staff' service attitude is good.	
	Purchasing XX brand made me happy.	
	Using XX brand let me feel very at ease.	
Perceived risk	I think XX brand does damage to body health.	Jocoby,1972 Simokos,1994
	I think XX brand does damage to financial condition.	
	I feel XX brand does damage to mental health.	
	I feel XX brand does damage to the society.	
Brand loyalty	I will repeat to buy XX brand product.	Aaker,1996
	In the purchase of similar products, I preferred XX brand.	
	I always hope to recommend XX brand to friends.	
purchase intention	As long as having the opportunity, I going to buy XX brand product.	Pavlou,2003
	As long as having the opportunity, I going to buy XX brand product in the future.	
	In the near future, I may buy XX brand product.	

3.2 Research object

This study chose a defensible product harm event – taking fruit milk "Coca-Cola poisoning" event as test object, questionnaire design uses scene type. The scene is adapted by reported real syrutra events happened during November 30, 2011 to December 7. Using this event as the research object, one reason is that milk powder is daily necessities, for the vast numbers of consumers are familiar with, we all have the experience of using or purchasing. The other reason is that the event belongs to the defensible product harm event, not causing substantial damage to consumer.

3.3 Questionnaire test/data collection

This research takes the way of random intercept and online survey, random intercept in Wuhan city part of the large business super and convenience stores, such as questionnaire survey at ZhongBai storage, ZhongShang supermarkets. The survey time is arranged on Saturday and Sunday. Online surveys first were uploaded the questionnaire to questionnaire star website and spread by weibo and

friend net. Do preliminary research before the final research.

4 Data Analysis and Interpretation

4.1 Descriptive analysis

Considering the selected research object of fruit milk drink daily product, in order to endure this investigation widely, the formal research was carried out on October 11, 2012 to November 15, every Saturday and Sunday at ZhongBai storage, ZhongShang supermarket, Wal-mart in Wuhan, China. We issued 260 research questionnaires, the number of recycling research questionnaires is 207, including 195 effective questionnaires. Tested consumers of 195 valid samples collected are made by descriptive statistical analysis.

From table 2 frequency analysis to see, 113 people in 195 valid questionnaires heard of the "Coca Cola drinks poisoning", occupy 57.9% of the population to be measured, including 39 people hear the "Coca Cola drinks poisoning " incident through people around, traditional media or other channels, 74 people knew this event by the internet, the proportion was as high as 65.5%, indicating that the Internet let the enterprise product harm crisis spread wide.

Table 2 Frequency Analysis

Did you hear about Coca Cola drinks poisoning incident?		Frequency	Percent	Cumulative Percent
Valid	yes	113	57.9	57.9
	no	82	42.1	100.0
Which channel did you get Coca Cola drinks poisoning incident?		Frequency	Percent	Cumulative Percent
Valid	network	74	65.5	65.5
	people around	18	15.9	81.4
	traditional media	17	15.0	96.5
	other channels	4	3.5	100.0

4.2 Reliability and validity analysis

Validity refers to whether the scale can reflect what we want to measure.

Reliability is also called consistency, to measure the item of scale consistency degree. Detection methods in common use is Cronbach 's coefficient method, a coefficient between 0 ~ 1. Generally speaking, internal consistency coefficient is(Cronbach 's α value) > 0.7 ,which shows that the effect is good.

The five variables reflecting test problems of the questionnaire were carried out by reliability analysis, the results were showed such as table 3.

Table 3 Variables Reliability Analysis

Variables	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Perceived risk	.856	.857	4
Brand trust	.862	.865	4
Emotion	.761	.811	4
Brand loyalty	.926	.926	3
Purchase intention	.888	.888	3

It can be seen from table 3, the internal consistency of brand loyalty is (Cronbach 's α value) $0.926 > 0.9$. The internal consistency of perceived risk and brand trust, purchase intention is more than 0.8, The internal consistency of brand emotion is (Cronbach 's α value) $0.761 > 0.7$, which means that the test questions have good internal consistency.

4.3 Variance and correlation analysis

Variance analysis can test whether consumers different perception of corporate network to deal with harm crisis has a significant impact on perceived risk ,brand trust and brand emotions. The premise of the analysis of variance tests data normality and homogeneity of variance. Do variance analysis with SPSS16.0, The results were showed as table 4.

Table 4 Analysis of Variance about Remedial Measures Response Perception and Perceived Risk, Brand Trust and Brand Emotion

Independent variables	Dependent variables	Df	F	Sig
Consumer perception about Internet remedial measures	perceived risk	1	101.897	.000
	brand trust	1	50.329	.000
	brand emotion	1	16.499	.000

According to consumer perception to the Coca-Cola company crisis response, we divide to into the consumers two groups, each group of perceived risk, brand emotion and brand trust values was shown in table 5.

Table 5 The Mean of Brand Emotion, Brand Trust and Perceived Risk under Different Perception of Remedial Measures

Consumers perception to Cocacola corporate network measurements	Means of perceived risk	Means of brand emotion	Means of brand trust
Positive response	3.28	3.35	3.28
No positive response	2.20	2.74	2.20
Total	2.84	3.10	2.84

As was shown in table 5, with consumers' different perception to the corporate network measurements as independent variables, perceived risk, brand trust and brand emotion as dependent variables, the results of analysis :Sig = 0.000, indicating that consumers' perceived risk, brand trust and brand emotional difference is significant. Due to the perceived risk in the questionnaire survey 1-5 representative from high to low, the brand emotion and the measurement of brand trust, 1-5 represents from low to high. According to mean analysis results which were showed in table 5, when the company took positive measures as a response, brand trust and brand emotion were higher than no positive response; perceived risk was less than no positive response. H1, H2, H3 are verified.

Through correlation analysis we analyzed how brand trust and brand feelings, and perceived risk affect consumers purchase invention and brand loyalty after product harm crisis. The SPSS16.0 for analysis, the results was showed in table6.

Table 6 Correlation Analysis of Perceived Risk, Brand Emotion, Brand Trust and Brand Loyalty, Purchase Intention

		Perceived risk	Brand emotion	Brand trust
Brand loyalty	Pearson relation	.412**	.692**	.463**
	Sig. (2-tailed)	.000	.000	.000
Purchase intention	Pearson relation	.421**	.586**	.533**
	Sig. (2-tailed)	.000	.000	.000

** . Correlation is significant at the 0.01 level (2-tailed).

As can be seen in table 6, the correlation coefficient of perceived risk and brand loyalty is 0.412. The significance level is 0.000 (< 0.05), which indicates there is a relationship between perceived risk and brand loyalty. Because of the perceived risk in the questionnaire 1-5 varies from high to low, and brand loyalty measurement 1-5 varies from low to high. it was verified that to reduce the consumers' perceived risk has positive influence on cultivating the consumer's brand loyalty after product harm crisis, H8 is verified; Similarly, the correlation coefficient of perceived risk and purchase intention is 0.421, the significance level is 0.000 (< 0.05). After product harm crisis, to reduce the consumers' perceived risk can strengthen the consumer purchase intention, H9 is verified. The correlation coefficient of brand emotions and brand loyalty is 0.692, the significance level is 0.000 (< 0.05), which indicates that deepening consumer brand emotion has positive influence on cultivating the consumer's brand loyalty, H6 is verified. The correlation coefficient of brand emotions and purchase intention is 0.586, the significance level is 0.000 (< 0.05), which indicates there is very strong positive correlation between brand emotions and purchase intention, H7 is verified; The correlation coefficient of

Brand trust and brand loyalty is 0.463, the significance level is 0.000 (< 0.05), that indicates enhancing consumer brand trust has positive influence on cultivating consumer's brand loyalty, H4 is verified; The correlation coefficient of brand trust and purchase intention is 0.533, the significance level is 0.000 (< 0.05), which indicates that there is very strong positive correlation between brand trust and purchase intention, H5 is verified.

5 Conclusion

Based on previous literature research, this paper discussed how enterprise network response influence consumers' purchase intention and brand loyalty when product harm crisis happened. Through the empirical research, related data confirmed that brand trust and brand emotion are higher than no positive response if the enterprise took positive response measures after the occurrence of crisis; risk perception is less than no positive response. In addition, this paper also confirmed that reducing consumer perceived risk, improving consumer brand trust and brand emotion can promote consumers purchase and brand loyalty in a certain extent.

Facing product damage crisis, enterprise doesn't need to be panic or ignoring. The enterprise takes positive response measures by internet, so avoiding consumer panic a wide range in time, reducing consumer perceived risk. And enterprise's apology description, recall or other active measures will not only enhance consumer confidence, but also strengthen enterprise brand of emotion, and promote consumer brand loyalty and purchase intention.

Although this paper drawn some conclusion, it still has some limitations. First, this paper research object is defensible product damage crisis events. The applicability of indefensible product harm crisis has yet to be further verified. Second, this paper researched a single enterprise' product harm crisis, but did not consider the industry product harm crisis phenomenon, such as "Shanxi old vinegar" event and "drunkard wine" event which influenced the industry development.

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A Research on the Strategies of Intellectual Property Protection Based on the View of Knowledge Management

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Abstract: when knowledge has become the most valuable asset of an enterprise, and been embedded into the core competence, intellectual property management then turn into a indispensable component of enterprise knowledge management aimed at obtaining and sustaining high profit. This paper clarifies the essence of knowledge management and intellectual property, analyzes the existing problems in knowledge management and intellectual property protection, and then proposes the strategies of intellectual property protection based on the view of knowledge management.

Key words: Knowledge management; Intellectual property; Property rights strategies; Solutions

The time comes to the 21st century, it is the era of knowledge economy, knowledge management emerges as the times require, and the intellectual property has been indispensable, the three penetrate into each other, interacts with each other, promote each other and develop together into the mainstream under the condition of high technology^[1]. Knowledge and information has gradually leveled with human resources, funds as the third important strategically resource. Enterprises employ knowledge as products, and protect their own rights and interests using knowledge as well, which is the fundamental goal of knowledge management, of which the objective is to maximize the value of intellectual property in order to obtain sustainable competitive advantage^[2]. Under the background of knowledge management, to carry out the protection strategies of intellectual property display much importance.

1 The Essence of Knowledge Management and Intellectual Property

1.1 Knowledge management

Knowledge management is defined as the management of information and human jointly, knowledge management is to combine the information processing capacity and human's innovative ability in order to better accustom the organization to the business environment^[3]. It is a brand new management mode, and an irrevocable outcome of the development of the market-oriented economy. Knowledge management is a major step to exhibit human ability and intellectual human resources, say, the information technology, market expectation, economic strategy and operating strategy, etc., and integrates them sharply, quickly and efficiently, to make them play a active role in maintenance and development of the competitive advantages of enterprises in the condition of a fierce market competition^[4].

From the view of enterprises, the aim of knowledge management is to enable the knowledge to create more value, hence to promote the management quality of the business operation, increase business profit, enhance business core ability, help businesses grow sustainably and healthily. The details include solving problems, setting strategic plan, protecting knowledge property, obtaining commercial information, enhance the adaptive capacity. From the view of the society, the aim is to promote knowledge innovation.^[5]

1.2 Intellectual property

Intellectual property is the knowledge asset protected by the law, and is a vital component of the knowledge asset, hence it is also called intellectual property asset. Since knowledge asset is a codified knowledge and the material form of the enterprise core ability, enterprises are always actively pursuing proper ways to protect knowledge asset in order not to be imitated by the competitors. The realization of this aim relies on the intellectual property. The forms of knowledge assets are various, while the core part is the knowledge with the property rights. The existences of intellectual property system not only render the knowledge asset protection by law, and also convert the intellectual property into a form of asset.

In the condition of knowledge economy, knowledge becomes capital, and knowledge asset is a important component of knowledge capital, while intellectual property is knowledge asset with property rights and a very important knowledge capital, see in figure 1. According to the core capability-based theory of the firm, we could find that intellectual property also has the three fundamental features which constitute the core capability of the firm, which are the attribute of value, the attribute of asset, and the

attribute of knowledge [6].

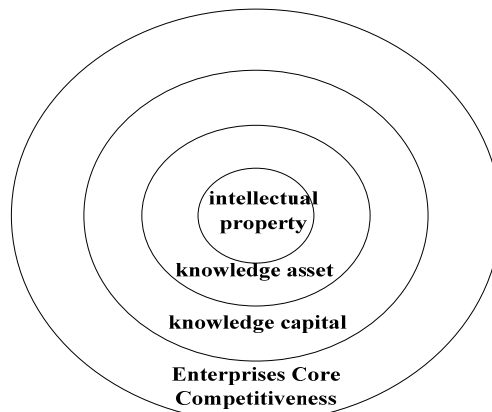


Figure 1 The Relations Between Intellectual Property, Knowledge Asset and Knowledge Capital

From the view of business administration, the first is the general term of intellect production rights that include copyrights, trademark rights, rights of invention, rights of discovery, business secrets, business names, geographical indication, etc., which is the civil rights enjoyed according to law by the human based on the outcomes of intellectual activities and experience from the operation activities. The first has five features, which are intangibility, statutory, exclusiveness, timeliness and territoriality [7].

1.3 The comparison between the first and the second

The first is an important content of business tow. Business tow is a management mode that businesses obtain, use, store, promote and transfer knowledge and intellect. Merely from the definition, the two have no significant correlation; however, from the analysis based on different angles, we can conclude that the two have connections and distinctions [8]. See in the table 1.

Table 1 Compare with Intellectual Property of Knowledge Management

	project	intellectual property	knowledge management
connection	common goal	Promote knowledge innovation	Promote knowledge innovation
	Interco ordination	Intellectual property rights protection use flexibility personal knowledge management	Knowledge management is the foundation of establishing intellectual property rights protection mechanism
difference	range of knowledge	Focus on explicit knowledge	Focus on tacit knowledge
	management technology	Using legal means to protect intellectual property Use technology to manage the enterprise intangible assets Using management implementation of intellectual property rights	Scattered in different link in enterprise human resources management all kinds of information technology market analysis and business strategy such as harmonious and unified
	fundamental function	Solve the problem of knowledge of use promote knowledge innovation	Market-oriented to promote knowledge innovation knowledge application
	Mechanism	Balance of interests legal contract	Values interests balance
	market access	Market value through knowledge possession	Through guidance to promote knowledge sharing knowledge into the market

2 The Existing Problems in The Second and Protection of the First

2.1 Business one management awareness weak

It is the premise of the first management that the businesses are aware of the importance of the first. Currently, the most businesses still have weak the first awareness, which has a significant correlation with the economic policy our country has been applied. Many enterprises are misled by the situation of large volume of China’s market, pursue blindly the factors like market, channels, prices, etc., ignore the care for core technologies, and hence pay a high price. Most enterprises have not established specific agents that manage the first so that some specific affairs about the first management and protection can not be solved timely, which cause the enterprises can not make quick response to newly emerging technological achievements in the market and bring the enterprises tremendous economic loss [9].

2.2 Lack of proprietary one right and core technologies

In our country, many research staff once get some achievements in invention and creation, they will first consider to publish papers, achievement appraisals, award applications, instead of seeking for the first protection. According to a certain statistic, each year our country have about thirty thousand significant science and technology achievements, but only ten thousand of which have been applied patents for. Take Jiangsu Province as an example, there are around 50000 enterprises with output value over CNY 5 million, and a total patent applications of 3889 cases with an average value of 0.07 cases per enterprise. There are 1438 high-tech enterprises, and 1618 patent applications with an average value of 1.12 case per enterprise. Contrary to this phenomenon, many foreign enterprises apply for a large number of patents, many of which have been the core technologies in certain industries. They employ the strategy of the first in advance so that imposes heavy restrictions on our country's enterprises.

2.3 Weak institutional framework, system construction, personnel allocation and strategies

The developed counties have been increasingly enhancing the protection of the first and the second, lifting considerably the level of the first protection, establishing and carrying out the second and the first strategies, advancing transformation of international the first rule vigorously. Their purpose is to serve for their economic development, and maintain their great power status and global influence. Meanwhile, the United States, Europe and Japan have intent to counter the developing countries including China through carrying out the first strategy. And the western countries have always had conspire to contain China's development, so these factors integrally threaten and put heavy pressure on our country. We have to be sensitive to the new situation of international the second and the second developments, particularly the basic trends that the developed countries are doing in the second and the first, in order to correctly seize the macro trend of the international the first system transformation and know ourselves. After the over-three-decade development process, we have accumulated our own experience, start to display our unique features, hence we could not simply copy the foreign measures. Therefore, enhancing the first and the second protection, carrying out the first strategy, developing the full potential of the role of the first system in business development, boosting the business technological innovation, accelerating researching the products with proprietary the first rights, and strengthening the international competitiveness, have been the urgent task of our enterprises. The enterprises should take the first and the second protections serious, must break the normal procedure and leap forward, and build and development the first protection strategies under the knowledge management as soon as possible.

3 Intellectual Property Protection Strategies Based on the View of Knowledge Management

3.1 Patent strategies is an important component of enterprise 1 strategy

Enterprises patent strategy means enterprises use the features and functions of patent and patent system to seek for the competitive advantage. It can be divided into two strategies, which are aggressive patent strategy and defensive patent strategy. The aggressive patent strategy means the strategy the enterprises employ to apply for patent rights more positively and actively in order to obtain initiative in the fierce market competition and reward the enterprises more economic benefit. The defensive patent strategy means the strategy the enterprises employ to defend themselves against loss when other enterprises wage patent attacks or other enterprises' patents impede their operation.

3.2 Apply trademark strategy, promote enterprise competitive advantage

Trademark is an important intellectual property pertaining to the survival and development of an enterprise, and is used by the manufacturers and services provide to distinguish their goods and service from those of others. Since the trademark law was published in 1992, the trademark work has made great achievements. The number of trademark registration per year is several hundred thousand. Foreign companies pay more attention to the trademark registration in China; hence market competition aroused by trademarks has been increasing fierce in our country. However, from the development of the enterprises of our country, trademark does not play an important role in the consideration of business operation. The first problem is that enterprises register not so many trademarks, and the second problem is that enterprise is not willing to maintain and carry forward the trademarks they possess. The enterprises in Jiangsu Province have also had such problems. For instance, Nanjing Guan shengyuan's overdue filling let the reputation of the nationwide Guan shengyuan brands impaired; Suzhou Xiang Xuehai was sold at a low price of only CNY1.04 million, such cases imply that the enterprises pay no enough attention to trademark management. The enterprises should actively apply for trademark registration both at home and abroad according to their technology realm and product categories to carry

out the trademark strategy. In activities like joint venture and cooperative production, the enterprises should pay attention to the protection of the existing trademarks and identify the real value of the intangible assets, meanwhile the enterprises have to maintain their own trademark reputation, and protect the domain names correlated with their trademarks and enterprise names^[10].

4 Conclusion

With the advent of knowledge economy, economic competitiveness has been weakened in traditional areas, and knowledge displays increasing importance and becomes the indispensable condition for business innovation, and this intangible asset will be the most valuable form of asset in 21st century. Enterprises must learn to protect themselves using the first law, and establish and carry out the first strategy, if they want to compete in the future world competition. Through collection and research of the first information and relevant information, businesses obtain relevant technology development information, market competition information, and law information, predict the trends of relevant technologies and economic development, and win the initiatives of the first competition and the whole market competition.

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Study on the Correlation Between Informationization Construction and Knowledge Transformation in Chinese Enterprises *

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Abstract: In order to reveal the incentive functions of enterprise informationization (EI) construction during the process of knowledge transformation, the structure equation modeling (SEM) is used in this paper. By model deduction, research design and model verification, the SEM can effectively reveal the correlation between informationization construction and knowledge transformation in Chinese Enterprises. For illustration, the collected copies are 300 enterprises, in which 271 copies are valid. The empirical results show that the reliability and validity in the information construction measurement model are quite well and the reliability and validity in the knowledge transformation measurement model are also quite well. The empirical research has revealed the EI-related microcosmic mechanism in the process of the knowledge transformation, which can provide the effective theoretical references and support for enterprises to further strengthen the informationization construction and raise the efficiency of the knowledge transformation.

Key words: Informationization; Knowledge transformation; Socialization; Structural equation model

1 Introduction

The knowledge transformation was firstly made by Japanese scholar Ikujiro Nonaka (Nonaka) in 1995, which referred to the internal conversion process between the tacit knowledge (belief, metaphor, intuition, knack and thinking patterns) and the explicit knowledge (knowledge of formatted dissemination with the standard and systematic language) in business management ^[1]. In Nonaka's vision, the knowledge transformation consisted of four stages such as socialization, externalization, combination and internalization. The socialization referred to the transformation between the tacit knowledge. In the first stage, each person's tacit knowledge was converted to tacit knowledge now also held by other members, who can make the communication each other through sharing experience, exchanging experience, and discussing idea or opinions in the micro community. Externalization meant the transformation from the tacit knowledge to the explicit knowledge. The body of knowledge can make the tacit knowledge apparent with the defined concept and the language through such ways as metaphor, analogy and model and so on. Combination referred to the transformation from the explicit knowledge to the explicit knowledge. At the third stage, this newly explicit knowledge became widely disseminated, discussed, redesigned and modified through document, conference, telephone discussion and electronic exchange. Potential customers, potential suppliers as well as the company CEO may all get involved. Internalization meant the transformation from the explicit knowledge to the tacit knowledge. Internalization converted the changed, explicit knowledge was converted into the tacit form by many people such as a product or a service ^[2].

2 Research Model Deduction

2.1 Elements design

According to research results of the literature ^{[3][4]}, EI construction system can be divided into four essential factors such as the information infrastructural construction, the application of information system, the cultivation of the information human capital and the information strategy management, which can reflect the comprehensive conditions of EI construction in China.

The information infrastructural construction refers to the maintenance, the transformation and the promotion of EI system, which is related to software systems (system software and application software), hardware systems (central processing unit, storage device, output and input device), and peripheral

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support systems (converter, router and transmission line). Being the primary factor of raising the efficiency of the information system, the application of the information system means the use, the development and the excavation in enterprises. Being the important factor of deciding the information efficiency, the cultivation of the information human capital refers to the development, the training and the motivation of human resources of the specialized information technology. The information strategy management means the design, the implementation, the feedback and the adjustment of overall plans relation to the information construction and the trend of development, which can manifest the platform function of the information technology from the perspective of the enterprise development strategy.

The four links of knowledge transformation have an effect on the knowledge transformation; however the effect has the big randomness and the uncertainty, which can mainly change along with the various factors' changes in the internal and external environments.

The information infrastructural construction has provided the essential technological means and the material base for the knowledge transformation so that persons can deal with kinds of knowledge transformation with the aid of the information tool. The information system application has provided the most direct service platform for information transformation so as to enhance the process standardization and optimize the flow process of the knowledge transformation. The cultivation of the information human capital has enhanced the application scope, the breadth and the depth of the information technology on a large scale. The information management strategy has carried on the scientific plan to information construction and the trend of development in enterprises to save the cost of information operation, enhance the rationality of the information investment layout, which can provide the strategic guarantee for the comprehensive enhancement to the knowledge transformation efficiency.

2.2 Theoretical analyses and hypotheses

According to the above theoretical analysis, the hypotheses of the empirical research can be seen in Table 1.

Table 1 Research Hypotheses

Hypothesis name	Path representation	Hypothesis contents
H1a	$\xi_1 \rightarrow \eta_1$	Chinese enterprise information infrastructure construction promotes the efficiency of the socialization of knowledge.
H1b	$\xi_1 \rightarrow \eta_2$	Chinese enterprise information infrastructure construction promotes the efficiency of the knowledge externalization.
H1c	$\xi_1 \rightarrow \eta_3$	Chinese enterprise information infrastructure construction promotes the efficiency of the knowledge combination.
H1d	$\xi_1 \rightarrow \eta_4$	Chinese enterprise information infrastructure construction promotes the efficiency of the knowledge internalization.
H2a	$\xi_2 \rightarrow \eta_1$	In Chinese enterprises the application of the improved business information system promotes the efficiency of the socialization of knowledge.
H2b	$\xi_2 \rightarrow \eta_2$	In Chinese enterprises the application of the improved business information system promotes the efficiency of the knowledge externalization.
H2c	$\xi_2 \rightarrow \eta_3$	In Chinese enterprises the application of the improved business information system promotes the efficiency of the knowledge combination.
H2d	$\xi_2 \rightarrow \eta_4$	In Chinese enterprises the application of the improved business information system promotes the efficiency of the knowledge internalization.
H3a	$\xi_3 \rightarrow \eta_1$	The cultivation of Chinese EI human capital promotes the efficiency of the socialization of knowledge.
H3b	$\xi_3 \rightarrow \eta_2$	The cultivation of Chinese EI human capital promotes the efficiency of the knowledge externalization.
H3c	$\xi_3 \rightarrow \eta_3$	The cultivation of Chinese EI human capital promotes the efficiency of the knowledge combination.
H3d	$\xi_3 \rightarrow \eta_4$	The cultivation of Chinese EI human capital promotes the efficiency of the knowledge internalization.
H4a	$\xi_4 \rightarrow \eta_1$	The improvement of Chinese EI strategy management promotes the efficiency of the socialization of knowledge.
H4b	$\xi_4 \rightarrow \eta_2$	The improvement of Chinese EI strategy management promotes the efficiency of the knowledge externalization.
H4c	$\xi_4 \rightarrow \eta_3$	The improvement of Chinese EI strategy management promotes the efficiency of the knowledge combination.
H4d	$\xi_4 \rightarrow \eta_4$	The improvement of Chinese EI strategy management promotes the efficiency of the knowledge internalization.

3 Research Design

3.1 Enterprise information index system design

According to research results^{[3][4]}, the following index system of the measurement model design can be drawn, which is combined with the feasible practice in enterprises.

The information infrastructural construction can be divided into four measurement indexes such as the rational information investment (X1), enterprises' local network quality (X2), database performance (X3) and system maintenance (X4). The rational information investment refers to the distribution rationality of the investment projects including software, hardware, and personnel assignment and so on. The quality of enterprises' local network refers to the perfection of the interior network system in enterprises. The database performance refers to a series of functions such as the data message memory, the filtration, the classification and the conformity of enterprises' database. The system maintenance refers to the examination, the monitor, the promotion and the transformation ability of EI system.

The information system application can be divided into four measurement indexes such as business process reengineering (BPR) (X5), customer relationship management (CRM) (X6), the policy-making support (X7) and the electronic commerce construction (X8). The BPR refers to the renewal and the adjustment of the original business process by means of information technology. The CRM refers to the excavation of the latent commercial value of the customer information with the help of information technology. The policy-making support is to make the management decision of different levels on the strength of the superiority of the information technology. The electronic commerce construction refers to the various commercial activities on the basis of the information technology.

The cultivation of the information human capital can be divided into four measurement indexes such as informationization training investment (X9), informationization specialists proportion (X10), multi-talented ratio (X11) and staff's information ability (X12).

The information strategy management can be divided into four measurement indexes such as system planning (X13), strategic guidance (X14), strategic layout (X15) and function management (X16).

3.2 The index system design of knowledge transformation

According to research results, the index system of knowledge transformation concerning the measurement model can be designed.

The knowledge socialization (↑1) can be divided into four measurement indexes. There existed the harmonious work atmosphere where the staffs can learn and help each other in enterprises (Y1). The decision-maker holds that it is important for enterprises' departments to strengthen communication and cooperation from a long-term point of view in enterprises (Y2). The staffs are willing to pass their own experience and skills on to others for enterprises' long-term benefits (Y3). The enterprise pays great attention to absorbing the competitors-related superiority and advantage (Y4).

The knowledge externalization (↑2) can be divided into four measurement indexes. The enterprise frequently encourages the staffs to sum up their own skills and the experience (Y5). In the organizational structure of enterprises there is the perfect experience promotion mechanism (Y6). The staffs are willing to format the individual skills and experience (Y7). The enterprise pays great attention to propagandizing and encouraging the outstanding achievements (Y8).

The knowledge combination (↑3) can be divided into four measurement indexes. There is the higher application efficiency insider information system in enterprises (Y9). There is sharing database with the stronger performance (Y10). The enterprise encourages various departments to make the reorganization and the adjustment of the accumulated work experience, the administrative regulations, and the technical process and so on (Y11). In enterprises the departments pay great attention to collecting related materials and data in terms of the business process (Y12).

The knowledge internalization (↑4) can be divided into four measurement indexes. The enterprise pays great attention to the enhancement of staffs' service skills and the establishment of a set of effective mechanisms (Y13). The enterprise pays great attention to the construction of enterprise culture (Y14). The enterprises provide sufficient incentive to the internal BPR (Y15). The enterprise pays great attention to the construction of the learning organization (Y16).

3.3 The establishment of research model

According to two index system designs, the structural equation model is shown in Figure 1.

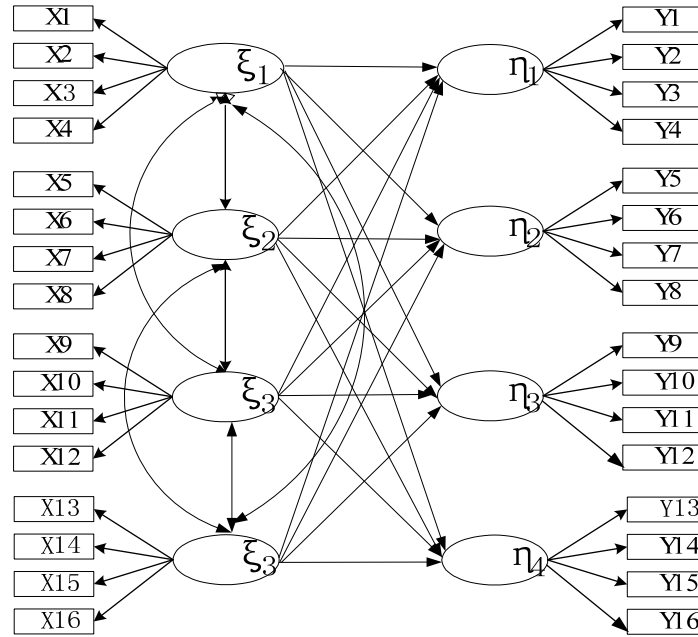


Figure 1 Structural Equation Modeling

4 Model Verification

4.1 Technical thinking

Based on sixteen cause-effect relationship hypothesis, the structural equation modeling is put forwards to verify the authenticity of the theory supposition and influence scope [5]. The structural equation modeling is related to four extraneous source variables ($\xi_1, \xi_2, \xi_3, \xi_4$), sixteen extraneous source targets (X1 to X16), four endogenous variables ($\eta_1, \eta_2, \eta_3, \eta_4$), sixteen endogenous targets (Y1 to Y16), sixteen cause-effect relationship as well as six related paths. Optimal model can be obtained through the effect matrix (τ), the effect matrix (β), the extraneous source variable covariance matrix (ϕ), the extraneous source variable factor load matrix (Λ_x), the endogenous variable factor load matrix (Λ_y), the extraneous source target variance matrix (Θ_ϵ), the endogenous target variance matrix (Θ_δ), the model residual covariance matrix (ψ), and kinds of fitting index and so on. By means of the optimal model, the path coefficient significance, the factor load significance, and the factor error variance significance can be estimated scientifically, which can finally fulfill the confirmation of above theoretical supposition.

4.2 Data collection

In the paper there are 300 samples resulting from enterprises' database in a consultant company. These samples come from 11 provinces, cities or autonomous regions including Beijing, Tianjin, Shanghai, Chongqing, Henan, Anhui, Jiangsu, Zhejiang, Shanxi and the Inner Mongolia Autonomous Region and so on. By the aid of electronic questionnaire, mail questionnaire, telephone interview and face-to-face talk with 300 investigation objects, the author seeks the data support from the senior managerial personnel such as CEO, CIO and CKO and so on in enterprises. There are 271 effective sample data, and the effective rate of collection is 90%, which has satisfied the requirement that the sample returns ratio is not less than 20%.

4.3 Analysis on reliability and validity

4.3.1 The reliability and validity analysis on the measurement model concerning information construction

The exploring factorial analysis results show that Alpha coefficient and half-value respectively is 0.9231 and 0.8860 in measurement model concerning information construction and the factorial analysis results in the accumulation explanation quantity is 81%. In the information infrastructural construction the intrinsic consistency check coefficients of four indexes are 0.7239. In the information system application the intrinsic consistency check coefficients of four indexes are 0.7169. According to the confirmation factorial analysis results indicate that the minimum value of 16 factor loading is 0.52, the maximum value of 16 factor loading is 0.89, the smallest T value is 2.17, NNFI=0.951, CFI=0.970,

RMSEA=0.044, $\chi^2(98) = 133.46$. Obviously, results of the reliability and validity in the information construction measurement model are quite well.

4.3.2 The reliability and validity analysis on the measurement model concerning knowledge transformation

The exploring factorial analysis results show that Alpha coefficient and half-value respectively is 0.8091 and 0.7255 in the measurement model concerning knowledge transformation. In the knowledge socialization the intrinsic consistency check coefficients of four indexes are 0.8282, and the relevance and Alpha coefficient do not change obviously. In the knowledge externalization the intrinsic consistency check coefficients of four indexes are 0.8309, and the relevance and Alpha coefficient do not change obviously. The confirmation factorial analysis results indicate that the minimum value of 16 factor loading is 0.58, the maximum value of 16 factor loading is 0.92, the smallest T value is 2.08; NNFI=0.931, CFI=0.900, RMSEA=0.032, $\chi^2(98) = 147.54$. Obviously, results of the reliability and validity in the knowledge transformation measurement model are quite well.

4.4 Model checking

By aid of SPSS11.5 and LISREL8.7, the effect matrix (γ) is shown in Table 2.

Table 2 Effect Matrix

Exogenous variables	Inner variables	Path assumption	Load coefficient	SE	Tvalue
Infrastructure construction	Knowledge socialization	$\xi_1 \rightarrow \eta_1$	0.39	0.09	4.37
Infrastructure construction	Knowledge externalization	$\xi_1 \rightarrow \eta_2$	0.18	0.07	2.43
Infrastructure construction	Knowledge combination	$\xi_1 \rightarrow \eta_3$	0.23	0.07	3.21
Infrastructure construction	Knowledge internalization	$\xi_1 \rightarrow \eta_4$	0.19	0.11	1.75
Application of information system	Knowledge socialization	$\xi_2 \rightarrow \eta_1$	0.24	0.08	3.00
Application of information system	Knowledge externalization	$\xi_2 \rightarrow \eta_2$	0.28	0.09	3.10
Application of information system	Knowledge combination	$\xi_2 \rightarrow \eta_3$	0.45	0.09	5.01
Application of information system	Knowledge internalization	$\xi_2 \rightarrow \eta_4$	0.17	0.10	1.70
Cultivation of human capital	Knowledge socialization	$\xi_3 \rightarrow \eta_1$	0.41	0.12	3.66
Cultivation of human capital	Knowledge externalization	$\xi_3 \rightarrow \eta_2$	0.27	0.09	3.00
Cultivation of human capital	Knowledge combination	$\xi_3 \rightarrow \eta_3$	0.15	0.12	1.33
Cultivation of human capital	Knowledge internalization	$\xi_3 \rightarrow \eta_4$	0.76	0.13	5.87
Information strategy management	Knowledge socialization	$\xi_4 \rightarrow \eta_1$	0.33	0.08	4.01
Information strategy management	Knowledge externalization	$\xi_4 \rightarrow \eta_2$	0.15	0.09	1.78
Information strategy management	Knowledge combination	$\xi_4 \rightarrow \eta_3$	0.32	0.08	4.00
Information strategy management	Knowledge internalization	$\xi_4 \rightarrow \eta_4$	0.46	0.11	4.18

The shaded areas indicate the path coefficient parameter which has been picked out in the process of model revision.

The model fitting index tabulation is seen in Table 3 (revision) simultaneously.

Table 3 Fitting Index Tabulation

Fitting index	Df	CHI-Square	RMSEA	NNFI	CFI
Index current value	410	674	0.030	0.922	0.901
Optimum value trend	—	Smaller is better	<0.08	>0.9	>0.9

Therefore, the model's fitting effect is good so that model revision does not need to be made [6]. (Other related confirmation results are omitted here).

5 Conclusion

From the information construction's angle, the enhancement of the efficiency of the knowledge internalization lacks the significant promotion although both the information infrastructural construction and the information system application have made the efficiency promotion of the knowledge socialization, the knowledge externalization and the knowledge combination to a certain extent. The information human capital cultivation has made the efficiency promotion of the knowledge socialization, the knowledge externalization and the knowledge internalization to a certain extent, but the enhancement of the efficiency of the knowledge combination lacks the remarkable stimulation. The information management strategy has made the efficiency promotion of the knowledge socialization, the knowledge combination and the knowledge internalization to a certain extent, but the enhancement of the efficiency of the knowledge externalization lacks the significant promotion.

From the perspective of knowledge transformation, the enhancement of the efficiency of the knowledge socialization stems from the promotion of the information infrastructural construction, the information system application, the information human capital cultivation and the information strategy management. The enhancement of the efficiency of the knowledge externalization derives from the promotion of the information infrastructural facilities, the information system application and the information human capital cultivation. The enhancement of the efficiency of the knowledge combination originates from the promotion of the information infrastructural facilities, the information system application and the information management strategy. The enhancement of the efficiency of the knowledge internalization stems from the cultivation of the information human capital and the promotion of the information management strategy.

The model's fitting effect is well on the basis of the fitting index tabulation. Therefore, the information construction has promoted the efficiency of knowledge transformation in Chinese enterprises to a certain extent.

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Study on the Local Government Project Promotion Strategy from the View of Investment and Financing Management

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Abstract: The project promotion strategy has already become a sharp weapon for the local government to develop local economy, gathering essential factors of production by the project promotion, giving impetus to the growth of investment by the project promotion, transforming government functions by the project promotion, enhancing the comprehensive competitiveness and reserved strength for economic growth. Thesis will be to analyse the project promotion strategy of the local government from the view of investment and financing management. The aiming at to Combined with the local actual and conduct scientific and rational analysis, exploring and enriching the theories of investment and financing management of the local government.

Key words: Project promotion; Investment and financing management; Regional economical development; Local government

1 Introduction

During the periods of "Eleventh Five-Year Plan for National Economic and Social Development", the local government takes highly of the implementation of the central policy for expanding domestic demands, closely seizes the historical opportunity that central government promoting regional economic development, and grasps the turning point of the country imposes 4,000,000,000,000 economical stimulation plan under the background of global financial crisis, takes the project as the guidance, with the aid of investment and financing platform, expands the investment scale, promotes the optimization of investment structure gradually, improve investment benefit. However, dose the project promotion only a slogan or an economical strategy adapts to Chinese national conditions? What is the relationship of the local government's investment and financing management which discusses hotly and it? Dose the local government implement project promotion strategy a rational choice or follows blindly? Can the project promotion become a kind of effective pattern to impel the local economy development? So far, researches about "project promotion" are really few. Therefore, this article will carry on scientific and rational analysis from the local conditions, exploring and enriching the investment and financing management theory of the local government, expected to instruct project promotion practice of the local government.

2 Analysis on the Economic Intension of Project Promotion Strategy

2.1 Project promotion is a pattern of investment and financing management leading by the government

The investment refers to the utilization process of the capital, while financing refers to the collection process of the fund. As for a concrete economic entity, the investment and financing are simultaneously exist. The goal of investment and financing is to realize the value of capital, and in a sense, the value of capital is to pursues the profit, thus realize the hedge and increase of capital. The investment and financing management refers to the process of policy-making, plan, organize and control to investment and financing activities. The local government investment and financing management is local government collect funds through multi-channel and multi-form, and guide the social idle capital to the weak links and the key areas of the economic society development which the central government plays a leader role. It mainly includes the infrastructure construction domain, the livelihood construction domain, the technical research and development domain, the human capital development and the cultivation domain as well as the high tech development domain, etc. And it mainly solve the problem of the public product, approximate public product supplies insufficiency and the problems related to important project and the key project construction's needs of national economy and livelihood. This is a concept expands from the government investment and financing, which means the government collect funds through finance and the credit method, and adopts the investment or the financing way to assign the funds among the department, the enterprise or the institution which urgently need development to realize certain goal of industrial policy and other policy. However, under our country's existing system,

the local government's property rights and governance is asymmetrical; The market economy is not mature and imperfect; The regional economy development is imbalanced, all entrusts local government with more economical functions. At present the economic construction expenditure take up nearly 30 percent of the government expenditure in our country^[1]. The local government can play a critical role in promoting the local economy, regardless of the national conditions or the actual need. Zhong Pengrong called it the official compels people to be rich, and each local conditions also demonstrate the project promotion, the attract bid for invite investments are the most important. The local government's investment and financing management is not to limit to the public infrastructure construction aspect, but pay more attention to the project, the industry and innovation which in favor of the economy growth. Therefore, the local government's investment and financing management is supposed to be a broader concept, which contains not only the government invest and finance directly, but also the management of local government's investment and financing behavior.

2.2 Project promotion is an important way to speed up the transformation of economy growth mode.

The project can be an important engine to drive the city and the local economy growth, and also an important way to speed up the economy growth mode transformation. Input project promotion in baidu encyclopedia search column, demonstrated 760 entries involves the province, the city, the county, the town all levels of local government. The project promotion has become a proper noun which widely used in local government's work report, becomes the effective device for the local government to develop local economy. The project has the division of big, medium and small, has division of scientific research item and the industrial project, the attract bid for invite investments project, the national, provinces and cities industrial policy project, the project which the monetary fund gives full support and etc, but the local government cares more about the project which can impel the local economic development. The author consider that, the project promotion refers to the local government carry on the economic activity of investment and financing management which take the project as the guidance in order to develop the local economy and local resources.

2.3 The project is an important carrier to support the government's invest and finance behavior

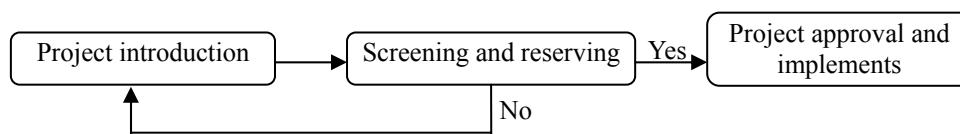


Figure 1 Project Promotion Flow Path

Considering the local practices, the main method of the project promotion is to attract bid for invite investments, for instance, the majority of local government implement the project promotion strategy primarily depend on attract bid for invite investments. The government of Hangzhou, the central area of Zaozhuang, Le'an County in Fuzhou explicitly proposes the implementation of project promotion and strengthen attract bid for invite investments in the government work report of year 2012. The goal of the project promotion is to stimulate economic growth, the Chong Ren County's government work report of year 2012 advanced, directs the project by opens, expands the investment by the project, guarantees the growth by invests, which fully explained relations between the project, the investment and financing behavior and grows, and concluded the economical growth is the foothold of the project promotion. The project promotion flow path including three processes which are the project introduction, screening and reserving, initiating a project and the project implements, as shown in figure 1. This is in accordance with the conclusion of the six stage pattern during the investment decision-making process which proposed by Fried and Hirsch after their empirical investigation. It includes the origin of investment plan, direction screening of the venture capital, comprehensive screening, the first stage appraisal, the second stage appraisal and Deal (including foundation and negotiations)^[2]. The standards which widely used in appraising the project promotion are investment and financing activity as well as its scale. There were 1662 significant basic construction items which above hundred million Yuan in 2010 Hunan, and the planned total investment reached 1,140,000,000,000^[3], and took the proportion of significant basic construction items occupies the total project as the standard to weigh the regional economy. He Nan Province established the big project office to put forward the management measures of the key construction project, explore the establishment of comprehensive valuation system for attract bid for invite investments, and enhance the quality of attract capital. Thus it can be seen, the core of project

promotion is investment and financing management. The project promotion is a kind of pattern of the local government's investment and financing management, combining the investment behavior and the government instruct enterprises financing together closely with the carrier of project.

3 Valid Analysis That the Project Promotion Avoids the Risk of Government'S Investment and Financing

3.1 Risk analysis from the investment and financing of the local government

The local government's investment and financing platform has become the most actively and noticeable financing main body, since our country implemented the positive financial policy and the moderate loose monetary policy to deal with the international financial crisis in November, 2008. However, the impulse to invest of the local government inflates continually, and the local government's debt scale and the risk accumulated ceaselessly. The local government's investment and financing platform performed many, mixed and disordered in quantity. 6576 investment and financing platforms have been set up around the whole nation till 2012 year's end, among which 3243 were stressed on financing function of government's construction items and 1173 combined financing function with investment function of the government's construction items, as shown in Table 1. The local government's investment and financing platform is large in scale, the remaining sum of company's government debt on the financing platform was 4,971,068,000,000 Yuan in the end of 2010, account for 46.38% of the remaining sum of the local government debt. The channel of financing is unitary, the loan increased 9,590,000,000,000 Yuan in 2009, increased 4,690,000,000,000 Yuan over the same period of the previous year. The financing amount of banks accounted for nearly 40% of the additional loan amount, and the total quantity was nearly 3,800,000,000,000 Yuan. The profit ability of local government's investment and financing platform is quite bad, the ability to meet the debt is insufficient. For instance, 358 companies serve the 105,971,000,000 Yuan debt which government have obligation of warranty and other correlation through the way of borrow new and repay the old, the average ratio is 55.20%, and 148 companies have over due debt 8,004,000,000 Yuan, the average ratio has reached 16.26%^[6].

Table 1 Government financing platform function and distribution

The total number of financing platform	Distribution platform of all levels		Financing platform function and platform number	
			Financing function	Platform number
6576	Province	165	Give priority to the government construction project financing	3234
	City	1648	Compatible with other investment construction	1173
	County	4763	With other business activities	2169

Moreover, the problem of idle fund is serious, up to the end of 2010, the remaining sum of disbursed government debt reached 1,104,447,000,000 Yuan. The primary reason for idle fund is that some local government float a loan blindfold, the projects and the fund do not match, trend of the investment has not carried out, the preparation is not adequate and over financing for fear of tight-money policy.

3.2 Valid analysis that the project promotion avoids the risk of investment and financing from the government

Many experts carried on analyze of the local government's debt risk and proposed suggestions. For instance, Ba Shusong(2009) advanced to impel reform on local government's investment and financing platform. The implicit liabilities should be published, the current situation of information opacity should be changed, financing behavior in local government's investment and financing platform should be marketized the bank must choose more careful risk management action to local government's financing, and liability of the local government's investment and financing should be established. The government audit report proposed to advance the cleaning up standard on the financing platform's companies continuously, prohibit local government's illegal guarantee, and promote the multiplication of investment and the consummation of the corporate governance structure. However, enhance the validity of the project can be the only way to really solve the problems exist.

The project promotion has already become an effective way for the local government to avoid risks on the investment and financing platform, after several years' exploration. The project promotion take the attract bid for invite investments as the platform and the project as the carrier, it prominent "project

guidance” function, and combine government financing behavior with investment behavior closely, drive the urban and the regional economy growth. Significant project construction can not only brings the direct benefit for the local economy development, but also may promote the necessary project construction as well as the upstream and downstream industry development, gather factors for industrial development.

4 Adaptability Analysis for Project Promotion to Local Economical Gradualness Development

4.1 Unbalancedness analysis on regional economical development

The local government make a reasonable decision should first consider the local conditions. In view of the economic situation, our country has a vast territory and large population; levels of local economy development have big difference. Given the development situation in the 11th five-year planning period, in the undeveloped area industry foundation is weak and the consciousness to start an enterprise is not thick. The undeveloped area basically have “payroll finance”, moreover, some county has heavy historical burden, and many economical resources have been at the idle condition for a long time. Considering advances from the publicized “12th five year plans”, though the Fifth Plenary Conference of Seventeenth Central Committee has given the signal that the economic growth will be suitable postponed in the “12th five year” period, but the central and the local government hold different views, particularly in undeveloped mid-west area, they still have high expectations on the economical development in the “12th five year” period. Different regions develop out-sync, and the local government faced with the different situations, especially in the undeveloped mid-west area, facing with competition of international and domestic market, development can be more difficult, but is beset with difficulties, but the ardor is very high. All this called for higher request to the local government’s investing and financing management.

4.2 Local difference analysis on project promotion strategy

In a country various areas face with similar system, but as the resources endowment various, the human resources, financial resources and the material resources which the local government can utilize have a big difference. Simultaneously, different local government may have distinctly different ideas, levels of effort and innovation abilities. The local government’s supplies function is major affected by resources factor and the potency factor. For example, some areas have projects but lack of fund, while some areas have sufficient fund but lacks the high quality projects, some areas lack of projects as well as the fund, an effective method to breaks through the bottleneck of the local development is urgently needed. This request the local government to carry on the investment and financing management reasonably, explore a economical development way which suit the local conditions positively.

Government in undeveloped areas often have to face with this problem: when projects and fund are both lacked in developing economic, government use the investment and financing platform to invest public infrastructure or financing, will inevitably result in big debt and risk. Whereas, in the developed areas, as the entity economy has developed greatly, the total quantity of urban economy is very big no matter in quantity or the scale. Thus it’s economical to make up public products’ insufficiency through the investment and financing platform. Method in Shanghai, Tianjin and Chongqing proved that the government debt problem is extremely prominent in undeveloped areas. Moreover, Li Xueqin and Fang Xianming^[7] constructed intercept changed panel data with fixed influence based on the correlative financial target data from 1998 to 2008 in seven different regions and analyze the connection between the financial support and the economical development from aspects of the bank, securities and insurance business. Conclusion can be obtained from the research that positive correlation exists between the financial support and the economical development in our country. The financial support can truly promote the economical development, but the explicit relations between financial support efficiency and the economical development does not exist, the financial support efficiency in some economical developed region even can be lower than the undeveloped areas. Therefore, the unbalanced regional economic development requests difference in the investment and financing management strategy inevitably, and the local government must make policy according to the actual conditions.

4.3 Gradual characteristic analysis on the Project promotion strategy

In different economical development stages may request for different investment and financing management and it decide that the project promotion strategy has obvious gradual characteristic.

Three stages existed in local economy development. Firstly, combine the investment with financing through the attract bid for invite investments. The attract bid for invite investments may be one way to

impel the project promotion which impelled under government's leadership. Its main purpose is to obtain the development fund, and gain advanced technology and managerial experience through project implementation. Secondly, construct the fund project platform through the utilization of investment and financing policy. Government's main function is to build good investment environment, and construct fund project platform for the enterprise. Thirdly, project promotions strategy in this stage, arrange investment project according to the local economy development need, then arrange money for the project and enhance the efficiency through combination of investment and financing. The government may mainly concentrate on the public infrastructure project.

Among the three stages in the project promotions strategy, the project promotions idea throughout, but location of the project various in different stages. The project promotions strategy is different with the project impel strategy which is driven by money, as it take the project as the core and the forerunner.

5 Conclusion

During “the 12th five year” period, the central positive financial policy and the loose monetary policy fade out gradually, and the financing environment been tightly. The supply scale and the supply rhythm of the capital supply on project are limited. Moreover, the competition between regions become seriously, and talents, capital, project resources become intense. The project promotions strategy take the project as a forerunner, the investment and financing as the platform, is adapted to the gradualness development of the economical undeveloped area. It will effectively solve the project and capital problems exist in the local development, avoid the investment and financing risks and bring about a coordinated development to regional economies.

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Small Incentive and Big Economic Fluctuation*

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Abstracts: This thesis researches the relationship among money supply, money output, and price fluctuation, basing on the enterprise motivation model, by using statistics of China from 1985 to 2008. Empirical study find the following results: If China's money supply stock follow i.i.d (independent identically distributed), the inflation rate and output volatility will be random; when China's economic grows rapidly it must be accompanied by great money supply shocks in a long term which will make inflation rate go even higher. This means to fundamentally avoid the high inflation rate when money supply shocks makes the output a upswing, it will be little returns if only use money policy. China's decision maker should pay more attention on improve workforce flexibility in order to maintain the sustained, rapid and steady development of the national economy.

Key words: Incentive; Money supply; Output; Price; Fluctuation

1 Introduction and Literature Review

Economic fluctuation means GDP fluctuates centering on macro-economy trend. Such fluctuations was called economical cycle for its cyclist. Since Burns and Mitchell put forward the specific descriptions of economic cycle, the theory of economic cycle has such a basic hypothesis that secular trend of macro-economic is stable which its average level will play the role of an axis. Such short time fluctuate of GDP which centers on the above axis is caused by economic demand. In a economic cycle, if actual economic growth is higher than average level, then the economic is in a expansion stage; conversely, it is in a cut-throat stage. Such hypothesis was adopted by Keynesian and monetarism and neoclassicism. However, we need to make economic decision before things happen, but the axis effect can only work after things happen. So there still need to be discussed in methodology if we want to find so called "cyclist style". Different people have different opinions on what caused economic fluctuation. But to my opinion, all these arguments can be classified into 3 kinds:

1.1 Result of material economic itself

On the effect of material economic to economic fluctuation, W.S.Jevons think that the cause of economic fluctuation is that agriculture industry always influenced by weather, especially by sun. the sun spot occur with constant periodicity influenced the agriculture industry, and then influenced the whole economic system. He also think that the frequency of economic fluctuation is approximately equal to that of the sunspot's occurrence. Since 80's of 20th century, the Real Business Cycle Theory of neoclassic firstly challenged the traditional economic cyclist theory from the angle of analytical procedure. They think that most changes of output are not centered on the average level but eternal. The changes of material economic caused by new technology shock are not cyclical but random. They try to combine the technology shock into the standard neoclassic model which holds that the origin course of economic fluctuation is practical factors, especially technology shock. Marxian economics holds that economic fluctuation is originally caused by the contradiction of market supply and demand.

1.2 Results of Financial factors (especially monetary factors)

There are many works discussing the effect of finance to economic fluctuation. In all of the financial factors, the monetary factors catch the most attention. So this article mainly researches the relation of monetary factors and economic fluctuation. From 1913 to 1937, English economist R. Hwatrey came up with the Quantity Theory of Money and business cycle theory which hold that is it just only monetary factors caused economic fluctuation and we can explain business cycle well just through the amount of money. The economic system influence the whole amount of output and income by creating money. The Modern Economic Cycle Theory of Fried was mostly inspired by above theory(Laidler, 1993, P.1068). Fried and Schwarz through study found that although in most years of economic boom and depression, the money stock is increasing compared with last year, however, the growth rate of money supply in depression is always lower than that in economic boom. Those 100 years they investigated in which money stock absolutely decreased are right in 6 depression period.

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What's more, those facts which causes monetary squeeze almost has nothing to do with the changes, synchronously or in advance, of the output of material economic and prices. They hold that monetary squeeze can not be the result of great depression, so monetary squeeze must be the cause of great depression. In the sme way, we can elicit that monetary expansion must be the cause of economic boom. Consequently, money stock plays a decisive role in economic cyclist fluctuation.

1.3 Results of both material economic itself and financial factors (especially monetary factors)

Lucas, from school of neoclassic reasonable expectance, combined Muth's rational expectations theory with Friesman's Natural rate Hypothesis. He holds that economic fluctuation and pursuing the maximized personal interests is not contradicts to the market clearing price system (presented by money). Because economic subject makes rational expectation on the information they thought trustworthy, the miscarriage can be vary.the random shocks which cause output fluctuation in material economic mainly are technology factors. Although Lucas's economic cycle theory doesn't deny the role of technology factors in economic fluctuation, he holds that the fluctuation is mainly caused by sudden or unexpected money supply changes. Suppose two marketing participants only know part of the market price information, they will wrongly judge the price change. Such wrongly judgment consequently makes the output and employment deviated from the average level in a long term. Then economic fluctuation was caused.

New Keynesianism holds that the cause of economic fluctuation can either be money factors or material economic. They hold that once economic deviates from average level, because of wage rigidity (efficiency wages, long term contracts and union power etc) price stickiness (represented by money), the output is hard to restore to the average level of full employment. Then economic fluctuation happens. In the 70's, 21th century, economists represented by Fisher had already started to revive Keynesianism. The pioneering work of Fisher was the symbol of the revival of Keynesianism.

J.A.Schumpeter come up with the theory of "innovation cycle" which holds that the original source of economic fluctuation is the changes of enterprisers investment timing preference in 1939. In our opinion, because an enterprise has the power to assemble capital and human resources, enterprises play a important role in economic fluctuations. The capacity of such power depends on whether enterprises can successfully incentive workforce work hard by capital at right investment time, if yes, output will be raised, if no, output will be diminished and then cause economic fluctuation. So we hold that under set investment opportunity and capital limitation, how enterprise can incentive workforce is the determining factor and solid micro-foundation of economic fluctuations.

This article established the following research framework basing on Fisher(1977)、Mankiw(1985) and Ball&D.Romer's (1990) researches: a representative monopoly enterprise, labors are homogeneous and their skills won't change in two adjacent periods, the enterprise make valid wages and choose optimal raw labor to maximize its profits. The key of this framework is the standard for enterprises to decide wages, whether wages are reasonable and does wages still depends on exogenous staggering contract. We finally find that efficiency wage model of Laffont&Martimort (2002) is suitable for our research. Efficiency wage models ask monopoly enterprisers to make a judgment on workers output. The enterprisers have to set a wage to stimulate workers work hard. Firstly, before production, the factory fix a wage which can stimulate workers to work hard. At that time the enterprises give workers their wages as expected for the production hasn't start. Secondly, the enterprise should has enough patient for the workers' work ability won't skip in two periods and workers' probability to increase yield is the same. There still will have wage stickiness. However, our conclusion still has some different with conclusions of stickiness wage model and rational expectations models. What's more, our conclusion is the direct evidence to prove that money policy can not stimulate economic, only money supply shocks and demand shocks can have real and long term effects on output and price fluctuations.

2 Wages, Incentives and Economic Fluctuations

According to Jean-Jacques Laffont & David Martimort's (2002) researches, enterprise's aim always is to maximize their profit and at the same time stimulate them to work hard. Suppose enterprisers firstly choose a wage to stimulate workers to work hard. Following are their plans:

$$\begin{aligned}
 &Max\{E_{1t}(P_t Y_{1-t_1})+(1-E_{1t})(P_t Y_{2-t_2})\} \\
 &E_{1t}t_1+(1-E_{1t})t_2-C > E_{0t}t_1+(1-E_{0t})t_2 \\
 &E_{1t}t_1+(1-E_{1t})t_2-C > 0
 \end{aligned}
 \tag{1}$$

Y₁ stands for the high output when workers work hard. Y₂ stands for the low output when workers work hard. P_t stands for the price in the t period, t₁ stands for the wages hard workers can get. t₂ stands

for the wages idle workers can get. E_{1t} stands for the probability workers produce Y_1 in term t_1 , E_0 stands for the probability idle workers produce Y_2 , C stands for the costs hard workers.

The wages enterprisers give to workers can be deduced as formula (2) and (3). It shows the wages enterprisers give to workers is actually the ratio of workers' cost C to the probability ($E_{1t}-E_0$).

$$W_t = E_{1t} C / (E_{1t} - E_0) \tag{2}$$

$$E_{1t} = e^{-\lambda} \lambda^{z_t} / z_t! \tag{3}$$

in which λ is parameter, Z_t is worker's work time in t period.

It is obvious that the utility value of hard work is larger than idle work, of course is also larger than that of not work. (see the two constraints in formula 1) That's why enterprise can always hire workers successfully. The enterprisers choose a suitable number of workers he hired in order to maximize his profits. Following is his plan:

$$\text{Max}\{Y_t P_t - N W_t\} \tag{4}$$

In the above formula $Y_t = AN^a$ and we can get the following result from formula (4),

$$a P_t A = W_t N^{1-a} \tag{5}$$

We get formula (6) from transformed formula (5) which is the expectation in period $t-1$.

$$\ln(a) + \ln(A) + \ln(P_t) - \ln(W_t) - (1-a) \ln(N) \tag{6}$$

In formula (6) $\ln(P_t)$, $\ln(W_t)$, $\ln(N)$ are the logarithm of P_t , W_t , N separately. According to formula (2), (3), (5), and (6), supposing workers have the same work time in period z_t and $t-1$, we can deduce enterprise's output formula from formula (6):

$$y_t = A + a[(p_{t-1} p_t) / (1-a) + \ln n] \tag{7}$$

In formula (7) $\ln(P_t)$, $\ln(W_t)$, $\ln(N)$ are the logarithm of P_t , W_t , N separately.

3 Money Supply and Equilibrium Models

According to Taylor (1977) and Mankiw's (1982) research, this essay makes the following assumptions:

$$y_t = m_t - p_t \tag{8}$$

According to Lucas(1972b) and Benassy's(1999) researches, this thesis suppose the money supply formula is

$$m_t = g + m_{t-1} + \epsilon_t \tag{9}$$

In which m_t stands for the money supply amount in t period, g is a constant, ϵ_t stands for the money supply shock in t period and it is a winding item.

According to rational expectation rules and formula (7), (8), (9), we can elicit following formulas:

$$(1-a) \epsilon_t + \ln(P_t) = p_t \tag{10}$$

$$y_t = g + m_{t-1} + a \epsilon_t - \ln(P_t) \tag{11}$$

Formula (10) shows that normal price depends on money supply shocks ϵ_t and the price expectation of current period from former period. Formula (11) shows that the output depends on the supply amount, money supply shocks ϵ_t of former period and the price expectation of current period from former period.

After we introduced an aggregate demand shock, formula (8) can be wrote as

$$y_t = m_t - p_t - d \tag{12}$$

We can get formula (13),(14) by using formula (7), (8) and (12).Formula (13) shows how aggregate demand effects price. Formula (14) shows how aggregate demand effects output.

$$(1-a) \epsilon_t + (1-a) d_t + \ln(P_t) = p_t \tag{13}$$

$$y_t = g + m_{t-1} + a \epsilon_t + a d_t - \ln(P_t) \tag{14}$$

Formula (13) and (14) indicates two pieces of information in macro-economics: 1. Money supply and demand shocks have long-term effects on price and output but only shocks of current period can have such effects. 2. Formula (13), (14) provide theoretic basis for unite root movement of price and output..(see formula 15,16) It shows that the unite root movement of output is actually decided by the expectation on wages (by money) which enterprisers give to workers.

According to rational expectation rules, formula (10),(11) can be transformed to formula (15),(16). Formula (17) shows that price depends on price of former period p_{t-1} and money supply shocks ϵ_t . Formula (16) shows current output is decided by output of former period y_{t-1} and money supply shocks ϵ_t .

$$(1-a) \pi_t + p_{t-1} = p_t \quad (15)$$

$$y_t = a \pi_t + y_{t-1} \quad (16)$$

If only money supply shocks π_t obey i.i.d, then formula (15) and (16) can provide evidence for the random walk of price and output. However, if money supply shocks π_t don't obey i.i.d, we can transform formula (15) and (16) into (17) and (18). In formula (17) and (18), $F_p = p_t - p_{t-1}$, $F_y = y_t - y_{t-1}$; formula (17) shows that inflation rate F_p is decided by money supply shocks π_t . Formula (18) shows the changes of final output depends on changes of money supply.

$$(1-a) \pi_t = F_p \quad (17)$$

$$F_y = a \pi_t \quad (18)$$

4 Conclusions

This article provided theory support for the long term effect of money supply shocks by introducing enterprises incentive model. At the same time, it reveals that money supply shocks can also have long-term effect under rational expectations models. This conclusion provides empirical evidence for New Keynesianism. If money supply shocks meet the conditions of i.i.d, thus this article's research conclusion can provide theory support for random inflation and output fluctuation.

At the same time, we finished our study basing on Chinese really economic. Our study conclusion on the one hand shows the rationality of this thesis's research model, on the other hand indicates two important things of Chinese economic: 1. Chinese money policy do not have validity in long time. 2. Money supply shocks have long-term effects on GDP output fluctuate. That means, China has to make great money supply shocks in order to realize high economic growth. At the same time, such great money supply will surely bring up price. Which effect will be more pronounced depends on the workforce flexibility and it directly relates to people's welfare. When it effects the output fluctuations more than price, it will improve people's welfare; on the contrary, it will bring down people's welfare. China's decision maker should pay more attention on improving workforce training, spastically front line worker's technical level, in order to improve workforce flexibility. Only that can China avoids the high inflation brought by money supply shocks when it pushes the output upward fluctuates.

This article's further research direction is to make an empirical research on international statistics, which is to re-examine our research model.

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Orientational Comparisons of University Libraries and Public Libraries: China as an Example

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Abstract: The purpose of this paper is to help University Libraries and Public Libraries in China correctly understand their unique positions in the process of their developments. Methods of comparing analysis between two types of libraries and survey-statistics of Chinese 39 "985" university libraries and 31 mainland provincial libraries are used. The university libraries are assistants for teaching and research, with embedded service regarding teaching and research units as their center, while local public libraries' dominant direction is a combination of reading and relaxing, with embedded service throughout community sites. The university libraries firstly serve their teachers, researchers and students, while public libraries give more consideration to the general public. The university libraries emphasize profession, research, academic features in literature collection, and database-driven, while public libraries outstand popularity, leisure, localized features and paper-document-driven.

Key words: University libraries; Public libraries; Feature; Comparison; Survey-statistics

1 Introduction

University libraries and public libraries are two main types of libraries. In recently library construction and the corresponding researches, emphasizing the integration of the two types of libraries becomes a focus. For example, in order to meet the needs of readers in the community, our university library recently bought some books about health, knitting, cooking, and some for children reading, however, our university does not have such discipline above. So does the integration of the two types mean the elimination of differences between them? Does such practice represent the future direction of Chinese libraries development? Such issues are worth considering. In the future development, under the limited funding conditions, in order to make these two types of libraries better serve readers, and better integrate into public service system, it is necessary to understand these two types of libraries development orientation, avoid lowering their service quality because of the fuzzy understanding. In the study of library science in China, many papers have been raised, about single kind library's development orientation, such as: Chen Li held that the local public library need to serve the local economic development, according to its features, to collect books, and to establish relational thematic databases.^[1] Xing Jun introduced operating ways, services to special groups, diversified convenient services, etc. of local public libraries in developed countries.^[2] Zhao Yumei discussed that the university library builds special discipline-collections libraries.^[3] In other countries, Kadiri thought that the university library exists in an academic context, and serves as academic support for teaching, learning, and research by faculty and students.^[4] Elizabeth Ann Hubbard realized public libraries should serve the special needs of specific populations (such as labor union) within their communities by providing the materials and resources.^[5] However, there are very few researchers noticing the difference between these two types of libraries, Feng Bin and Qihao Miao noticed the difference of reader of two types of libraries, but they did not compare their other aspects.^[6]

This paper attempts to make a comparative study from service concepts, service objects, features and other aspects of the two types of libraries, and to help people better understand these two different kinds of libraries' developing orientation, combining with statistical analysis between the Chinese mainland 39 "985 Project" university libraries and 31 provincial libraries.

2 Comparison of the Service Concepts

The service idea of the university libraries is its embedded services centered on teaching faculties and research institutes with its professional collections as assistant of teaching and research. University library is an important role of teaching and research, "a bridge between students and lecturers"^[4]. It is not entertainment venues, which determines that it has more normative manners, and its atmosphere more emphasizes on calm and seriousness. There are two main aspects of embedded services in university libraries: first, space embedded. Through modifying the system of the traditional main-library-centered to the branch-led, the total resources will be distributed to all branches, each

branch close to or integrate with the corresponding professional institutes, departments, colleges, so that libraries can provide readers convenient services as much as possible. Second, staff embedded. Some professional librarians in branch change to excellent discipline librarians who are tied together with teaching and research teams, providing literature renewing, data collection, latest book procurement and other services. Now the developments of discipline-branch-libraries in Chinese universities is becoming a trend. There are 26 "985" universities have clear disciplinary branches, accounted for 66.7% of the total "985" university libraries, that is to say, the average number of discipline-branch-libraries in "985" University is 2.77. (Table 1) If adding discipline branches transformed from reference rooms of affiliate colleges, the real number is far more than this.

Table 1 Discipline Branch in "985" University Libraries

985 University Library	The amount of Specialty Branch	985 University Library	The amount of Specialty Branch
Tsinghua University Library	7	Tongji University Library	1
Xi'an Communication University Library	1	Xiamen University Knowledge Resource Port	5
Zhejiang University Library	6	Tianjin University Library	3
Southeast University Library	2	Nanjing University Library	0
Chinese People University Library	0	Harbin University of Industry Library	3
Jilin University Library	5	Shandong University Library	6
South China University of Technology Library	1	University of Electronic Science and Technology of China Library	0
Lanzhou University Library	0	Sichuan University Library	4
Shanghai Communication University Library	4	Northwestern Industry University Library	0
University of Science and Technology of China Library	0	Central China University of Science and Technology Library	1
Beijing Normal University Library	16	Beijing Institute of Technology Library	4
Beijing University Library	4	Central South University Library	1
China Agricultural University Library	0	Beijing Aerospace University Library	0
Nankai University Library	2	Fudan University Library	6
National University of Defense Technology Library	2	Nationality University of China Library	0
Hunan University Library	11	Wuhan University Library	4
Dalian University of Technology Library	0	Northwest A&F University Library	1
Zhongshan University Library	2	Northeastern University Library	0
Ocean University of China Library		East China Normal University Library	0
Chongqing University Library	6		
Total	108	Average	2.77

The service idea of the local public libraries is as a communicating place and its embedded services should be extended to some sites in community along with the joy of reading, "Public libraries must more and more take their place as street corner universities, providing real opportunities for everyone regardless of their place in society"^[7]. For those who wish to acquire knowledge, public libraries provide a quiet reading environment. And for the other peoples, public library is a place of communication and leisure even joy. So more spaces in public libraries don't emphasize calm and serious. That is the important difference contrary to the university libraries. Their function, as some scholars have said, "public libraries promote social cohesion and community confidence by fostering connections between groups and communities....The library can help individuals, especially older people, overcome the problems of social isolation and loneliness."^[8] The public libraries can also carry out cultural and recreational activities to attract local residents - readers, "the perception of the role of the public library has often been a largely recreational one, as is evident, for example, in responsibility for services being transferred from Education to Leisure Departments by many local authorities."^[9] So "the library has to serve not only the earnest seekers after knowledge, but also those who are merely gratifying an elementary curiosity, and those who are seeking relaxation and recreation"^[10]. Embedded services of

local public libraries are not discipline branch model, but rather to send the book into community, or establish book delivery sites, this trend in the West is called “Libraries build community”^[11] or “The street corner university”. In addition, more convenient services are provided to the physiologically vulnerable groups, for example, establishing some areas for the disable, the elder and the children. The appearing frequency of service areas for children and old people in the Chinese provincial libraries is up to 74 %, while for disable people is up to 42%. (Table 2).

Table 2 Featured Service Institution of Chinese Mainland Provincial Library

The Name of Provincial Library	Special Service Area for Children and Old People	Special Service Area for Disable People	The Name of Provincial Library	Special Service Area for Children and Old People	Special Service Area for Disable People
Capital Library of China	1	0	Jiangxi Province Library	1	1
Tianjin Library	0	0	Jiangsu Province Library	1	1
Shanghai Library	0	0	Anhui Province Library	1	1
Shandong Province Library	1	0	Guangdong Province Library	0	0
Shanxi Province Library	1	1	Hainan Province Library	1	1
Jilin Province Library	1	0	Sichuan Province Library	0	0
Liaoning Province Library	1	1	Heilongjiang Province Library	1	0
Chongqing Library	1	0	Yunnan Province Library	0	0
Shanxi Province Library	1	0	Hebei Province Library	1	1
Xinjiang Uygur Autonomous Region Library	1	0	Inner Mongolia Autonomous Region Library	1	0
Qinghai Province Library	0	0	Gansu Province Library	0	0
Guizhou Province Library	1	1	Ningxia Library	1	1
Fujian Province Library	1	1	Guangxi Zhuang Autonomous Region Library	1	1
Zhejiang Province Library	0	0	Tibet Autonomous Region Library	1	0
Henan Province Library	1	0	Hubei Province Library	1	1
Hunan Province Library	1	1			
Total	23	13	Frequency	0.74	0.42

3 Comparison of Service Objects

For the university library, its priority is to serve their teachers, researchers, students, and the special collections of university libraries will also attract professional researchers in society. These two types of readers are professional and research-oriented, and thus have strong purposes when they are reading. These readers’ orientation rightly mirrors the original value of all libraries that is “a prime place of expansions of thought and knowledge”^[12] University libraries opening to the public as a trend now, it must attract readers outside the universities, but we hope it is not because of leisure books, rather those professional featured literature.

For the public library, its clients are the general population. Local featured literature will attract some of the local scholars who interested in local politics, economics and cultural studies, but its main target is still the general population. “Contrary to the homogenous user groups in university libraries, public libraries cover a wide range of users – they could not refuse any group of readers but adapt themselves to the variety of needs.”^[6] Behaviors of such readers usually do not have particularly strong purpose, even if there are purposes, their purposeful object to be read generally are popular science books, basically nothing to do with the technological frontiers of knowledge.

4 Comparison of Collection Features

Distinctions of service concept and service objects inevitably affect the collections of both types of libraries with different characteristics. Currently, these two kinds of featured collections in China are not

done enough. Quite a few libraries still continue the model of “large and all-inclusive” or “small and all-inclusive”, but lack of clear development idea. As readers’ different objects and different needs to knowledge, local public libraries and university libraries in the future should make more efforts on the special collections. Except the national center library, other types of libraries should expertise in a particular field, a certain type of literature collection, and give up acquiring other areas or professional literature. Specifically, the two kinds of collections should widen the gap in the following aspects:

4.1 Profession or popularity

For the university library, its collections should be focus on profession, while the public library, popularity. Professional collections ask for books with certain depth, which generally meet the needs of those people equipped with strong professional knowledge and capabilities. The stronger professional books are, the target readers often narrower and the circulation lower. For colleges and universities (especially research universities such as the “985” in China), this kind of books are precisely the focus of their acquiring. But for public libraries, purchasing such books is not to say that there is no audience, however low efficiency, so such books should not be the focus of their collections. Popularity does not chase the depth connotation or require professional knowledge and abilities, only need basic abilities of reading. Such books tend to have larger circulation, very wide range of readers, and the large borrowing amounts. These types of books should be priority objects of public libraries, while the proportion of such books in university libraries should be continually reduced.

4.2 Research or Leisure

Behind profession and popularity, differences between research and leisure-recreation are hidden. For the university library, its collection feature emphasizes research, to serve professional researches and university teaching and research. This collection features not only serve the university teachers and students, but also become the non-university researchers’ the priority literature sources with speeding up process of university libraries open to the public. As for the public library, its collection features should be more emphasized leisure-recreation, taking serving people’s daily lives and recreational needs as the primary purpose. Such collections should be concerned about hotspots of people’s daily lives, such as diet, health, entertainment, recreation, hobbies and so like. “A public library has to meet the much more diversified user needs, such as for everyday problem solving, for enjoying leisure, or for just killing time”^[6]. Currently, local libraries accumulate large number of electronic documents, a considerable part of which are a variety of audios and videos entertainment products, but such basic electronic literature does not appear in the university libraries.

4.3 Discipline feature or regional feature

In the different development of the two types of libraries, in addition to the above-mentioned two distinctions, they are faced a problem forming their own characteristics by the collection of featured literatures. Featured literatures represents the characteristics of library collections, so it is very important for the library. There are many reasons in forming featured literatures. Firstly, because of the rapid growth of varieties and quantities of social publications and the diversification of carriers patterns, single library cannot meet the needs of each reader. Therefore, it is necessary to adjust development ideas of the collection, find or form their own features. Secondly, because of the development funding constraint caused by the government’s insufficient investment, especially at some local public libraries in China, there are nearly 1/3 of them no new collections because of lack of funding. Thirdly, because of historical reasons, some libraries in their own development have noticed to form their own characteristics and make a certain accumulation of special kinds of collections. Finally, because of the readers’ needs, with the improvement of the level of social civilization, readers will consciously choose what to read, and evaluate a library service quality based on the extent that books meet their own needs.

The collection feature of university libraries is their characteristic of discipline. Their own distinctive brand professions and key disciplines will gradually form disciplines specialty features in the corresponding data collection aspects of professional books. Along with the academic exchange internationalized and digitized, the characteristics of discipline often reveal itself through commercial professional databases and self-built specialized databases around the core disciplines. Statistics shows that (Table 3), “985” universities average have up to 188.9 specialized databases, and 85,700 kinds of electronic journals, 1,829,500 electronic books, 12.54 self-built specialized databases. The data is much higher than the average level of local public libraries.

The collection feature of local public libraries is their localized features, appearing as the accumulation of local literatures. Local literatures refers to literatures which about local culture, local resources, economic and other aspects. Since some literatures with special characteristics result in special characteristic libraries, localized literatures is the advantage of public library collections.

Statistics shows that (Table 4) in Chinese mainland provincial libraries, the frequency of occurrence of localized literature collection rooms or similar agencies are up to 1.39, while the average amount of the localized collection databases are more than 5.58.

Table 3 The Construction of Discipline Featured Resource in “985” University

“985” University Library	Specialized Data Bases	Scholarly Electronic Journals	Ebooks	Self-built Specialty Data Bases
Tsinghua University Library	464	65,000	Unknown	8
Nanjing University Library	Unknown	33,800	805,000	Unknown
Zhejiang University Library	400	48,626	1,510,000	4
Southeast University Library	104	41,000	1,708,100	Unknown
Shandong University Library	201	37,600	1,570,000	1
Jilin University Library	62	Unknown	1,400,000	13
Sichuan University Library	Unknown	Unknown	Unknown	11
Lanzhou University Library	76	Unknown	Unknown	Unknown
Harbin University of Industry Library	42	Unknown	820,000	Unknown
Beijing Institute of Technology Library	177	Unknown	2,776,000	Unknown
Beijing Normal University Library	281	65,000	5,484,000	25
Beijing University Library	500	Unknown	2,760,000	20
Fudan University Library	Unknown	46,000	1,958,600	4
Nankai University Library	271	Unknown	Unknown	16
Wuhan University Library	Unknown	1,001,000	6,272,000	11
Hunan University Library	154	20,000	100,000	Unknown
Chongqing University Library	125	10,700	1,800,000	Unknown
Zhongshan University Library	300	70,000	1,523,400	Unknown
Northeastern University Library	38	Unknown	Unknown	Unknown
Central China University of Science and Technology Library	308	20,000	1,020,000	
Tongji University Library	Unknown	40,000	1,800,000	4
Xiamen University Knowledge Resource Port	Unknown	Unknown	Unknown	26
Tianjin University Library	46	8,251	1,120,000	49
Xi’an Communication University Library	252	28,600	1,070,000	12
Shanghai Communication University Library	374	47,200	2,336,000	1
Chinese People University Library	300	Unknown	Unknown	7
University of Electronic Science and Technology Library	170	Unknown	Unknown	7
South China University of Technology Library	97	Unknown	Unknown	40
Northwestern Industry University Library	43	20,000	400,000	8
Ocean University of China Library	111	30,000	1,100,000	6
Beijing Aerospace University Library	65	12,000	1,633,000	Unknown
Central South University Library	90	190,000	1,400,000	3
University of Science and Technology of China Library	55	29,000	690,000	8
China Agricultural University Library	Unknown	Unknown	1,470,000	14
East China Normal University Library	116	44,000	1,336,000	Unknown
National University of Defense Technology Library	220	Unknown	Unknown	Unknown
Northwest A&F University Library	Unknown	Unknown	5,315,000	4
Nationality University of China Library	Unknown	Unknown	480,000	Unknown
Dalian University of Technology Library	225	62,700	1,400,000	Unknown
Total	5667	1,970,477	53,057,100	301
Average (only confined to those who have this Type featured literature)	188.9	85,700	1,829,500	12.54

Table 4 Featured Resource of Chinese Mainland Provincial Library

The Name of Provincial Library	Localized Literature Collection Room	Localized Collection Database	Rare Book Collection
Capital Library of China	0	5	1
Tianjin Library	4	0	1
Shanghai Library	9	9	1
Chongqing Library	4	21	1
Shanxi Province Library	1	1	1
Jilin Province Library	0	17	1
Liaoning Province Library	1	0	1
Heilongjiang Province Library	1	17	1
Shanxi Province Library	1	8	1
Gansu Province Library	1	7	
Qinghai Province Library	1	9	1
Shandong Province Library	1	0	1
Fujian Province Library	1	10	
Zhejiang Province Library	1	15	1
Henan Province Library	1	6	1
Hunan Province Library	1	0	1
Jiangxi Province Library	1	0	1
Jiangsu Province Library	1	2	1
Anhui Province Library	1	0	1
Guangdong Province Library	1	1	1
Hainan Province Library	1	0	1
Sichuan Province Library	1	8	1
Yunnan Province Library	1	1	1
Guizhou Province Library	1	10	1
Hebei Province Library	1	1	1
Inner Mongolia Autonomous Region Library	1	5	1
Xinjiang Uygur Autonomous Region Library	1	0	1
Ningxia Library	1	1	1
Guangxi Zhuang Autonomous Region Library	1	10	1
Tibet Autonomous Region Library	1	1	
Hubei Province Library	1	8	1
Total	43	173	28
Average	1.39	5.58	0.9

Some colleges and universities form regional features in their research (mainly in the social sciences and humanities), and accordingly localized characteristics will be formed. From the overall, however, which does not eliminate the differences in the collection features. First, because the proportion of these universities is smaller (less than 40%), second, the specialty areas of collections are relatively narrow, the numbers are relatively limited, and therefore they cannot really deconstruct geographical features of public libraries.

4.4 Database-driven and Paper-document-driven

For the university library, for the sake of the needs of international perspective and academic exchanges, the construction of the database is the most important thing, especially for science and engineering. The funding of introducing databases is the bulk of expenditure of libraries, and expenditure ratio of traditional paper books is declining year by year. “For all the ARL academics, expenditures for electronic resources have risen an average of 85.32 percent annually in this seven-year period(1996-2003)”^[13], while its colleagues in China may keep pace with the same or a higher developing speed. For public library, the paper document is still absolutely dominant because of the historic cause and lack of funds, its databases are built around the localized characteristics, and less like the university library that spend heavily on a variety of professional databases from abroad. In addition, the frequency of occurrence of a featured collection in local libraries—“Rare Books Collection Room”, is up to more than 90% in the provincial libraries (also see Table 4), and such collections only appear in

key comprehensive universities, but not in science and engineering universities. Such kind of special collections precisely exist in paper form.

5 Conclusions

Only university libraries and public libraries taking differentiated development paths can they win more rational basis in order to exist. The provincial libraries in China have more clear positioning, and get impressive results in aspects of embedded services in community, humanistic solicitude, localized featured literature collections, etc. Most important university libraries in China have correctly positioned, too, and have made considerable progress in the aspects of embedded services in teaching and research institutes, providing calm atmosphere of academic, organizing discipline-featured literature, etc. They are two types of libraries' developments in China. But some university libraries, quite a few district public libraries, and most county public libraries in China exist the problem of position ambiguity, for example, some university libraries' collections are lack of professional features, but pursuit large and all-inclusive patterns of collections, lack of embedded services far away from teaching and researching places, too emphasis on leisure, and some university libraries' opening to the public without any limit of the expertise degree of readers in community, only attracting the public for its collections of leisure, etc., while some district level libraries are on the developing way of small and all-inclusive, lack sense of service embedded into community and without local featured literature collections, and too profession of some books in their collections to be read by the public readers. Libraries which exist these problems should seriously review their own development orientation and return to the right way, which just is the practical significance of this paper.

In future studies, the author will investigate more and more libraries in Chian at all levels and all types, finding excellent libraries, establishing models of the library at each levels or each types, meanwhile noting the problems existing in some libraries, analyzing causes of them, discussing the possibility of problem-solving.

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Intellectual Property Management of Digital Publication in China: Some Problems and Solutions

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Abstract: Setting objects of management of intellectual property in digital publication (IPDP) and describing its boundary range, and then we can get the management model of intellectual property in digital publication. Further researches on managing relations of IPDP and its change based on this model are focused on. The main task of the researches is to find out and analyze the problems existed in the process of the management of IPDP, including what is the intellectual property in digital publication, how to possess, authorize, and transfer it and how to manage the added value of IPDP. Based on the analysis, solutions to the problems are provided.

Key words: Intellectual Property Management; Digital Publication; Management Model of IPDP

1 Introduction

With the development of information technology, especially the growing popularity of mobile networks, digital publishing has gradually risen. Digital publishing in China started late, but its development speed is very quick. In the last decade, it has developed into a new type of economy industry. The industry mainly include electronic books, digital newspapers, digital periodical, network literature, network educational publications, network map, digital music, animation, network game, network database publications, mobile phone publication. The publication content almost covers all areas and reaches beyond the traditional publishing. In the past few years, the average annual growth rate of global digital content industry exceeds 33%. In China, comprehensive reading of various media include books and periodicals and digital publications among the 18 to 70 years of national, the rate was 77.1%, in which digital reading contact rate was 32.8%, 8.2 percentage points higher than last year.^[1]

The composition of China's intellectual property rights is mainly composed of copyright, patent, trademark exclusive etc, so the study on intellectual property management are mostly concentrated on developing policies and regulations in these few areas.^[2] Foreign scholars have more detailed research in this field. The distinction of object to the protection of intellectual property rights are more careful and logical.^[3] Devoted to the study of intellectual property right relationship and management for digital publication does not see more.

2 Setting Management Model of Intellectual Property in Digital Publication.

Research on intellectual property in digital publication is focused solely on copyright in many articles. Copyright is only one of the important contents of intellectual property right. In the intellectual property system to the digital publications, the copyright is the core, and it is the main object researched in this article. Category of intellectual property system in digital publications is far more than copyright.

Like traditional publishing, digital publishing is also concerned with the providing or multiplication of documentation and recorded information; carefully checked and peer reviewed, original, integral and authentic. Even until today, the publishing process was traditional and reclusive. Publishing as a whole is very big business, with several mega-companies that dominate the landscape. Major categories of publishing are scholarly publishing, professional publishing, text book publishing, reference works, dictionaries, multi-volume compendia, etc. The basic activities in publishing are selection, editing (copy and language), design and illustration, translation and indexing, production, promotion, marketing, sales and distribution.^[4] That is to say, information content is the prime object of digital publication. The information is usually composed by 3 components: information content that conveys the meaning of the message; information form that consists of two sub-components: information format is the type of information such as text, mathematical models of numeric data; information structure is the means of expression of information content such as specific language used in the text, or types of graphs; and information medium is the package in that information being captured and communicated, whether on paper or electronic format. Accordingly, intellectual property of digital publications is composed by different right of these 3 components.

On the basis of the above analysis, a model of intellectual property rights management of digital

publications can be simply constructed. The model can be used to describe the structure of intellectual property rights system of digital publications. The elements of the system are consisted of information content and the providers, information format & structure and the designer, information medium and the designer. Relations between the elements which are formed through the conclusion of relevant legal relationship are the object of management of the system, see figure 1.

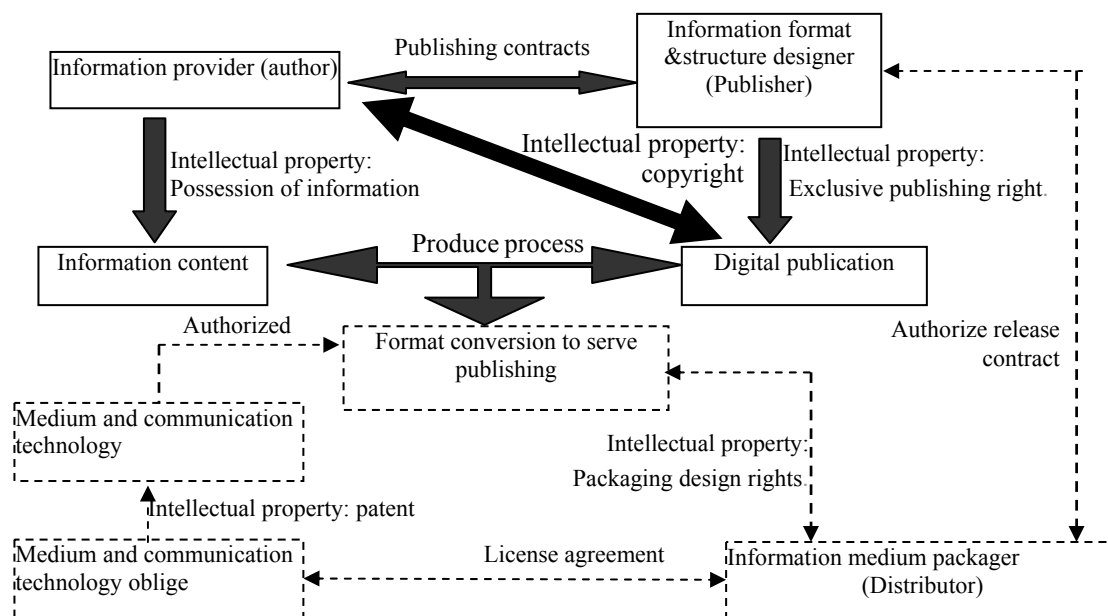


Figure 1 Model of Intellectual Property Rights Management of Digital Publications

3 Problems of Intellectual Property of Digital Publications Management

Although digital publishing is to digitize content resources of traditional printed books, the conversion of the expression form has broken through the visual limitations; it can be text, sound, image to spread the information content. That is to say, digital publishing is a digital technology, with the continued rapid development of the information technology closely related. The development of information technology has brought the development of digital publishing, and brought new problems to intellectual property management of digital publishing at the same time.

On the other hand, from the recipient of knowledge content point of view, digital publication is mostly spread through the network, which makes the regional difference, time difference, and even the difference between senders and receivers are continuously vanishing. The vanishing of difference in digital publishing has thoroughly changed the ultimate form of publishing industry. Many new problems will occur in the new industry.

3.1 The system structure of intellectual property management of digital publications become more complicated

The dotted frame part in Figure 1 is the added part on the base of traditional publishing intellectual property management system. The distributor is induced into digital publishing industry. Usually, the distributors are network platform operators, mobile platform operators etc. The distributor packs the information content provided by press through some medium and new technology. The adoption of new technology makes the system more complicated:

- Various types of digital publications, diversity, especially the new form of media or media technologies are constantly emerging, the traditional classification of categories of publications become fuzzy, it increases the difficulty to determinate the ownership of intellectual property of digital publications.
- In order to adapt to the transmission of digital publications, sometimes information content should be reformed to adapt to the production, this transformation has been beyond the publishing editor's category, and derive new kind of intellectual property rights from the digital publications.
- To meet the personalized publishing requirements, special design of digital publications is often

required. The design is also a kind of knowledge production labor process, material fruits of that work should also have the intellectual property rights.

- In digital publishing process, the application of new technology is inevitable, this new technique is also related to intellectual property rights.

3.2 The boundary of object of digital publications intellectual property rights management is not clear

The complexity of the system increase will undoubtedly lead to its boundary turn to uncertain. Digital publishing is mainly originated in digital network platform. Many works has entered the public domain before being published. The information content of works in the public domain will be continually rewritten and adapted during the process of communication by the audience according to their requirement. In this respect, a typical example is the open source code in information field, each programmer can add and modify the original works code according to their own style, the famous operating system —Linux is formed in this way. It is impossible to find out what is the boundary of intellectual property rights set in this case.

The essence of digital publication is that it is the existence of digital information content, it is dynamic. Digital publications are spread on the Internet, sometimes just some data, such as database products, which does not meet the legal meaning of traditional copyright works definition. Online meeting, online editing, interactive computing is widely used in the production process of digital publications. Information content published by the form listed above, will be of how much originality, or to what extent cannot be determined. These changes made boundaries between the original works and the interpretation of the works become blurred.

3.3 It is difficult to determine the term of validity of digital publications Intellectual property rights.

In order to promote scientific and cultural development, encourage the intellectual achievements of the public, it is a common principle in world to limit intellectual property in time. Known from the IPM model, the intellectual property system of digital publication is a complex of different rights. The protection period of any kind of these intellectual property rights is not the same, that is to say, the deadline of the protection period is different. So it is necessary to make strictly distinguish between different digital publications intellectual property rights. However it is difficult to make this distinguish in many cases.

Protection period of copyright — the core of digital publication intellectual property system is sometimes difficult to determine. Different country gives different rule to manage the intellectual property. The protection period will be ended at the 31st Dec in the 50th year after the death of the owner according to China's copyright law. If it is a cooperative work, the deadline will be the December 31st in the 50th year after the death of the last author. In some cases, all the authors of network works are difficult to fully determine down, not to mention the last one to die.

It is also difficult to determine the start date of digital publication right of copyright protection period. Digital publications distributed on the network are not accomplished at one stroke. Before the complete works published, some of its contents may have entered the field of communication (complete published), and in the network environment, this part of the content may be constantly interpreted, to determine the initial state of the works is very difficult. Therefore, it is not so clear to determinate the first published date of digital publications as traditional publications?.

4 Solution to Problems of Intellectual Property of Digital Publications Management

Until today, the digital publication of the intellectual property management is a hot issue. Many countries give careful consideration to it in the policy formulation and legislation. The establishment of special intellectual property management services is also a good plan to solve these problems. For the protection of intellectual property rights of special problems, there should also be more flexible solutions to them.

4.1 Perfecting the legal system of intellectual property protection of digital publications

According to the legislation of China, the intellectual property law is only a concept, and not a specific system method. The legal system of intellectual property law is mainly constructed by the copyright law, patent law, trademark law, anti-unfair competition law and other laws, administrative regulations or rules and judicial interpretation, the relevant international treaties constitute. Among them, the copyright law is often cited as judicial ruling to intellectual property rights in digital publications.

In order to improve the intellectual property of digital publication management, current corresponding legal norms should be perfected. The following should be taken into consideration during making laws about intellectual property protection of digital publications:

- Give definition of digital publications on law to accurately describe the object of intellectual property management of digital publications;
- Laws and regulations on intellectual property of digital publications transfer, value-added, trade and other links
- Determination of the subject of rights should be clear, not easy to determinate in the network circumstances should give reasonable presumption principle.
- The legal gaps in the region due to the application of new technology should be filled in time.

4.2 Establish special intellectual property management services system

It is essential to develop an intermediary, agent, consulting and other services system for an industry to get a healthy and orderly development. The establishment of a self management industry association is also useful guidance. The services should include the following tasks:

- They will support the development of not one but several intellectual property of digital publications management systems, mandated by the diversity of publishing in China and the disparate needs of the various industry sectors. The systems will represent a fusion of technological, business, and legal components.
- Play a role in the development Uniform File Identifiers and other pro-competitive standards to facilitate publishing in a networked environment.
- Provide guidance in the marketplace, where intellectual property management systems of digital publications are already being developed.
- Play a leadership role in promoting and strengthening legislative protection for materials in digital form.

5 Conclusions

The digital publishing and intellectual property industry are still developing in their primary stage. As well as all new things, although it has rapid development, digital publishing and intellectual property industry has encountered all kinds problems in the process of the development. A model of intellectual property of digital publishing management is set up in the article, and based on the model, the problems are analyzed and summarized. This class of problems has not been limited to the discussion in the academe at present stage, government departments also attach great importance to them. The corresponding policies and regulations are being developed and perfected. Further observations and researches will be required when the new legal system promulgated.

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An Innovative Model for China's Patent Management: Based on Analysis of China's Current Patent Law

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Abstract: This paper intends to adopt the methodologies of practical analysis and comparative analysis, draw lessons from the advanced patent management experiences in the United States, Japan and South Korea, which will then be combined with China's actual situation, and then put forward an innovative model for China's patent management based on the deficiencies of the current patent law in China. Meanwhile, this paper points out that China's patent management should be planned and improved from the main body, building a three-in-one patent management model from the government, enterprises, colleges and universities in three aspects, which can make up for the inadequacy of China's current law, fully arouse the enthusiasm of the principal subjects in various aspects to promote the research and development, protection and utilization of patented technology, and adapt to the trade competition in era of knowledge economy.

Key words: Patent law; Patent management model; Enterprise; Government; University

1 Introduction

Because of the arrival of the knowledge economy, every country attaches great importance to the protection and management of intellectual property. In the field of intellectual property, patents are the largest part of economic interests, so the states and enterprises have attached great importance to the patent strategy.

The United States which established early patent system has more advanced managerial experiences in the management of the Patent. The patent law in the United States is very comprehensive and detailed in the nation in terms of patent. In setting institution, it specifically set Patent and Trademark Office to be responsible for the registration and management of patents, which enumerated the duties of the Patent and Trademark Office officials in detail, and set up the completed power control mechanism. Compared the United States with the rest of the world, it has a mature model of university management patent that is used for reference. According to Academic Ranking of World Universities, ARWU 2007⁷ that was published by Shanghai Jiao Tong University Institute of Higher Education, there were 17 universities in the United States in the world's top 20 universities. The universities in USA attached great importance to encourage the motivation of the patent creation in the model of university management patent. The famous "Du Pont Act" in the United States provided for such a principle of "who invented, who owns patents", which took the intellectual property owners from funders into completers. This principle greatly stimulated the enthusiasm of universities for researching science and technology, and created a good atmosphere of scientific research.

Japan is also the intellectual property power, which obtains patents with attracting worldwide attention. After World War II, Japan established the perfect system of intellectual property rights for encouraging technological innovation and increasing R & D efforts and the patent application. Japanese enterprises grasped the historical opportunity. On the one hand, it actively introduced and absorbed the advanced western technology. On the other hand, it constructed a rigorous peripheral patent encirclement with bypassing the strong Western technology to out flank the strategic offensive and applying for the "peripheral patent", to gradually reduce the scope of patent protection in the West and Japan, so that others finally had to cross license.

South Korea's intellectual property developed relatively late, but it caught up from behind and had made remarkable achievements in the field of science and technology. South Korean government attached great importance to the development of science and technology, though increasing scientific research investment and actively encouraging technology innovation, finally had reached the world top level in terms of quantity, scientific research personnel of research investment and patent application rate of growth. In addition, South Korean Patent Office had also established free intellectual property retrieval system, that was convenient for accessing and exchanging patent information. With the positive actions from South Korean government in the patent knowledge management, South Korea's power of science and technology made a spurt of progress.

China's current "patent law" only sets regulation on the country's patent administrative department

as the authorized organization for patent management, its subject single, unclear functions, the administrative department for patent, countries simply passive registration and management, did not have the effect of promoting patent technology application. In China's patent law, the patent managements of enterprises, colleges and universities are not mentioned, so there are a lot of loopholes.

2 Overview of Patent Management Model

2.1 Concept of patent management model

Patent is proprietary rights that law gives inventors on the creation in certain period of space and time. Firstly, the patent is the main economic resource which modelrn countries have. Secondly, it is an important manifestation with the comprehensive national strength and international competitiveness. Thirdly, it is also the key for the modelrn enterprise to maintain the competitive advantage and sustainable development capacity.

Patent management model is a series of comprehensive utilization about the integration of resources and the control of management process through the establishment of a sound system of law and the patent, which is to achieve the maximum economic benefits and improve the international competitiveness. Meanwhile, patent management model also stresses the development of patent technology in addition to the full utilization of existing resources and protection.

2.2 Classification of patent management model

This paper classifies on patent management model according to the subject of patent management, and discusses all kinds of management model in detail. The most basic purpose of patent management is to encourage innovation and protection of intellectual property rights, so management should be overallly designed center on the acquisition and protection of patents and the value of patent utilization. Specifically, it is divided into the following three categories.

First, it is the national patent management model. This model is based on the country as the main body of the patent management, which manages patent through the establishment of patent policy and the patent system. The management model of the national patent, is to make full use of the advantage, to provide legal and institutional support for the development of patent technology, and to promote the patent to be used.

Second, it is enterprise patent management model. Enterprise patent management model is that the enterprise carries out activities about organization, integration and implementation of patent resource through the use of patent resources development and patent resources market, which refers to in order to give full play to the role of the patent system in the development of enterprises. Generally, enterprise patent management model includes the three factors of patent development, patent protection, patent operation.

Third, it is patent management model in colleges and universities. University patent management refers to the development of the school through the patent technology management, utilization and other forms, which promotes the development of patent technology and improves the research level and obtains patent income model. In addition, we should distinguish invention and non-service invention, funders and completed in the patent rights of attribution. The invention naturally belongs to colleges and universities, however patent rights is owned by completed, not sponsor. For a service invention-creation, to give the actual inventor appropriate the material and spiritual incentives, so as to fully guarantee the inventor of creative enthusiasm.

3 Insufficiency of Chinese Current Patent Management Model

Because the economic development started lately in China, the development level of local economy is different, and many systems are not perfect. Issued the first "patent law" since 1985, now less than 30 years. The patent system is mostly the experience of other countries for reference, not be nurtured from China's own actual conditions and legal traditions, a lot of problems will appear when some systems are actually used. Because influenced by the economic level and system, the patent consciousness of many enterprises and individual is not strong. They do not know the importance of patents, but also lack funds and technical ability for patent research. In addition, they also lack experience in patent management, patent utilization, patent protection, and so on, so they are in inferior position in international competition.

3.1 Lack of initiative in patent management of the government

According to the regulations of Chinese "patent law", the National Patent Office is responsible for the examination, registration and management of the national patent. That mainly includes the form of

review and substantive review about patent application from all over the world, and applications through substantive examination of patent are awarded the patent announcement, registering number and collecting the patent fee, providing the patent search service. Based on the above definition of patent management, the government not only provide the basic service for patent, but also emphasis on full protection and utilization of patent for promoting the development of patent technology. In China, the National Patent Office is engaged in some patent examination and registration services, but not in the patent policy and patent incentive mechanism for the establishment of the patent and the full utilization of resources. And the rules of "patent law" are relatively simple and the function of the government is not clear, besides it lacks the construction of incentive mechanism and patent resources utilization mechanism. Due to lack of the national initiative and imperfection of national system, which greatly hinder the development of China's patent technology, China is at a disadvantage in the international competition.

3.2 Lack of patent consciousness of enterprises

As the market economy started lately and the economic development is not mature, China is lack of competitive enterprises and there are big problems in patent management for Chinese enterprises. There are some common problems in Chinese enterprise patent management model.

Firstly, the majority of Chinese enterprises lack patent consciousness, and do not know the importance of patents. Because the patent investment cost is very large and difficult to bear fruit in the short term, a lot of enterprises are unwilling to give investment in the patent development, but in some lower technical threshold industry, or get patent through the transfer of the patent from abroad.

Secondly, intellectual property is a small proportion in the enterprise assets, most Chinese enterprises have not set up management department, which is responsible for the management of patent technology R & D and patent protection for preventing patent infringement. This leads to that research and development of patent technology is not enough, utilization of the patent technology is not sufficient. Thus the enterprise is difficult to respond promptly and effectively in the face of these problems.

Thirdly, the international patent consciousness of Chinese enterprises is not strong. Most companies are focusing on the immediate interests, not a long-term international vision, and no application for foreign patent protection. Now, some of the world's powerful enterprises have attached great importance to the international patent application, and patent protection is applied for nationality, where their own patent products may be used, so a international protection network of patent product will be formed, and greatly enhancing the enterprise's international competitiveness and influence.

3.3 Poorness of scientific research ability for university

College is the cultivation base of national talents, and teachers and students in colleges and universities are the main force of the national science and technology innovation, so that universities are the major national scientific research position. But Chinese did not give full play to their talents, and the contribution rate of science and technology is not high. For example, the overall number of inventions is not high. The important invention patents of technology are less valuable. The threshold of the utility model and design patents is low. Patent applications are more repeated and the utilization is not enough. Because of the examination-oriented education system, students lack the ability of creative thinking, and the university education is not to cultivate a positive attention on the students' innovative thinking and ability. With lack of understanding of the importance of the patent, college pay much emphasis on the employment rate, rather than scientific research ability, which leads to the shortage of patent technology, the insufficiency of patent protection and the imperfection of the patent incentive mechanism.

4 Improvement of the Patent Management Model of China

China's "patent law" simply provides some functions in the management of national patent, resulting in patent management model is single and backward, which greatly hinder to the development of patent technology and improvement of the international competitiveness of china. Based on analysis of the existing patent management problems of China, to survive in the tide of knowledge economy, we should perfect and innovate patent management model. This paper is divided from the main body, with changing the former single national patent management model, and establishes the coexistence of countries, enterprises, colleges and universities in three models, which respectively play a role in patent management model and promote the development of science and technology in China. There are the following three aspects.

4.1 Improvement of national patent management model

As it is self-evident importance in patent management, to promote the development of patent

technology, we should firstly perfect the management model of national patent. According to China's specific conditions, China can learn technology strategy from Japan to strengthen national initiative in patent management and improve the intellectual property strategy on national strategic height. The national patent development strategy must have a corresponding system to guarantee the goal realization, so the "patent law" should be modified and perfected, which have a clear national function in the patent management for establishing patent incentive mechanism, being awarded patent technology, cracking down on patent infringement of patent and the construction of patent protection mechanism. The government also adjust the industrial structure for encouraging the development of high-tech enterprises, and provide a relaxed policy environment for enterprises. In a word, the states must give full play to the advantages of national status in patent management and actively participate in the promotion of patent development to improve the technical strength in China.

4.2 Innovation of patent management model for enterprises

Enterprises are the most active subject in economic activities, and intellectual property is the important resource of enterprise. Most Chinese enterprises do not have the specialized intellectual property management departments. Aiming at these problems, enterprises should establish specialized intellectual property management departments through changing the blending model of management in the past and innovating enterprises patent management model, which is responsible for handling all matters related to intellectual property rights. To set up intellectual property department, Chinese enterprises can learn from the advanced experience of enterprise patent management in other countries, and combined with China's actual level of economic development.

I think that there are the following aspects. First, enterprises should strengthen the importance of intellectual property rights, increase research investment and restructure enterprises development strategy. Second, there is clear attribution of rights of patent. Belonging to the service invention patent should belong to the scope of the enterprises. Take the enterprises as the subject of patent technology to ensure recovery of patent investment, for making full use of the patented technology and maximizing the economic and social value. Third, to encourage R & D innovation patent technology through the establishment of patent incentive mechanism. Finally, talent is the fundamental force of the development of science and technology, enterprises should strengthen the introduction and cultivation of scientific talent. Meanwhile, enterprises have competitive patent technology to remain invincible in the competition in the world through the patent management model innovation of enterprises.

4.3 Establishment of patent management model for colleges and universities

To promote the development of Chinese patent technology, china must establish the university patent management model and perfect for making full use of the talent advantage and promoting the development of college patent technology. Firstly, colleges and universities should change educational idea and the previous way of examination-oriented education, increase training of academic ability and create an open academic atmosphere for encouraging teachers and students to carry out creative activities. Secondly, china should establish scientific incentive mechanism to increase scientific research investment and incentives. Thirdly, it also should improve the quality of college patent technology, and have development in high-tech fields. In a word, colleges should establish and perfect university patent management model to stimulate the enthusiasm of students and teachers, and give full play to the advantage of talents for making greater contributions to the development of national patent technology.

5 Conclusions

With the coming of knowledge economy, the market competition is becoming more and more fierce. In order to succeed in the world competition, China should fully recognize the importance of patent technology, and take various measures to promote the development of science and technology and enhancing the competitiveness of the country in the world. This paper analyzes the current situation of patent management mode, summarizes the existing problems of Chinese patent management model, draws lessons from the advanced experience in reference to the United States, Japan, South Korea in patent management, combined with the actual situation in China, puts forward to build Chinese patent management model from the government, enterprises, colleges and universities in three aspects. Specifically, China must firstly carry the innovation on patent management model, strengthening national initiative in patent management, and constitute strategic target of rejuvenating the country for improving the legal system and providing policy and the good system environment. Secondly, enterprises should establish specialized intellectual property management departments by innovating patent management model, and pay attention on the patent technology of the independent research and

development and transformation of the achievement for enhancing the strength of science and technology by the transformation from manufacturing industry to the new high-tech industry. Thirdly, colleges should also establish patent management model for universities, and give full play to the advantage of talents to improve quality of patent for providing everfount talent and technology support for national and social development of science and technology. All in all, the development of patent technology of China needs the mutual cooperation and support of government, enterprise and college, which play their respective advantages for promoting scientific and technological progress of China. In the future, China should pay attention to the specific system of each model based on Patent Law, and make Chinese patent management model more perfect and specific, practical and operable.

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Puzzles and Solutions of China's Intellectual Property Culture Construction

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Abstract: Intellectual property produced in the western industrial revolution and technological revolution, it far-reaching influence to western economic and social development. China's intellectual property is produced in the process of modern China's integration into the world. Today, intellectual property legal system construction in China has made great achievements, but also facing a lot of problems. The basic theory of intellectual property is very weak, blending and collision of traditional culture and the new trend of intellectual property rights, also some internal contradictions, surging Chinese intellectual property system process. The research about intellectual property culture is particularly weak, and can't adapt to research the legal system of intellectual property boom, many legal problems need to be solved. This article is from the legal perspective, by means of explaining concepts, comparative research, discusses the legal problems existing in Chinese intellectual property culture construction, to solve these puzzles. In order to put forward ideas and suggestions for Chinese intellectual property culture development.

Key words: Intellectual property; Intellectual property culture; Intellectual property strategy; The legal system; Comparative analysis

1 Introduction

A nation needs to maintain vitality of thought, and cultural traditions, to stand among the nations in the world. Intellectual property culture in China is pregnant with the intellectual property law system transplantation and introduced. The profound change and influence of this process cannot do without the international community. In June 5, 2008, China's State Council issued the "outline of national intellectual property strategy", the intellectual property culture as one of the key part of this strategy. Advocating for intellectual property culture "respecting knowledge, innovation, integrity of the law" in the whole society. Construction of intellectual property culture has become an important component of China's ideological and political education in new period. However, the construction of intellectual property culture in China there is a dilemma, not only the concepts of intellectual property rights has win support among the people, for the establishment of the intellectual property system is often ignored cultural field, only focus on the construction of legal system. What is causing these difficulties, how to overcome difficulties, China's construction of intellectual property culture road should decide on what path to follow.

2 Intellectual Property Culture Outline

2.1 Cultural and intellectual property culture

Culture such as water, nourishes everything. In a sense, culture is a kind of valuable self-conscious peculiar to human beings, it is to distinguish from the animal kingdom. The first point of education is to inspire awareness. Formally proposed the term intellectual property culture is the 2003 World Intellectual Property Organization (WIPO) will be the construction of intellectual property culture into one of the strategic goals of WIPO, put forward the "intellectual property rights to promote development and prosperity, the establishment of intellectual property culture" of creativity, hope all parties to build a suitable for their needs of intellectual property culture. What is the culture of intellectual property right, the academic community has for its definition unable to agree on which is right, many scholars believe that the parent system of intellectual property culture is the culture of law. But the author thinks, the legal culture from the perspective of jurisprudence, starting from the legal norms of legal theory, and mental habits are studied, and can not be completely open to various forms of intellectual property culture. In the current Chinese intellectual property development without sufficient to support the basic theory, the culture of intellectual property right in any one culture system, is not comprehensive, research on intellectual property culture in China, can not ignore its existence characteristic.

Intellectual property culture is a kind of advanced culture, in China is in the enlightenment and cultivation stage, this stage is very fragile and special, many phenomena perplexing. Therefore, the

general understanding of intellectual property culture is better than in a narrow sense, and also conducive to the development of intellectual property culture. So the author advocates, intellectual property culture refers to human generated in the creation, use, protection, management, and other intellectual property rights related activities, all the spiritual concept of the impact of the development of intellectual property rights, and the cultural connotation of the intellectual property system and the material achievement reflects the value. It contains three internal structure, namely the intellectual property culture ideology, including intellectual property rights, intellectual property rights consciousness and conception of academic thought and behavior; The culture of intellectual property right system configuration, including the concept of cultural value behind intellectual property policies and regulations and management; and intellectual property culture material forms, including entity forms of intellectual property intellectual achievements can reflect the specific cultural individuality and commonness of connotation, such as trademark, patent products, cultural works what can show the culture.

2.2 The culture of intellectual property right and legal system

In China, the culture of intellectual property right and the legal system of intellectual property rights is accompanying. Intellectual Property Law refers to collectively regulate social relations caused by intellectual creation activities. From a legal point of view, the force of law reflected in the regulation of force on people's behavior, the behavior caused, change and termination of legal relationship, behind the law reflects the legislators expect in the legal system and the ideal order, select the should be made to the public proper behavior.

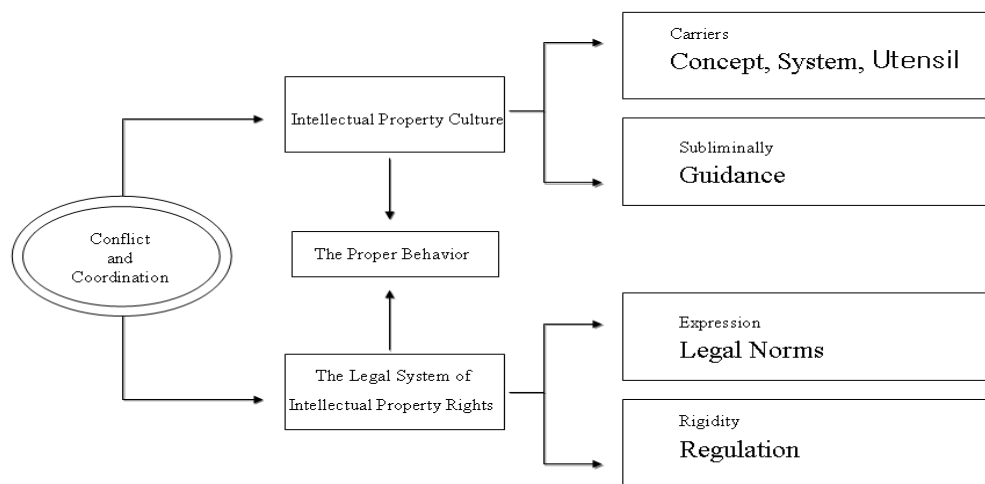


Figure 1 The Mechanism of Intellectual Property Culture and Intellectual Property Legal System

As the Figure 1 shows the different mechanisms about intellectual property culture and the intellectual property legal system. From a cultural point of view, consciousness is the core of the culture, it is influence character by environment leads and infiltration affect attitudes people's ways of thinking and behavior, and guide people's behavior habits and patterns, and accepted by the general public. That is to say, the influence of different mechanisms with rigid regulation is the culture of intellectual property right and the legal system of intellectual property rights have, they depend on each other, the legal system of intellectual property rights, the operation process and the degree of its validity, essentially depends on the current social culture is formed and adapt to the environment.

3 The Construction of Intellectual Property Culture Abroad

3.1 Development strategy of intellectual property rights in America and Europe

The United States is intellectual property power, also is one of the world's earliest establishment of the intellectual property system, intellectual property protection as a basic national policy to as early as the beginning of its foundation. The United States intellectual property system is built around the theme of the market economy, the combination of patent and trade is a prominent feature of the United States Patent policy.

In 2002 the United States Patent and Trademark Office issued a "twenty-first Century outline strategy", to develop a quality as the core, high working efficiency, sensitive to the market organization,

to support the market driven system of intellectual property rights. The main contents of American intellectual property strategy including law continuously revised and formulated, promote the transfer of technology, technology innovation, improve industrial competitiveness, strengthen the protection of intellectual property rights in international trade, the reform of the administrative institution of intellectual property rights, special emphasis on the research of patent strategy, and pay attention to strengthen intellectual property alliance with other powers.

With the basic completion process of intellectual property law in EC 1973 “integration”, as one of the intellectual property system and the modern legal important birthplace birthplaces of the European Union for the protection of intellectual property rights very seriously, in some ways even more strictly than the United States. Especially, the legal system of intellectual property rights is quite mature, supplemented by complementary measures. Notable is, there are some intellectual property divisions between the US and Europe, but not because of different views of the law, but in order to maintain their own competitive advantage and economic interests.

3.2 The development of intellectual property strategies in Japan and South Korea

Japan is the earliest implementation of patent system in Asia. In recent years, put forward “the information age of innovation, intellectual property country” policy, as well as the construction of “powerful Japanese” seven strategic. In 2002, Japan introduced include intellectual property right innovation strategy, the protection of intellectual property rights strategy, intellectual property strategy and intellectual property talent strategy four aspects of “intellectual property strategy outline”, and in the same year in November formulated the “intellectual property law”, then the security mechanism of the establishment of law and policy initiatives. These measures are largely targeted at china.

The industrial structure in South Korea began to change since late twentieth Century, the invention and utility model patent application volume growth success brings its per capita GDP growth, which rely on the rapid rise of intellectual property. According to researchers, South Korea in recent years in the research and application of life sciences and biotechnology has invested huge. South Korea also developed their own intellectual property strategy, it attaches great importance to IPR protection in foreign countries, according to statistics, South Korea not only pays attention to apply for a patent in China, the number of patent applications in the developed countries is far higher than china.

Table 1 Comparison of Intellectual Property in the Four Countries

Intellectual Property in the Major Countries	America (Since the founding of the American)	Europe (Began in England and France)	Japan (The earliest implementation of patent system in Asia)	South Korea (Relying on the intellectual property rights to drive GDP growth)
Intellectual Property Strategy	Aggressive and expansionary trends	Intellectual property law “integration” of the EC	Intellectual property protection, application, innovation and talent strategies	Pay attention to their own intellectual property protection in foreign countries
Key Areas and Characteristic	The combination of patent and trade	Legal system and matching system	Legislative and administrative support	Research and application of the life science and biotechnology

3.3 Enlightenment and reference

The development of intellectual property rights, many economic powers ahead of China is not only the legal system of intellectual property rights, and intellectual property research and construction. These measures with the background of national intellectual property strategy, the cultural connotation is more recessive. In the case of the United States of the world powers have gradually began to replace the traditional industrial economy to knowledge economy, the knowledge economy has come of age in the world. China must be sensitive to seize the new mode of human society transition period of economic development, respect for knowledge and talent, pay attention to intangible assets, especially economic patent accumulation. Secondly, the need to pay attention to supporting the establishment of the protection system of intellectual property rights, reducing the judicial cost, improve administrative efficiency, save the limited resources, better protection of intellectual property rights, and create a good environment for integrity of the law in the society. Once again, China in compliance with the rules of the world trade organization, to perform at the same time the international protection of intellectual property rights obligations, should also increase the intensity of innovation and basic research, explore the

intellectual property resources potential, create advantage areas, safeguard national interests, to make intellectual property culture and system construction of parallel and promote deepening.

4 The Plight of China's Intellectual Property Culture Construction

4.1 Chinese intellectual property culture and citizens

In recent years, along with the process of Chinese reform and opening-up, intellectual property has exerted great influence in the government, enterprises, universities and the theory, but from the ordinary citizen is the distance. On the one hand, excessive pricing knowledge product neglects the present Chinese consumer affordability and reasonable interests, misunderstanding and resentment for intellectual property. On the other hand, publicity and education of intellectual property rights under realistic conditions, in the economically developed city and area, people have a certain degree of understanding of intellectual property rights of Chinese citizens. But most of the people, the illegality of infringement of intellectual property rights do not have enough knowledge, even as the people have the right to intellectual property awareness of self-protection is quite indifferent, not good at through legal means to advocate and safeguard their legitimate rights and interests.

4.2 Chinese intellectual property culture and enterprise, society and the state

Intellectual property rights as an important lifeline of China's current development, the system construction and cultural construction need parallel. China whether can get rid of in a passive position on the issue of intellectual property rights, to build an innovative country, whether the protection and use of intellectual property effectively, slowly find advantages in the new round of International competition, hang upon this single action. The development of intellectual property culture is also a positive response to the party construction culture "big development, great prosperity", since 2008 the "outline of national intellectual property strategy" promulgated, China intellectual property culture rule set has been basically completed, but the consciousness of intellectual property rights has not yet win support among the people, there are many vacuum and confusion in the research field. Since a paragraph of period, China's intellectual property pays much attention to the legal construction, ignored legal spirit and value idea behind cover, the construction of intellectual property and cultural alienation, difficult to grasp.

At present, more and more Chinese entrepreneurs realize that intellectual property rights of the "soft power" have great significance for the enterprise competition ability and development strategy. However, there is a considerable number of enterprises weak awareness of intellectual property rights, infringement phenomena have occurred. The ability to use intellectual property to improve the competitive advantage of enterprises is very poor. The development of intellectual property in China is facing many inherent theoretical emptiness and external competition pressure, there is confusion and contradiction. In the construction of the legal system of intellectual property rights to achieve leap-forward development, research and development of intellectual property culture is extremely unbalanced.

5 The Causes of China Intellectual Property Culture Construction Difficulties

5.1 The influence of Chinese traditional culture

Respect knowledge is the basic value idea of intellectual property right culture, its performance for the whole of society widely advocated respect for talent, respect for creation, respect for rights idea; innovation is the culture of intellectual property right is the basic quality of spirit, its performance is to carry forward the innovation, the courage to compete, the spirit of tolerance of failure; integrity of the law is the ideological foundation of intellectual property culture benign orderly inheritance, its performance for the widespread practice of honesty and credit, law-abiding, comply with the public interest, the harmonious development of the fashion. But China lacks rooted soil for intellectual property culture to development. Some Chinese traditional culture and intellectual property culture does not adapt.

In the feudal society of China, the Confucian absolute legitimacy and political centralization, limiting the ability of expression and innovation thinking in a long time. On one hand, the invention and creation skills as "diabolic tricks and wicked craft", heresy, depend on the industry used to constraint, the rejection as the standard, technical personnel not only to reuse, and even attracted the fatal disaster. On the other hand, Chinese traditional society with particular emphasis on sharing collectivism culture, from knowledge possession, private domain and the public domain boundaries are fuzzy, "free", "sharing", "seeking" is considered to be one of self-cultivation and virtue, do not pay attention to the protection of private rights, nor pay attention to knowledge creation whether can bring tangible benefits. Therefore, it is easy to do not understand or blame for the intellectual achievements of use restrictions.

In addition, Chinese traditional culture has on the "past" very strong dependence, lack of

philosophical dialectic, are often loosely followed over all, gross consciousness persistence in society, especially in some economically underdeveloped areas, seriously hindered the spread and development of innovative fashion.

5.2 The internal conflict of intellectual property rights

The internal contradictions of intellectual property in the form of system of the intellectual property right in the field of culture, more requirements to increase research on basic theory of intellectual property rights. Some scholars conclude, the contradiction between mainly includes the knowledge product non-excludability and intellectual property monopoly exclusive, Scholars conclude, the contradiction between mainly includes the knowledge product non-excludability and intellectual property monopoly exclusive, conflicts between intellectual property rights and public interests. And the conflicts in these aspects such as intellectual property rights of knowledge of both excitation and inhibition, intellectual property rights and justice, freedom, regional and global, national and international.^[1]

In a word, study of intellectual property rights often pay attention to the practical benefit of knowledge economy can bring, and legal system building, policy strategy, while neglecting to explore its cultural connotation. Vision research is far from enough, many problems have not been solved, which intensified the internal contradictions of intellectual property rights.

6 The Way of Chinese Intellectual Property Culture Construction

6.1 Critically inheriting Chinese traditional culture

Material civilization and spiritual civilization are related to each other, any kind of cultural development, can not be completely out of the existence of the original environment and social foundation. For Chinese construction of intellectual property culture, first of all need to from the thought “liberation”, dialectical thinking about the essence of traditional culture, absorb and carry forward, to create a good social atmosphere of intellectual property culture. For example, in the traditional Chinese society and culture, the importance of education, attention to the inherent quality and moral spirit, suit one's measures to local conditions, ideas and intellectual property culture have in common. Should be absorbed on this cultural essence, making them more adapted to the spirit of the times of intellectual property culture.

6.2 Strengthening the research theory of intellectual property rights foundation

Cultural roots and development can not leap forward, it has followed step by step in the evolution of human society, the culture of intellectual property right is no exception. Therefore, the construction of intellectual property culture itself is a long-term, arduous and complicated engineering. The construction of intellectual property in China generally focus on the legal system of intellectual property and intellectual property strategy, and ignore the cultivation of the good social intellectual property culture, although this behind the time pressure, but need to be vigilant, not indulging in intellectual property construction like rootless duckweed. Practice the correct guidance of scientific theory, it is necessary in the University, enterprise and society to explore a set of intellectual property to basic theory research association cooperation, increase research efforts. The legal system of intellectual property rights to intellectual property and cultural support, and the practice of intellectual property law system have great influences on the evolution of intellectual property culture. That is to say, the construction of intellectual property culture in China needs the combination of China's current legal system of intellectual property rights in the reality, and on this basis to play the leading role of theory.

For example, some researchers and business managers are beginning to realize that, the urgency of cultivating enterprise culture of intellectual property, intellectual property culture enterprise positioning as “an innovative enterprise culture”, it will be incorporated into the system of enterprise culture. However, the enterprise culture is generally acceptable in today's world and look at perspective comes from the management, strategy and system level, the formation of enterprise intellectual property culture is the comprehensive effect of the coordination about all aspects such as environment, history, industry, human performance, etc.^[2] So the author think, if starting from the enterprise culture of enterprise intellectual property culture, it is not to be abandoned cultural education and cultivation. In the research of intellectual property culture should pay attention to from more aspects of the study field, to avoid biased.

6.3 Development path with Chinese characteristics of the intellectual property cultural

The development process of China's intellectual property rights has its own characteristics, so the Chinese cultural construction of intellectual property rights must be based on China's national conditions, exposure to the Chinese intellectual property strategy background, explore the development path of

development suited to their own, with its own characteristics in all aspects.

First of all, in the construction of intellectual property culture ideology should pay special attention to fusion of all kinds of useful theories, ideas, respect knowledge, education, cultivating citizen awareness of intellectual property; In the construction of intellectual property culture system form, should focus on technology innovation, cultivating innovative talents, such as the embodiment of the spirit of innovation and product innovation, advocating justice incentive mechanism, form a good creation, management, use and protection of intellectual property rights and social culture atmosphere; In the construction of intellectual property culture material form, should pay special attention to the integrity of the law, social law, such as trademark logo vector rational treatment, packaging, patent products contain culture, respect for cultural heritage, and fully demonstrated the unique value and charm of its connotation.

Then, to explore the establishment of safeguard measures a set of intellectual property culture, can introduce from abroad, but also can find inspiration from the existing mechanism in the system, the key is on practice. Support from the thought, strengthen innovation talents with professional knowledge and ability training. Support from the organization, increase the public intellectual property legal system publicity, and management mechanism construction. Protection from the conditions, the construction of all kinds of domestic and international intellectual property rights exchange platform, academic discussion and learning meaningful activities, increase the input of funds, improve the convenience of patent, trademark and other intellectual property retrieval system access, so people can quickly obtain information related to intellectual property rights. Support from the policy and system, reasonable pricing of enterprise knowledge product to safeguard the interests of enterprises and social public interest balance, improve the relevant legal system of intellectual property rights, promote in the process of reform and opening up and the socialist market economy environment, the rule of law and intellectual property culture, towards a more autonomous, science on the road ahead.

7 Conclusions

Culture is not only an important force in promoting social progress, but also a strong support to promote national prosperity. At present, research on the basic theory of intellectual property in China is very insufficient, often concern are hardly lasting in-depth, especially for the study of intellectual property culture has obvious shortcoming. Most of the people in China for intellectual property of universal awareness and consciousness is not enough, violations have occurred, no formation mechanism and environment to protect the knowledge property use, and lack of cultural sedimentation. Especially in Chinese enterprises, with independent intellectual property rights of quality rarely, practical foundation and capability of intellectual property is serious insufficient, which has affected the core competitiveness of enterprises, the more influence to academia to mature for the interpretation and research of intellectual property culture. All these make China among the pressure facing the world economic power, very easy to produce uncomfortable.

The author thinks, the cultural cultivation and construction of intellectual property in China, not to seek a similar concept is simple and applied in the past to explain inherent theory, research results can not passively waiting for foreign, blindly with international standards for transplantation. Attention should be paid to critically inherit traditional Chinese culture, a deep understanding of intellectual property culture concept, intensify IPR basic theory research efforts, taking a development path with Chinese characteristics of the intellectual property cultural.

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Research of First Mover Advantage of Innovational Brand Equity

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Abstract: This paper uses case analysis, literature search, and normative analysis to conduct the research. The paper firstly analyzed case of Bayer Aspirin, Based on this case analyze, And put forward first mover advantage is the important factor for development of different innovational brand equity. On this basis, It is considered that consumer switching cost, preemptive market entry and preemptive patenting are key factors to build innovation brand equity, and the preemptive market entry and preemptive patenting are key factors to first mover advantage of innovational brand equity. Then the paper thoroughly and systematically research the mechanism of each key influencing factors on first mover advantage of innovational brand equity. At last, This paper draw a conclusion that the innovation brand should make use of advantage of technology and consumers are in general risk averse psychology, adopt preemptive market entry, thus the innovational brand equity can be established easily, it also can make innovational corporation obtain competition advantage in the market.

Key words: Innovational Brand Equity; First Mover Advantage; Preemptive Market Entry; Preemptive Patenting

1 Introduction

As pointed out in some management literatures, the innovating brand equity represents a competitive advantage that is protected by high imitation barriers due to the combination of high ambiguity and legal property rights. However, as Porter has pointed out, a competitive advantage building on innovative brand equity is not a cause but rather an outcome.^[1] Moreover, marketing expenditures also often quoted as investments in brand equity, they are insufficient in building a strategic advantage since such marketing expenditures are easily imitated. Nevertheless, companies can differentiate their products and service from the offerings of competing companies through marketing activities by building subjective attributes. However, if the product or service does not hold its promises, the advantage generated through marketing expenditures will be very short lived.

The starting point of any positive reputation or image associated with a certain trademark or brand name is the underlying superior product and service offering. Thus, the starting point of any superior brand recognition is a technological advantage the company holds in relation to competitors. This advantage generates by offering customers an objectively superior product and service a positive image on the market. Firms own such a technological lead, and they are able to enter a market ahead of competitors with a new or improved product or service, so they are called first mover firms. Such a first mover position is either gained through good luck or through the systematic generation of new immaterial technological assets. As Schmalensee has pointed out, These original innovators have three significant advantages besides the possibility to appropriate the returns of investments in research and development due to their temporary monopoly position. These three advantages that emerge from technological innovation, are the possibility: (1) to move down the experience curve ahead of competitors, (2) to acquire scarce complementary resources and thus preempt competitors, (3) to lock in customers through high switching costs.^[2] As will be presented, all three first mover advantages can be used by the original innovator to efficiently establish innovational brand equity which in turn represents a considerable and extremely long lasting market entry barrier for companies envisaging to subsequently enter the market.

2 An Example

The technical advantage and brand equity is a support helping enterprises gain sustaining competitive advantages. For example, Bayer has succeeded due to its strong global brand equity Aspirin to dominate the ASA (Acetyl Salicylic Acid) market over a period of more than 100 years, Because it had obtained widespread patent protection and preemptive market entry for its innovation. Bayer AG which had been one of the early companies developing new drugs entirely within the company through organized R&D(Research and Development) activities, it is still one of the leading European companies

with respect to R&D expenditures in the pharmaceutical field. In fiscal year 2009, Bayer had invested some US \$ 2.18 billion in R&D activities in the field of Pharmaceuticals. Moreover, with respect to ASA Bayer AG even represents the only company devoting significant financial resources to research and development. Thus, Bayer AG has occupied since the early 20th century a technologically leading position in the field of ASA and has defended its position throughout the century by significantly investing in R&D.(see, table 1). On the other hand, ASA is no longer the drug of first choice in all countries, nor is Bayer Aspirin the undisputed leading brand in the analgesics market. Nevertheless, the brand equity is still the second most important international analgesics brand in the world after Tylenol and represents one of Bayer's most important pharmaceuticals. In fiscal year 2009, for example, Bayer Aspirin was the company's 3rd most important pharmaceutical in terms of sales with an annual turnover of some US\$ 980 million(see, table 2).^[3]

Table 1 Most Important Brands of Bayer AG in the Field of ASA

Year	Innovation	Advantage	Brand
1899	Acetyl salicylic acid	Effectiveness, Low side effects	Aspirin®
1900	ASA Tablet	Ease of dosage, Reduction of consumer	Aspirin®
1904	Soluble ASA Tablet	Ease of utilization	Aspirin®
1971	ASA + Vitamin C effervescent tablet	Reduction of side effects, vitamin C	Bayer Aspirin+C®
1992	Chewable ASA tablet	Ease of utilization	Bayer Aspirin direkt Kau-tablet®
1993	Enteric coated ASA tablets for the long-term treatment & heart attack prophylaxis	Effectiveness in the treatment of heart attacks, improved gastric tolerability	Bayer Aspirin Protect®
2000	ASA Tablets for treatment of migraine	Effectiveness in the treatment of strong pain	Bayer Aspirin Migraine®

Source: Bayer annual report (2005).

Table 2 Bayer AG's Most Important Health-Care Products in 2009

Pharmaceutical Brand	2009 Sales (US\$ million)	Change to Previous Year
Ciprobay®	1,959	18%
Adalat®	1,421	6%
Aspirin®	980	6%
Kogenate®	477	-3%
Glucometer Elite®	394	19%

Source: Bayer annual report (2010).

3 Methodology and Analyze

The above presented case studies Bayer Aspirin have the aim to further specify research focus, point out the relationship between technological advantage and preemptive market entry based innovational brand equity, In this respect it has to be stressed that Bayer Aspirin had built and fostered its market based and technology based competencies in close interrelation. Whereas in both cases the starting point presents a technological innovation, the long-run success of the Bayer Aspirin relies on the mutual influence of technological expertise and brand equity. Thus, the brand equity was built and maintained by the companies' specific technological expertise, on the other hand, the companies were able to defend their technologically leading position because of the established brand equity. The following research investigates in particular how established innovational brand equity influences the switching cost of customers, as well as which enable innovational companies to most efficiently build innovational brand equity.

3.1 Innovational Brand and Consumer Switching Cost

The customers can often not evaluate the objective quality of a certain offering ex ante consumption^[4]. By assuming that consumers are in general risk averse, they stick to the brand on which they possess the most information about its quality even if the established brand is more expensive than unknown 'me too' brands. One famous management scholar Schmalensee has cited the example of prescription drugs, where following companies cannot overcome the disadvantage vis a vis pioneering brands by merely offering the same pharmaceutical at a lower price, but they have to offer distinct

therapeutic benefits. Thus, consumers can be expected to face considerable switching costs if they have to change to a brand whose quality they do not know in advance. This phenomenon is particularly pronounced in industries that are featured by high cost of acquiring information, a low frequency of purchase, and relatively stable technology and consumer requirements. On the other hand, also an information overflow can be assumed to increase consumers brand awareness because of the extremely high costs of information processing.

But why do first mover have an advantage in building innovational brand equity? Psychological literature argues that customers pay disproportionate attention to innovations. Consequently, pioneering brands will occupy a relatively large mind share. Moreover, a first mover firm occupies a temporary monopoly so that customers do not have the choice between several different product offerings sold under different brands and consequently customers acquire significant information about the pioneering brand, in addition, the initial innovator is able to define the product or service attributes which customers will subsequently consider as important within a particular product or service category.^[5] Thus, successive entrants have to invest considerable amounts in advertising, offer their products and services at considerably lower prices, and have a significantly superior offering in order to attract customer attention and create purchasing incentives.

Thus, established innovational brand equity can be assumed to be an important market entry barrier for late movers that cannot be overcome by offering the same product and simply charging a lower price than the established firm. It follows that established innovational brand equity presents an important strategic advantage which puts in particular 'me too' brands at a disadvantage and thus effectively deters potential market entry. However, how can firms possessing a certain invention establish most effectively brand equity that builds a significant market entry barrier for subsequent entrants in the market?

3.2 Innovational brand equity and First Mover Advantages

As pointed out in the preceding discussion, companies that are first on the market with a certain innovation which creates a perceivable consumer benefit, it have advantages in building innovational brand equity vis-a-vis late movers. Moreover, such established innovational brand equity which combines legal and reputational aspects, represents an important strategic resource due to asymmetric information prevailing on most markets about the objective quality and characteristics of the various offerings and the risk aversion of customers. Thus, established innovational brand equity increases customers' switching costs and in turn augments customer loyalty. However, which factors do lead to such first mover advantages that result in a persisting strategic advantage? The following sections analyses in particular the two factors of preemptive market entry and patenting which are crucial in the establishment of innovational brand equity.

3.2.1 Preemptive Market Entry

Innovational firms are, by definition, the first to offer a certain product or service on a specific product, service, and national market. Advantages of preemptive market entry that result in a innovational brand equity position emanate from four main effects: (1) Fast establishment of loyal customer base, (2) Opportunity to gain broad distribution,, (3) Benefit of learning curve and economy of scale effects, (4) Standard building prospect.^[6] As already discussed above, customers pay more attention to innovations as to subsequent 'me too' products and gain information about the quality of the innovational brand since they cannot choose between different comparable offers. Thus, first mover firms can benefit from a rapid formation of their customer base which will show a high brand loyalty. This is due to the temporary monopoly position of the innovator and the customers' accumulated information about the quality of the products and services sold under the specific brand. Moreover, innovators can by simply being a pioneer, profit from a advantaged product image. Hence, pioneering firms have to spend less on marketing and promotion activities to inform customers about their offerings and simultaneously profit from a positive image of being the 'innovator.' Another point in advantage of being first is that innovators can in general more easily establish a broad distribution and obtain advantageous shelf or store space locations.^[7] This represents a significant advantage since customers' contact with the brand is improved so that brand awareness will be increased. Moreover, in industries where retailers have a decisive influence on customer purchasing behaviour and represent an important source of information about the product quality (so called 'shopping good') a broad distribution can lead to advantaged sales figures. However, in industries where retailers can reliably evaluate product quality and endanger their reputation in the case of inaccuracy of the evaluation, the positive effect of a broad distribution gained by the innovator may be relatively unimportant and short lived.

In industries where learning curve and economy of scale effects prevail, first-mover firms can build rapid brand recognition which in turn increases the quantity sold and thus drives again economy of scale

and learning curve effects. Consequently, the innovational firm will by following a target costing strategy, efficiently deter imitation and market entry in the long-run due to the impossibility of subsequent market entrants to eliminate the innovator's cost advantages. As can be seen in figure 1, the demand curve D1 shifts out to D2 due to the increased appeal of the good through the innovation. By lowering the prices from P1 to P2 the innovator increases the quantity sold from Q1 to Q2. Consequently, the innovational firm benefits from a reduction in the long-run average cost (shift from LAC1 to LAC2) because of EOS (Economies of scale) and learning curve effects due to the increase in quantity sold.^[8] Thus, late-mover firms which are expected to sell lower quantities because of the lack of established brand equity, will be effectively deterred from entering the market by the innovator's predatory pricing strategy.

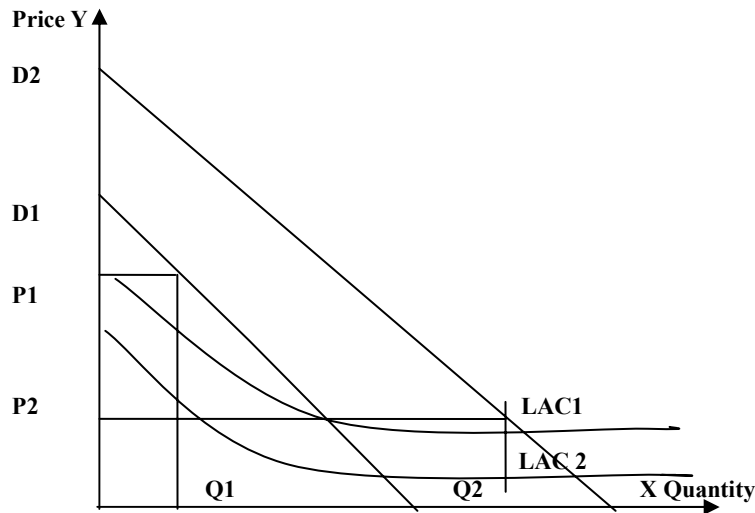


Figure 1 Market Dynamics of Innovation

Another advantage of innovational companies is their ability to establish a product or even technology standard. Once consumers are used to the qualities of the leading brand subsequent entrants have to carry out the same qualities and they have to invest in informing the customers about the specific qualities of their offering. Although, late-movers may be able to offer the same product or service with some new features and at a lower price, customers may stick to the established innovational brand because of the acquired information about its quality and the risk-aversion of customers. Moreover, if a brand that customers rather perceive as a late-mover offering comparable products at a lower price, and tries to sell a high priced innovative product, customers may just get confused since the product may not fit the brand's image or reputation. Consequently, the company has to invest in intense customer information and still faces an extremely high risk that the market launch of the innovation may result in a complete failure.

3.2.2 Preemptive Patenting

Another advantage of first-mover firms and in particular firms that generate patentable inventions that they can deter immediate imitation of its invention by legal prosecution of patent infringers. However, as broadly discussed, the patents do not bestow its holder with perfect protection, thus appropriation of the returns of the innovation. In most industries patents are invented around within a few years, they are obviated on another legally feasible way years before the actual patent right officially expires.^[9] Although, the temporary monopoly position delivered by the patent right may be too short to appropriate an adequate part of the returns of the innovation, it may be sufficiently long to establish market based brand equity. Moreover, as a patent attorney pointed out, patents do represent an important 'image object' since the company can efficiently communicate competitors, the potential cooperation partners as well as customers its inventive capacity and the leading technological position of its products and services by filing patents. Thus, we can argue that companies can by filing for patent protection on their technological innovations, it benefited from a temporary monopoly not only to appropriate a sufficient part of the returns of the innovation to justify the investments in their generation, but also to establish market based assets such as strong brand equity. Thus, the innovative companies bestowed

with patent protection of their invention may be able to benefit of a longer duration of its monopoly position and thus to more effectively establish considerable brand equity vis-a-vis innovators not owning patent right protection and hence a legal monopoly over their technological invention.

The innovational brand equity in contrast to patent rights and technology in general extremely long-lasting and hard or even impossible to obviate by competitors. Once the innovational company has successfully established a advantaged brand equity position with regard to later entrants by means of its temporary monopoly position established by patent right protection, the company benefits of the advantages of a company that followed a preemptive market entry strategy. These market based advantages will persist even if competing companies succeed in inventing around the subject matter of the patent or if the patent right expires. Thus, patent protection bestows the innovational company with a legal monopoly that subsequently enables it to effectively build complementary brand equity. The established innovational brand equity will then substitute for the loss of patent protection once the patent has expired or competitors have successfully invented around the subject matter of a valid patent right. Accordingly, Schmalensee has stressed: "By granting pioneering brands exclusive use of their trademarks forever, society grants something like a patent with infinite life."^[10] Consequently, the innovational brand equity can be classified as an important strategic resource that may enable an inventing company to efficiently uphold market entry deterrence or at least bestows the innovator with a long lasting advantage which enables him to appropriate a significant part of the revenues generated by his innovation. A prominent example of a company that successfully used its monopoly position due to patent right protection to establish innovational brand equity represents the case of the innovator of NutraSweet.

4 Results

Consequently, first-mover firms benefit from lasting advantages vis-a-vis later entrants. This is in particular true in industries characterized by durable, irreversible, market specific assets, such as innovational brand equity, and that are not subject to frequent changes in the underlying technology. Moreover, established market-specific assets are of particular strategic importance in markets where information about product quality is difficult or even impossible to obtain ex-ante purchase (e.g., in the case of experience and credence goods), or if the perceived risk of the purchaser is relatively high. This is in particular the case if the product or service is infrequently purchased and thus private information are incomplete, if the unit price is high, and if the consequences of a bad choice are significant. These factors create a high importance of innovational brand equity in conveying information about a product's quality and create a high awareness of the consumer about the pioneering brand. In addition, first movers benefit from the consumers' information advantage in relation to subsequent 'me too' brands due to previously accumulated experiences. These accumulated information create a significant customer lock in due to apparent brand switching costs. In these circumstances pioneers have an advantage in developing brand equity with regard to later entrants.^[11] The established innovational brand equity, in turn, represents an important sustainable strategic advantage which may enable the innovator to effectively deter market entry.

5 Conclusion

Nevertheless, one has to keep in mind that technological innovation and preemptive market entry does not unreservedly entail success. Various scholars have stressed the immanent disadvantages of being first since fast followers may be able to enter a market more efficiently due to the opportunity to learn from the original innovator's experience.^[12] This is in particular the case in industries that are confronted with frequent changes in the underlying technology or where no dominant design has been established yet. Moreover, in markets where no uncertainty and thus no risk for the purchaser exists, the brand equity does not have a significant economic value. In such circumstances pioneering firms cannot rely on establish brand equity as a sustainable strategic advantage and consequently followers may be able to leapfrog market leaders. Thus, the innovation brand should make use of advantage of technology and consumers are in general risk averse psychology, adopt preemptive market entry, so the innovational brand equity can be established easily, it also can make innovational corporation obtain competition advantage in the market.

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The Optimal Allocation of Regional Science and Technology Resources Based on Cooperative Game Theory

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Abstract: The level of scientific and technological resource allocation is directly related to the momentum and direction of regional science and technology and economic development. Optimizing the allocation of scientific and technological resource is a core issue enhancing the regional independent innovation capability and national competitiveness. This paper starts from the main body of regional science and technology resource allocation, introduces the cooperative game theory, researches and analyses on the path of optimal allocation of regional science and technology resources.

Key words: Region; Scientific and technological resource; Optimal allocation; Cooperative game; Path choice.

1 Introduction

Technology innovation refers to the sum of all kinds of resources which the main body of science and technology innovation is used for achieving economic and social benefits in technological innovation activities. Science and technology resources allocation is according to the needs direction, various scientific and technological resources' allocation usage in different subject areas, process, space and time. The key of optimal allocation of regional science and technology resources is to handle the relationship and responsibilities between the configuration principal parts in the region correctly. The core issue is to maximize the efficiency of the regional resources allocation to make it more adapted to the needs of the development of regional technology and economy. Currently, there forms a view in domestic academic circles about regional resources allocation's research, dominated by market allocation and supplemented with government allocation. About how to define the concept of scientific and technological resources and expand the scope of the resources allocation, there are also some studies in the academic circle. However, there are few system studies about the relationship and responsibilities between the configuration principal parts of the optimal allocation of regional science and technology resources. Therefore, this paper tries to take governments, companies, universities, research institutions and other regional science and technology source distributions as the object of the research, uses cooperative game theory to analyze the main characteristics of the configuration, and form a good pattern of having an accurate position, creating synergy innovation, optimizing the regional configuration in regional innovation system.

2 The Optimal Allocation of Regional Science and Technology Resources Based on Cooperative Game Theory

In order to achieve goals, regional science and technology resource distributions will maximize the use of community resources and improve the input-output ratio according to their affordability in a certain region. In reality, a subject of science and technology resource allocation will become the dominant integrated and consolidated with other subjects of science and technology resource allocations in the hands of technology resources. It will become the subject of science and technology resource allocation temporarily, i.e., to become the main user of scientific and technological resource allocation and other subjects of science and technology resource allocation will become a provider of scientific and technological resources. In a certain region and different kinds of events, each subject of science and technology resource allocation configuration will become either the provider or the main user of the science and technology resource allocation. Under different conditions, the main user of the subject and the resource provider can be transformed into each other and occur linkage of changes. All aspects have mutual contacts and effects. Any problem existing will affect the overall effect of technology resource allocation.

The main user of the subject of science and technology resource allocation will always consider the bearing capacity and satisfaction degree of the provider of science and technology resource allocation to

decide the use of specific configuration measures. And a rational resources provider will forwardly consider the interests and requirements of the main user when they are deciding on which actions to take. If the main user and the resource provider can take a cooperative attitude and reach some kind of agreement to which they can both obey, then a cooperation game relationship will be formed in the optimal allocation of regional science and technology resources.

The cooperative game which includes more than 2 players is called multiplayer cooperative game. Assuming the player number is 3, it is possible to form a situation which includes all 3 people participating or 2 of 3 people in the collaborative. To the union which is formed by 2 people, two people can make their maximum benefit and the possible distribution of benefits may dominate the formation of alliances. Set the main user as M_A , and the technology resources he owns as $R = (x_1^k, x_2^k, \dots, x_r^k)$, r . And R is the number of types of resources. According to various main users of scientific and technological resources, we form n sets of strategies. Based on how much their vote in person, we can desire m sets of configurations, then $\sigma_{Ai}^k = \{f_{ij}^k(x_1^k, x_2^k, \dots, x_r^k), (j=1, 2, \dots, m)\} (i=1, 2, \dots, n)$. Set the number of resource provider ($z=1, 2, \dots, z$) is Z and the main user's science and technology resources allocation strategies $\sigma_{zj}^k = (u_{zj}^k / d_{zi}^k) \times 100\%, (i=1, 2, \dots, n)$ are NO. Z resource provider's satisfaction to optimal allocation policy $f_{ij}^k(x_1^k, x_2^k, \dots, x_r^k)$.

Regional science and technology resource optimal allocation of cooperative game really needs to go through two levels of the game process to determine the cooperation game solution. The first level of the game is resource provider Z 's game process and it corresponds to one of the main user's strategies. It assumes that there is a collection of all non-optimal allocation schemes. (Central Core) (In cooperative game theory, non-optimal describes the concept of allocation scheme n is not only to meet the satisfaction individual rationality $x_i \geq U_i$ and to meet the rationality of "small collective". Otherwise it is impossible to achieve the large group N 's allocation scheme as well as the alliances. Core (Core) represents the collection of all non-optimal allocation schemes.) When selecting an allocation scheme in the core issue, the person will no longer be able to reject the proposal. Under this kind of allocation scheme, it is possible to achieve maximizing the collective interests of the main user. Set B as the collection of the resource provider, corresponds to the main user of the No. I strategy. The resource provider selects the most optimal allocation scheme σ_{Bip}^k (A allocation scheme in the core issue.) from M sets of strategies.

The second level of the game is the game process between the collection of Z resource provider and the main user is the Z -game consisting of a collective resource provider B and the main use M_A , corresponds to n sets of strategies $\sigma_{Ai}^k = \{f_{ij}^k(x_1^k, x_2^k, \dots, x_r^k), (j=1, 2, \dots, m)\} (i=1, 2, \dots, n)$ of the main user M_A . The collection of resource provider B selects n optimal strategies $\sigma_{Bip(i)}^k (i=1, 2, \dots, n)$ from m strategies. Then the main user M_A and the resource provider B select the best cooperative game solution through consultation from n sets of strategies $(\sigma_{Aip(i)}^k, \sigma_{Bip(i)}^k)$. It is to say, the main user M_A and the resource provider form a big alliance N to achieve the maximum benefit $V(N)$. And through selecting a best allocation scheme from n sets of strategies, they give the maximum benefits to the people in the game. People get benefits from distribution in more than (or not less than) the benefits they get from doing it themselves or forming small groups.

Set $u_{A(ij)}^k = e_{Aij}(x_1^k, x_2^k, \dots, x_r^k) - c_{Aij}(x_1^k, x_2^k, \dots, x_r^k)$ as the actual profit the main user can get from the strategy $f_{ij}^k(x_1^k, x_2^k, \dots, x_r^k)$ after putting technology resource $(x_1^k, x_2^k, \dots, x_r^k)$, $e_{Aij}(x_1^k, x_2^k, \dots, x_r^k)$ is the benefit and $c_{Aij}(x_1^k, x_2^k, \dots, x_r^k)$ is input costs.

Set $u_{B(ij)}^k = e_B(f_{ij}^k(x_1^k, x_2^k, \dots, x_r^k), \sigma_{Bj}^k) = \sum_{z=1}^Z u_{z(ij)}^k (f_{ij}^k(x_1^k, x_2^k, \dots, x_r^k), \sigma_{zj}^k)$ as the total benefits that the collection of resource providers B can get after the main user's technology resource allocation scheme $f_{ij}^k(x_1^k, x_2^k, \dots, x_r^k)$. Then the game matrix of the collection B of Z resource providers and the main user can be expressed as table 1.

Table 1 Regional Science and Technology Resource Allocation Game Matrix

	σ_{A1}^k	σ_{A2}^k	...	σ_{An}^k
σ_{B1}^k	$(u_{A(1,1)}^k, u_{B(1,1)}^k)$	$(u_{A(2,1)}^k, u_{B(2,1)}^k)$...	$(u_{A(n,1)}^k, u_{B(n,1)}^k)$
σ_{B2}^k	$(u_{A(1,2)}^k, u_{B(1,2)}^k)$	$(u_{A(2,2)}^k, u_{B(2,2)}^k)$...	$(u_{A(n,2)}^k, u_{B(n,2)}^k)$
	\vdots	\vdots	\vdots	\vdots
σ_{Bm}^k	$(u_{A(1,m)}^k, u_{B(1,m)}^k)$	$(u_{A(2,m)}^k, u_{B(2,m)}^k)$...	$(u_{A(n,m)}^k, u_{B(n,m)}^k)$

In summary, the formation under cooperation game of regional science and technology resource allocation can be seen as resource providers in a certain region, and resource providers have cooperative game. The main user and resource providers have cooperative game, and it is the results of these two levels. In table 1, there is a benefits allocation scheme which is negotiated and both sides can accept in cooperative game theory matrix. Through negotiations, in the premise of taking the collective rationality into account, users can find an optimal decision scheme which is good to both the main user and the resource provider.

3 Conclusion

The correct understanding of the regional science and technology resource allocation will provide objective evidence to the regional science and technology planning, science and technology system reformation, science and technology running structural adjustment, optimal allocation of regional science and technology resources, science and technology management, and make the regional limited human, material and financial resources to achieve the best integration of technology resources.

Under the circumstance that the amount of regional technology resources is constant, the best way to improve technology resources outputs efficiency in short-term is through expanding integration technology resources and achieving the maximum outputs in optimization configuration. Technology resources configuration is in the premise that it won't damage any benefits of technology resources providers, and not reduce any technology resources of the technology resources provider to find an optimal decision scheme which is the best to both sides in different regulatory means and different application areas. It will achieve the optimal allocation of technology resources. In the process of science and technology resource allocation, each main configuration should enhance communication and take positive and cooperative attitude to form a cooperative game and meet the effects of "1+1>2".

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Conversion Management of Patent Achievements in Colleges and Universities of China Based on Triple Helix Model

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Abstract: Nowadays, patents in Chinese colleges and universities grow quickly, but the rate of the patent achievements conversion is low. How to improve the patent achievements conversion in colleges and universities is becoming an essential task. This paper uses triple helix model to solve the problem of patent achievements conversion in colleges and universities of China. It puts forward the specific method including: guided by the triple helix model, colleges and universities should make the system construction, platform construction and talent team construction regular, strengthen the relationship among colleges and universities, enterprises and government, making use of the social resources, and broaden the channels of patent achievements conversion. Thus they can achieve the goal of promoting the patent achievement conversion.

Key words: Triple helix model; Colleges and universities; Patent achievements conversion management

1 Introduction

The western developed countries attach great importance to the conversion of patent achievements and have achieved very good results. According to statistics, the western developed country patent achievements conversion rate is more than 45%, and the transformation of science and technology to production ratio has reached 60%~80%. The output value of high-tech enterprises has reached 25~30% of the social total output value proportion.

The report (2010) of colleges and universities intellectual property in China shows that from 1985 to 2010, the total number of patents application in colleges and universities are 319,595, and the average annual growth rate is 19.8%. Cumulative patent authorization amounts to 150,029, and the average annual growth rate is 26.0%. In 2010, there are 79,332 applications of patent in Chinese colleges and universities. The number is 52 times compared with that of 1985. Meanwhile the number of patent grant is 4,3153, which is 113 times compared with the figures from 1985 to 1986. According to statistics, during the period of "11th five-year plan", a total of 284,856 colleges and universities across the country apply for patents, but only 130,404 of them has acquired the licenses and among all the patents only 8,223 has been transferred into practical application(accounting for 8.65%), and this figure is far lower than that of developed countries (accounting for 60% to 70%). For example, the survey named "Chinese Patent Licensing and Maintaining in Wuhan's Higher Educational Institutions During 2005 to 2008", given by Wuhan University and Wuhan Intellectual Property Office, has illustrates that among 15 universities, 147 of 590 have been applied (only occupying 24.9%), whereas there are still 211 of 443 haven't achieved conversion. As a result a large number of patent achievements are idled. Thus, it can be seen that the distance between the increasing number of patent licenses and the low patent conversion rate has arisen a serious issue. How to deal with the issue and promote the patent conversion rate is becoming a significant problem faced by all Chinese higher educational institutions.

2 The Role of Triple Helix Model in Colleges and Universities' Patent Achievement Conversion Management

Triple helix model is given by sociology Professor Henry Etzkowitz of New York University in 1995. It is about the interaction and synthesis between enterprises, universities and governments in the regional economic development. The model is based on the biological characteristics, molecular biology and the molecular structure of the double helix of DNA crystallography three-spiral structure. That means the university, government and enterprise in the process of innovation, close cooperation and interaction, should keep their own independence and characteristics^[1]. Colleges and universities, enterprises and government use structure arrangement, system design and overlapping to affect each other, in order to form the increasingly spiral "triple helix" relationship to achieve resource and information sharing and full communication among all of them, and finally achieve maximum beneficial effects. William research shows that in the triple helix model, the cooperation among the different

organizations explains the success of technological innovation network application and commercialization of leap^[2]. According to the triple helix model, universities, enterprises and governments need to play an important role in social innovation and development. At the same time, the development of society will constantly push the colleges and universities, enterprises and governments forward, as a result of a positive tendency.

The role played by triple helix model in colleges and universities' patent achievement conversion management is quite important. In the late 20th century, a lot of colleges and universities in Europe and the United States, such as MIT and Stanford universities, the Munich Technical University and etc., make full use of their own patents and set up high-tech companies to accelerate the conversion of patent achievements and incubation, creation, and establishment of new industries. The universities, enterprises and government form three spiral patterns to develop closely social link. Through methods such as school-run enterprises directly involved in the conversion of scientific and technological achievements, the good social effect and economic effect have been created as a result. The patent achievement conversion based on triple helix model mainly functions in the following three aspects: first, push the universities to become the source of technology transfer. Triple helix model elements arranged through the positive reconstruction and innovation adjust and improve the original innovation of science and technology, making the universities, companies and governments maximize the participation and cooperative engagement. In this process, colleges and universities use their intellectual resources, acting as central agencies to unite enterprises and governments closely and to realize their social and economic goals in the development of social economy. The triple helix model also plays an increasingly prominent role in innovation radiation effects. Using the Massachusetts Institute of Technology for example, it insists on synchronous development in economy and discipline, and produces great economic benefits and social benefits. The school's graduates and teachers have created more than 4,000 enterprises around the world and about 1.1 million jobs, with annual sales up to \$2, 32 billion, which equals to about \$1,16 billion GDP, what is a little lower than South Africa, but is higher than Thailand^[3]. Second, triple helix model can promote the patent achievements more in line with the needs of society. Triple helix model is a kind of multivariate innovation system, and the premise of its growth is encouraging innovation activities from all walks of life. Because universities enable to understand social needs accurately by exchanging information with enterprises and governments, and thus the university's patent achievements will be more in line with the societal demand and reduce the "junk" patent and inspire teachers with more innovative ideas to development services for the society. Third, triple helix model can provide an open and dynamic information model for the patent conversion. Under the triple helix model, colleges and universities, governments and enterprises are participating in the science and technology innovation activities, which makes colleges, enterprises and governments contact more closely, exchange information more smoothly and makes enterprise understand latest patent achievements in colleges and universities more conveniently and utilize new patent achievements to upgrade technologies more actively.

Thus, under the guidance of triple helix model, the conversion rate of patent achievements in European and American countries are greatly increased, which can be of great references in the conversion of scientific and technological achievements in China.

This article analyzes the present situation and problems of patent achievement conversion of colleges and universities by applying triple helix model in China. The purpose is to solve the existing problems and promote the conversion of patent achievements.

3 Reasons for Low Conversion Rate of Patent Achievements in Colleges and Universities

3.1 Useless patents accounting for a large proportion

The patent is the premise of the achievement conversion, and R & D subsystem's function is to create the patent. Comrade Deng Xiaoping once mentioned, science and technology is the first productivity. Science and technology plays an important role in the development of our society. Colleges and universities, as an important force of innovation of science and technology, have made great achievements in the aspects of scientific and technological innovation efforts. According to statistics, for each year, China's colleges and universities obtain patent achievements even more than 10,000, but the real implementation of conversion and industrial achievements is less than 1/10. The college and university's technology innovation ability has been greatly improved, but patent achievement conversion of is still too slow. Although this external cause results promotion, but the most important is the college

and university's patents do not meet the development needs of the market and enterprises. They produce a lot of "useless" patents, wasting the massive science and technology resources and human resources.

3.2 Irregular teachers' evaluation mechanism

The number of funds is an important index. The evaluation of college and university's scientific research strength and social status therefore relies on the evaluation of teachers. Teachers tend to undertake research projects, publish papers and awards as the standard, quantitative indicators and detailed assessment contents. Positive evaluation mechanism can inspire the college and university teachers' research projects, published papers for science and technology awards, but indirectly block the path of patent achievements conversion. Many teachers do research on patents or identification of patents, more often than patent achievement conversion, because it is more conducive to the examination, a period of school status consolidation. Therefore, teachers' evaluation mechanism, focusing on theoretical research, is not conducive to the patent achievement conversion and the restrict output of the patent achievement conversion of colleges and universities.

3.3 Irregular research project review system

At present, the longitudinal research projects from China's government financial allocations are declared by the Science and Technology Management Department of College and University organization. Research projects focus primarily on the basis of fields, so the technology project review is paying attention to the model of project application, neglecting the project itself, and is not conducive to the patent achievement conversion. This brings two problems: firstly, for the College and University Science and Technology Management Department in the declaration of the project, research contents mainly focus on application projects, but the market value and real value are ignored. The teacher will be in the "baton", pointing to the direction of the project, and they do not consider the market demand and the achievements of the scientific research project. Secondly, the course of the study focuses on the theoretical analysis and evaluation, and the results are often laboratory prototypes or theoretical papers, and monographs, generally not referring to the problem of markets or enterprises and being out of touch with reality.

3.4 Lack of professional talents

Patent achievement conversion team in colleges and universities is mainly composed of two parts, namely, the patent achievement conversion department and the scientific research personnel. In colleges and universities, the scientific research personnel understand their professional knowledge and are good at the innovation and scientific research in model, but for the needs of the markets and enterprises, they do not know much besides lack of patent achievement promotion ability and management experience. Conversion of patent is the department responsibility for the patent achievement promotion agency. The staff should not only have a certain understanding of the major and important patents, but also understand the society and the demand of the enterprises. Now many universities of the patent department staff are very difficult to have these qualities, which affects the conversion of our patent achievements in certain extent.

3.5 Deficiency of strict process protection and management system

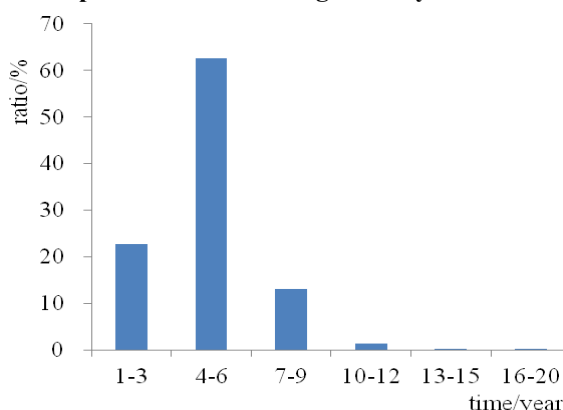


Figure 1 Duration of Effective Invention Patents in Higher Institutions

First of all, the lack of censorship for patent applications leads to the great number of but low quality applied patents, many of which have no practical use. Secondly, disregarding the management of authorized patents also plays a great role. According to statistics, in colleges and universities, effective

invention patents last time (life) distribution as follows: 1-4 years 17,055, accounting for 48.2%; 5 years or above, 18,358, accounting for 51.8%^[4]. Nearly half of the invention patents give up their rights four years later, which further induces the less likely conversion of patents (Figure 1). Thirdly, the path for patent achievement conversion is singular, which lacks of professional and efficient patent achievement conversion platform.

4 The Advices for Patent Achievement Conversion Management in Colleges and Universities

Patent conversion is considered a systematic work according to triple helix model. During the process, universities, enterprises, and governments are indispensable in the conversion chain. It is necessary and important for universities to coordinate the relationship between businesses and governments, and build the university - enterprise - government three-spiral pattern. Based on the triple helix model, universities should establish a close connection among corporations and governments, by making rules and regulations as the foundation, also by establishing platforms and cultivating talents as the guarantee. Maximize the social resources and widen the conversion path to promote the patent achievement conversion.

4.1 Strengthening the “direction” function of system

The scientific research evaluation system has a thorough knowledge of the control and guidance for university teachers and technical personnel. Colleges and universities should actively carry out the relevant research, and constantly perfect the scientific evaluation system as well as enhance the scientificity and operability of the evaluation performance. Specifically, the patent conversion system construction in colleges and universities not only need to have a clear distribution of interests, but also should be linked to teachers' title promotion, performance appraisal, etc. Only ensure the patent conversion to be closely linked to the immediate interests and long-term interests of teachers, can teachers consider the feasibility of the technology and achievement conversion during the process of patent application, and also consider the advancement and technical maturity of achievement in product appraisal. Thus this will arouse the enthusiasm of teachers in scientific research.

4.2 Establishing patent review mechanism

At present, the patent application and grant has reached a certain size and the patent work center should be transferred from quantity increase to quality increase. The first measurement is to establish patent review mechanism. Before the patent application, research products should pass through thoroughly the analysis and argument, which should include not only the advancement of technology, but also include the prediction and analysis of industrialization prospects. Projects that have no practical value or are obviously useless in social development and industrialization should be given certain limits or even banned from declaration. Second, we should strengthen the management process. Through the appraisal and evaluation of patent authorization system, colleges and universities can select prospective and potential patents to provide them with financial supports and longer time for right maintenances. What's more, this kind of mechanism is beneficial for colleges and universities' hatching and nurturing good patents.

4.3 Improving the patent achievement conversion platform construction

To make research products and patents converted from universities to corporations, colleges and universities should further improve the science and technology achievement conversion platform, and integrate the government and social resources to form a favorable environment, so that both sides of supply and demand can trade easily. The realization of information exchange makes patent achievement conversion platform a real connection between colleges, universities, governments and other research institutions, which promotes the virtuous circle of exchange between the technical and economic, so as to promote the conversion of patent technology.

4.4 Strengthening the patent achievement conversion team

Talents are the key to the conversion of scientific and technological patent achievements in colleges and universities. Colleges and universities should utilize their own advantages and strengthen the patent achievement and talent cultivation. Creating more opportunities for patent service personnel to get training, they will not only have a better understanding of their work, but also learn more about the marketing and management. Thus, the well-trained, interdisciplinary, professional team will be cultivated as results.

4.5 Strengthening the relationship with social intermediary service platform

Under the triple helix model, intermediary service agencies will play an effective and critical role in

helping patents convert into the investment and financing, offering the policy guidance in conversion of patents and providing the evaluation of intellectual property rights, etc. Colleges and universities can rely on the professional intermediary service institutions to make objective evaluations about the marketing situation, as well as giving full play to the advantages of information network and propagandizing the patent conversion purposely to work for patent conversion services.

5 Conclusion

Scientific and technological patent achievement conversion in colleges and universities has its internal regularity. It is not simply imposing the method system of the triple helix model into the management of the process of scientific and technological patent achievement conversion, but from a deeper theoretical level, grasping the essence of conversion of scientific and technological achievements in colleges and universities, thus to promote the conversion of scientific and technological patent achievements.

In the university-enterprise- government triple helix model, the conversion of patent not only needs supports of the government and the active participation of the enterprise, the efforts of colleges and universities are also necessary. In the three spiral model, the colleges and universities should actively improve the management system, adjust the organizational structure, enhance the personnel ability, and closely combine with the practical need of our society, making the college and university patent achievement conversion gradually enters the benign development track and making greater contributions to the social progress and China's economic development.

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Research on the Policy System in the Construction and Development of Wuhan City Circle*

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Abstract: On September 10th, 2008, Wuhan City Circle comprehensive reform scheme has finally been implemented and officially approved by the State Council. This is the first city circle (group) throughout the nation to start the comprehensive reform pilot. And it is consisted of 9(1+8) cities. To promote the implementation of the comprehensive reform, Hubei Provincial Government quickly issued an overall implementation framework which is especially for the construction of city circle and builds the blueprint of Wuhan City Circle construction on the whole. This paper analyzes the Two Type Society of Wuhan City Circle policy and holds the view that the problems are so notable with imperfect policy, narrow policy coverage, poor pertinence, and short of a complete set between policies and laws. Focused on six supporting policies, this paper aims to solve these problems, propose solutions, and conduct special research about the policy system of the construction of Wuhan City Circle, and it makes every effort to improve the policy system of Wuhan City Circle.

Key words: Wuhan City Circle; Policy system; Status analysis; Perfection measures.

1 Introduction

On September 2008, Wuhan City Circle Construction of Conservation-minded and Environment-friendly Society Comprehensive and Complete Reforming Experimental Regulation was officially approved by the State Council. With the guidance of the overall plan, Hubei Province City Circle comprehensive reform and relevant departments have issued five special planning and six supporting policies, thus forming the overall framework and policy system.

Currently, throughout the world, the representatives of mature urban agglomeration development are America, Japan, Britain and France.^[1] For instance, Sansan, Boswash, Chipitts in America; London City Group in Britain; Paris City Group in France; Tokyo metropolitan; Nagoya metropolitan; Osaka metropolitan. Among all of them, as the dimension of Tokyo metropolitan is almost equal to Wuhan City Circle, there are much experience can be learnt from it. The constriction of Tokyo metropolitan in Japan benefits from the perfect law system. Japan has paid great attention on transportation, investment in industrial cluster and financial center development; they also attach tremendous importance to land and environmental protection.^[2] All of these are perfect experiences for Wuhan City circle to draw on.

2 Current Situation of Policy System of Development of Wuhan City Circle

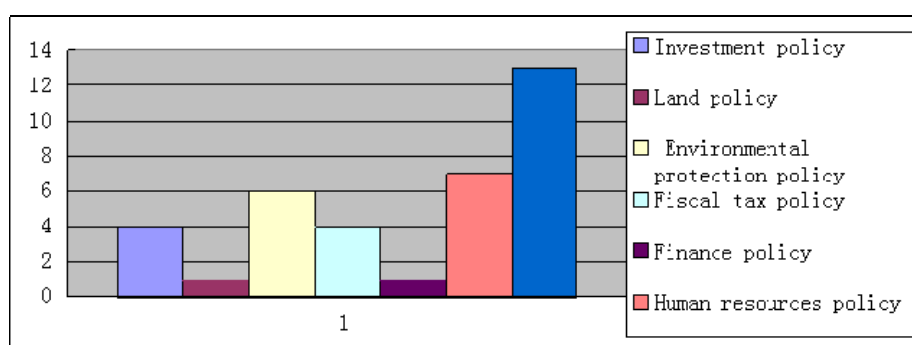


Figure 1 Wuhan City Circle Development Policy System

On July 31st, 2009, Hubei Provincial People's Congress has approved Wuhan City Circle Construction of Conservation-minded and Environment-friendly Society Comprehensive and Complete

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Reforming Experimental Regulation, which becomes the basic law of guiding the development Wuhan City circle. There is also another one, Wuhan City Circle Corporate Stock Equity Funding Registration Trial Method; this one is under the control of local government regulations. There are no more laws beyond these two concerning Wuhan City Circle. However, policies referring to Wuhan City Circle are enormous. This paper has combed the policies referring to Wuhan city circle and statistics are as follows.

According to Figure 1, it is clear that the framework basically set up the supportive policy system, reflected through the following six aspects, investment, land, environmental protection, fiscal tax, finance and human resources. But, only depending on polices of these six aspects is not able to regulate all the problems inside Wuhan City circle. For now, there are still problems in many aspects.

3 Problems Existed in Current Policy System

3.1 Too narrow of the policy's coverage

Through observation, it is found that six supporting policies are settled by the policy system, they are investment policy, human resource policy, fiscal tax policy, environmental protection policy, finance policy and land policy. But the development of Wuhan City Circle should not simply rely on these six aspects. There are no policies which are relevant to such as technological innovation, administrative system, people's livelihood which is actually essential to the core benefits of the city circle. Meanwhile, among the six supporting policies, the number of discipline in financial policy and land policy are relevantly small, while those of the others are relevantly large.

3.2 The penetration between policies is not strong enough

Even though the six supporting policies of Wuhan City Circle each belongs to a different area, there is certain independence between these policies, but the penetration between policies is still existing. Disciplines in financial policy are relevantly weak. As is known to all, there is close relationship between finance and investment. Disciplines in financial policy may probably influent investment direction, while disciplines in investment policies may probably influent financial policy. Wuhan City Circle policy system, however, seldom relates to disciplines of generality of the policies. The phenomenon of policy disposition is ubiquity in the area of investment, fiscal tax, and finance.

3.3 The pertinence of the polices is not strong enough

The six supporting policies specially planned six significant fields individually in Wuhan City Circle. But the disciplines are much too extensive and lack of specific details and the target is not strong. Such as the investment policy, the most core policy is "Rules on Promoting the Investment for Wuhan City Circle of Hubei Province Government", this rules made a rule on 15 different aspects, such as renewing the working philosophy of in investment, converting the growth pattern of investment, strengthening infrastructure and the basic industries construction and so on. But the rules are much too general, which are poor in practice.^[3] It is the same in all the other five fields. Even though there is relevant policy guidance to specific practice of Wuhan City Circle, there are no targeted enforcement rules.

3.4 Incompatible between policy and law

Talking about policies, laws are essential to refer to. Policy and law, as two tools to adjust the society, play an irreplaceable roll in the development of Wuhan City Circle. So far, there are only two directly relevant laws to Wuhan City Circle. On the contrary, there are so many policies on Wuhan City Circle. The use of a large amount of policies may certainly result in the existence of "prefer policy to law". Each city in the city circle has the power to make policies, but Wuhan is the only city among the city circle which has the power of legislation, this objectively deprives the power of participating in legislation. How to solve the problem of legislation in Wuhan City Circle, especially the problem of who is the legislative subjection, which makes it vital for policies and laws to supporting each other.

4 Improvement of Policy System in Wuhan City Circle

4.1 Extending the coverage of policy

First, Financial Policy. In order to systematically guide the construction for regional center of Wuhan City Circle, it is essential to publish the suggestions and the specific planning schemes of practice of Wuhan City Circle and the construction of financial center in regions. Besides, it is necessary to perfect the financial market in Wuhan City Circle and to establish the system of financial integration in Wuhan City Circle. Furthermore, for the sake of carrying out the process of financial integration in Wuhan City Circle, it is of great importance to establish a series of systems, such as the integration of

credit finance, the integration of funds cleaning and the integration of bill market.

Second, Fiscal Tax Policy. It is supposed to integrate the fiscal system in Wuhan City Circle and to surely coordinate the government finance among different cities. For the sake of guaranteeing it, the economic development of local area will benefit and belong to the local city, make innovations in system of sharing government finance and fully take care of the development initiative of every city based on ensuring the sharing proportion of public finance in every local administration.

Third, Human Source Policy. At the standard of talent selections, gather the people from all over the world, appoint people on their merit, possess both political integrity and ability, and win people by virtue. To guarantee the policy, it is necessary to establish the integrate system from the employment, dismissing, allowance to promotion. To manage the talents, encourage the flow of talents, and to establish Wuhan City Circle technical talents sharing system.

Forth, Investment Policy. Expanding the investment to a great extent, and take advantage of transportation to motivate the positive interaction and motivate the exchange of key elements and the integrity of resource among different cities in urban circle.

Fifth, Land Policy. On the basis of the current land policy, develop the new ways of intensive land-use and increase the guarantee of the rural land.

Sixth, Environmental Protection policy. Learning experience from the United States, taking regional management framework, and breaking the boundaries between states. The whole country could be divided into ten geographical regions according to geography and social economic. Set up regional offices, and carry on united management. Paying attention to concept that the government is playing leading role of environment protection and enterprises are the main force.^[4]

In addition, on the aspect of technological innovation and reform of public administration, it is necessary to accelerate the process of formulating policy measure to promote the industrialization of high and new technology and implement the reform of public administration.

4.2 Strengthening the connection of policies effectively

First of all, in the field of finance and investment. Except that scaling up the direct financing on existing foundation and developing the pretty loan of small and medium-sized enterprises, actively promote constructing technological investment loan system to solve the financing problems for the small and medium-sized enterprises, especially the technological ones.

Secondly, in the field of environmental protection. The formulation and performance of the environment protection policy affect the development of Wuhan City Circle. The environment concept should be sun through in every policy of the policy system,

Finally, in the field of finance and taxation. Besides linking up with environment protection policy, it also should be based on the important and difficult points of investment. It has to offer financial policy support to, for example, strengthen environment construction and the investment of livelihood of urban and rural people. Furthermore, it should give some tax preference to small and middle sized high and new technology industry, advanced manufacturing business and modern agriculture construction.

4.3 Establish policy implement and assessment system

First of all, concerning of the body of policy making and assessing, it is necessary to clean up the existing policies and eliminate those different local policies that do not agree with the 'six assorted policies'. Thus, guaranteeing the policy unity in the whole Wuhan City Circle.

Besides, concerning the evaluation standard of policy implementation, regulate the behaviors between direct and indirect implementation subject. Increase the diaphaneity justice of government policy implementation, and foster a kind of system that citizens take part in policy supervision.

At last, concerning the evaluation effect of policy implementation, I think it is essential to evaluate the effects of policy implementation of Wuhan City Circle and according to the professional work field of every department, then give the marks judging by the policy implementation, and make every effort to reflect the policy implementation of every field objectively, fairly and completely.

4.4 Perfect the relevant laws and regulations and elevate the mature policy to the law

Refactoring legislation system in Wuhan City Circle, the author suggested Hubei Province People's Congress (NPC) set up "joint committee of Wuhan City Circle legislative work". The committee is made up of nine municipal people according to certain proportion, and sets up into a standing body. Henceforth, the legislative work of Wuhan City Circle is uniformly completed by the organization. In addition, in the process of legislation, opinions should be widely listened, letting the environmental protection department, the legal profession, business, education, ordinary citizens participate in the legislation suggestion work and understand the demands of the law. What's more, based on the current situation of the development of Wuhan City Circle, a comprehensive local laws and regulations should

be issued as soon as possible.

5 Conclusion

The Report to the Eighteenth National Congress put forward the construction of the grand goal of “beautiful China”, and Wuhan City Circle is the best practice for this goal. Wuhan City Circle policy overall framework basically established the Wuhan City Circle development policy support system which is mainly reflected in investment, land, environmental protection, taxation, financial and personnel from six aspects, and made good protection effect on the development of Wuhan urban construction. This paper analyzes existed problems caused by the policy system and puts forward measures to solve these problems to promote the coordinated development of Wuhan City Circle.

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Business Associations, Horizontal Joint Action and Upgrading in Industrial Clusters*

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Abstract: Industrial cluster upgrading is a complex task that is affected by many factors. Joint action is an important aspect of collective efficiency and it can play an important role in promoting industrial cluster upgrading. But because enterprises which manufacture the same or similar products in an industrial cluster usually face competitive pressure coming from each other, joint action, especially horizontal joint action is difficult to be realized. This paper discusses the role of business association in promoting horizontal joint action and industrial cluster upgrading. Using descriptive clustering method, we classify and explain that business association can serve as a provider, an organizer or a compensator in fulfilling this task. At last, we point out that in order to facilitate business association to perform this task, the rule of establishing business association corresponding to administrative division needs to be abolished, and a management system based on the character of industrial cluster should be established.

Key words: Business association; Industrial cluster; Upgrading; Horizontal joint action; Descriptive clustering method

1 Introduction

Industrial clusters play an important role in prompting local economic development and labor employment. Geographically concentrated and interconnected companies in an industrial cluster can obtain inputs; access information, technology, institutions and public goods; coordinate with related companies; and measure and stimulate improvement more efficiently (Porter, 1998). Empirical evidence also shows that small and medium enterprises in an industrial cluster have a competitive advantage over isolated enterprises (Pietrobelli and Rabellotti, 2004).

However, with the development of economic globalization, enterprises face unprecedented competitive pressure arising from increasingly globalized product markets (Schmitz, 1999). In such circumstances, industrial clusters may lose former market share if they cannot improve their competitiveness. To respond to the challenge of globalization, the literature on competitiveness suggests enterprises to 'upgrade'-to make products more efficiently and to increase value adding activities etc. (Humphrey and Schmitz, 2000).

Collective efficiency is a central concept introduced by Schmitz (1995) for analyzing competitive advantage of an industrial cluster. The collective efficiency argument "suggests that the upgrading called for cannot be advanced by SMEs on their own. A collective response is needed" (Nadvi, 1999a). Thompson (2004) also argues that active collective efficiency (joint action) which stems from purposeful cooperation between enterprises in a cluster is important for process upgrading, functional upgrading and product upgrading, for "Cooperation is necessary because the individual firms are too small to carry out such a project." Some scholars divide joint action into vertical and horizontal ones and demonstrate the relation between industrial upgrading and them respectively. In the vertical side, Nadvi (1999a) argues that enhanced vertical interactions "facilitate a wider set of technical discussions within the supply chain on quality and technical upgrading". Pietrobelli and Rabellotti (2004) also point out that vertical joint action with suppliers and buyers is crucial to improving products. In the horizontal side, Nadvi (1999a) emphasizes that horizontal joint action can assist the process of upgrading by facilitating the flow of technical formation, assisting in managerial training and creating a reputational basis for the industrial cluster's products. And Giuliani et al (2005) and Pietrobelli and Rabellotti (2004) also point out that multilateral horizontal cooperation plays an important role in product upgrading through actions such as participation in trade fairs, collection of information and connection with international buyers.

Joint action is critical for upgrading and accordingly, for enhancing competitiveness of an industrial

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cluster, however, it is difficult to be realized, especially the horizontal joint action. In many industrial clusters local producers are often also local rivals (Nadvi, 1999b). "...under competitive market conditions businessmen ways have to face the possibility of being driven out of business by their competitors, and that one of the ways by which they can ensure their survival in the market is by doing everything they can to eliminate their competition" (Schmitter and Streeck 1999). Allowing for the competitive relation among enterprises, Schmitter and Streeck (1999) argue that though homogeneity increases the range of common interests, meanwhile it also fosters competition and makes mutual cooperation more difficult to be established. Pietrobelli and Rabellotti (2004) also point out directly that "Horizontal bilateral linkages are not well developed, with rivalry among firms prevailing over cooperation". In addition, some empirical researches also demonstrate that relative to vertical joint action, the level of horizontal joint action is lower (Schmitz and Nadvi, 1999; Schmitz, 1999). Therefore, it is difficult to realize horizontal coordination amongst enterprises which have similar products. In this paper, we will discuss the role of business association in prompting horizontal joint action. Finally, we summarize and raise some issues which need to be solved in the future.

2 The Role of Business Association for Prompting Horizontal Joint Actions and Upgrading

Pressure of competition coming from outside an industrial cluster and trust deriving from long-term relationships within an industrial cluster can promote horizontal joint action. Besides, organizational concertation executed by business association is of critical importance. There are a lot of papers relating to the role of business association in promoting joint action among enterprises (Doner and Schneider, 1998; Humphrey and Schmitz, 2002; Pietrobelli and Rabellotti, 2004; Giuliani et al. 2005; Johannes, 2008). For the main worries of an entrepreneur who wants to provide collective goods may be the deterioration of his competitive advantage, as we have referred to in part 1, business association may make effort to promote an adjustment of the distribution of cost and gain in member enterprises and take the worries away accordingly. Based on the existing research, we develop the role of business association from the perspective of benefit balance.

In 2012, we conducted an investigation in Zhejiang Province and 30 business associations were investigated. Based on the investigation results, below we classify all the roles that business association can act for overcoming the difficulty of horizontal joint action among competitive enterprises into three types, that is, provider, organizer or compensator, and discuss them in detail.

2.1 Business association as a provider of collective goods

Business association is a formal organization which collects membership dues and spends it in promoting the common interests of the members. Therefore, providing collective goods by business association is one of the most important forms of horizontal joint action. The role of this kind of horizontal joint action in promoting industrial upgrading lies in a very broad field. Business association may promote process, product or functional upgrading by setting up a research and development center, contacting with universities and research institutes for overcoming technical problems, developing regional brand, marketing for increasing the influence and customer loyalty of the product manufactured by its membership, providing information about new market, organizing trade fairs for promoting product sales, regulating the behavior of the members for protecting innovation and assisting members in meeting new quality standards raised by customers, competitors in other clusters, new bill etc.

The problem that only one or a few enterprises bear all the costs can be solved by business association's behavior of providing collective goods. But it has to be noted that the cost of collective goods provided by business association is shared by all the members. Therefore, 'small' collective goods can usually be provided by business association without disputation. For collective goods which are 'big' and have an uneven distribution of gains (or the gains that an enterprise gets do not match the dues it pays), if they are still provided by business association, an argument may be triggered.

2.2 Business association as an organizer for providing collective goods

Business association is an organization that facilitates members to communicate. Regular exchange of views such as sodality, forum and conference can help members get familiar with each other, and so promote joint action among them. Moreover, when cluster enterprises face a special threat, business association can organize a special forum for responding to the risk event. Business association may invite those enterprises which are in the same danger to participate the forum. Then business association gives suggestions about joint action for vanquishing the danger. And according to the gains of every member from the joint action, business association distributes the cost of joint action to every member.

In this way, the provision of collective goods will not change the market position of these enterprises which take part in joint action. Therefore, the threshold of providing collective goods returns to rational restraint condition. That is, for an entrepreneur, as long as the gains he can get from collective goods are more than the cost that he must bear, he will choose to participate in the joint action.

2.3 Business association as a compensator for providing collective goods

For an entrepreneur, to provide collective goods means he will face some risks. The risk not only comes from that what he gets from collective goods is less than the cost. It also comes from that he needs to bear the whole cost of collective goods without acquiring the whole advantage of them. In this condition, other enterprises may gain a relative advantage because they can get gains from collective goods without bearing any cost. That is, it is only the basic condition that gains from collective goods are more than costs. For making the provision of collective goods come true, a further condition that the relative competitive advantage of the provider is not affected by the provision of collective goods must also be satisfied. Unbalanced distribution of the benefits from collective goods may lead the entrepreneur to provide collective goods even if he cannot get all the gains. This happens when the gains he can get from collective goods will bring him more competitive edges relative to his main competitors, even if taking the cost into consider. That is, the provider of collective goods must get more advantages than his main competitors. Besides, there are five situations in which positive advantage does not necessarily bring about the action of an entrepreneur. We list them in Table 1.

For promoting the provision of collective goods, business association needs to compensate the provider. But the compensation must be provided based on an analysis on the characteristic of collective goods, such as, the benefited range of collective goods, the relative level different enterprises benefit from collective goods, etc. Based on these analyses, business association needs to make sure that resources are used fairly. In addition, different types of providers of collective goods may have different concerns, business association may design different patterns to compensate the provider according to his main concern so as to reduce the financial pressure arising from the compensatory behavior.

For performing these functions well, business association needs sufficient capital and human resources, mature governance structure and autonomy etc. Besides, management system of business association should be adjusted according to the need of industrial cluster upgrading. In china, business association is required to be set up corresponding to the administrative division. And for a given industry, only one business association can be set up in an administrative area. If an industrial cluster spreads into two or more administrative divisions, enterprises in an industrial cluster will be divided into several different business associations. This will make horizontal joint action much more difficult. Through coordination by a business association corresponding to a higher order of administrative district, this problem may be resolved. But business association in a higher administrative district may contain many enterprises which are not in the industrial cluster, so it cannot act singly on behalf of the industrial cluster. Therefore, the management system for business association needs to be adjusted when such a situation happens. And a management system corresponding to the character of industrial cluster needs to be designed and established to relieve the difficulty of horizontal joint action.

Table 1 Five Conditions in Which Enterprises are Not Willing to Providing Collective Goods Even if the Advantage is Positive

Types	Detailed description
I Competitive Edge Dwindle	Industry leader losses part of competitive edge because the gap between him and his main competitors is reduced when he provides collective goods.
II Competitive Edge Lose	Industry leader losses all his competitive edge because the gap between him and his main competitors is removed when he provides collective goods.
III Be Overtaken	Industry leader is overtaken by his competitor and losses his leadership position because of his providing of collective goods.
IV Drop into Inferior Position	An entrepreneur drops behind the same rank competitors because of his providing of collective goods.
V From Disadvantage to more Disadvantage	An entrepreneur who is in a bad place drops into a worse place because of his providing of collective goods.

3 Conclusions

This paper has illustrated that horizontal joint action which is important for industrial cluster upgrading may be difficult to be realized. It is because that although there is demand for cooperation among enterprises, at the same time there is fierce competition among them, especially among direct competitors. Horizontal joint action happens mainly among enterprises which produce the similar

products. Therefore, demand for horizontal joint action may be overwhelmed by competitive relations among them. Business association can be a provider, organizer or compensator of joint action and therefore may play an important role in promoting horizontal joint action. But for realizing the function, business association needs to overcome the problems of capital, human resource, autonomy, etc. In China, the current management system is a restriction for business association to fully perform the function. It is because when an industrial cluster spreads into some different administrative districts, the enterprises in the industrial cluster will be divided into many different business associations. And this will increase the difficulty of coordination by business association.

This paper is only a primary analysis about this question and there are many problems that need to be solved in the future. At first, an entrepreneur pays attention to both net gains and relative gains compared with his main competitors. And he may make decisions based on a complex consideration of the two values. Therefore, an experimental study needs to be conducted to develop the analysis presented in this paper. Second, the degree of difficulty of horizontal joint action will be influenced by the cluster structure, type of horizontal joint action (such as, joint venture or joint marketing), enterprise market position, external pressure, social capital, distribution of collective revenue etc. and the theoretical and empirical research need to be done to reveal the comprehensive influence of these factors. In addition, in China, the actual role of business association in promoting horizontal joint action and its advantage relative to other governing subjects needs to be researched empirically and based on this, the feasibility of allowing business association to be founded corresponding to industrial cluster may be discussed.

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IT Industry Development and the Role of Regional University: The Case of Ruby Course at Shimane University

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Abstract: Human resource cultivation and agglomeration underpins sustainable regional development and regional university is expected to play this role. Matsue city and Shimane prefecture collaboratively promote IT industry development utilizing Japan native and easy-to-learn open source computer language Ruby as strategic regional resource because of the creator residence. Shimane University respond to this demand and has offered Ruby specializing courses as cultural subjects. This paper introduces the development and the challenges of the courses in the context of regional development with referring to the competitiveness of Ruby.

Key words: Open source Software; Ruby, Programming education; Regional industry development

1 Introduction

The programmer's choice of programming language is affected by multitude of factors. She may prefer the language which they used at the very beginning of their career just like mother tongue. Or she can choose the language fitting best to her cognitive and psychological set. On the other hand, organization she belongs may determine for securing efficient teamwork and knowledge sharing. Customer can also designate the language for preserving internal consistency. And in some cases, development environment will prescribe the language

Language, as a tool, changes over time in any sense, while many languages come and go. Object-oriented languages (Java, C++) dominate today in place of procedure-oriented (C) ones both in academia and practice^[1], and programmers should adapt to the change. Ideally, programmer thus can handle wide range of languages and choose appropriate one depending on the situation just like multilingual person. Widely held view suggests that expert programmer should have broad view, general and specialized knowledge, problem solving competence, common to experts in other fields^{[2],[3]} and the core ideas for computer teaching, the algorithms, the architectures and the design principles, have remained unchanged^[4]. Given this, if the purpose of computer programming courses at higher education institutions is to nurture novice programmer's competences requisite for letting some of them become expert, instructors should choose the language best fitting to the purpose or develop pedagogical language such as SCHEME, PYTHON and BLUE, if necessary, and there is a substantial body of literature studying the influence of language selection on student's learning effect^{[5],[6],[7]}.

Meanwhile, Shimane University, a regional university in Japan, offers a unique programming course along with regional economy course among cultural subjects for all students specializing in Ruby. Ruby is an object-oriented language created by Yukihiro Matsumoto, known as "Matz" in open source communities, and released in 1993. Since then, Matsumoto, living in Matsue, the municipal capital of Shimane prefecture, has been developing Ruby in collaboration with many open source developers all over the world through the Internet. The number of core contributors for Ruby development is about seventy in 2011, and the two-third of them is Japanese. Ruby is one of the very few open source projects that Japanese engineers mainly commit to development. At the earlier stage, while Ruby lured geeks so much, it had not been spread in business uses. But, in 2005, David Heinemeier Hansson – a programmer in Denmark, released Ruby on Rails, web application framework constructed by Ruby. Hence, Ruby came to attract attention and to be used also for commercial purpose, particular in web application field, and the number of Ruby engineers has been astonishingly soaring. Ruby ranks 10th next to SQL, according to the recent popularity investigation by Lang Pop.com^[8].

IPA (Information-technologies Processing Agency), the Japanese government agency, has devotedly support the Ruby project toward the standardization of Ruby workflow. As Ruby is an open source language, there are many implementation ways of Ruby. Ruby 1.8 affiliate (implemented by C language) and the current Ruby 1.9 and 2.0 affiliate (implemented by virtual machine YARV), IronRuby (implemented to operate Ruby on .NET Framework), MacRuby(implemented to operate Ruby on Mac OS X), and Rubinius (bytecode interpreter on a virtual machine), etc have coexisted which altogether impair the interconnectivity and the portability of program written in RUBY. IPA started standard specifications making, first domestically based on standard specifications in 2008, and constituted it as

JIS (Japanese Industrial Standards) in 2011. Finally, Ruby became international standard ISO/IEC 30170 in April 2012, and the approval as an international standard is expected to enlarge market potential of Ruby.

In addition to the Japan nativeness and explosive dissemination in practice across the world, the background motivation for the course offering at Shimane University comes from the ongoing regional effort to revitalize Matsue city and Shimane prefecture with the heading of “Ruby City Matsue” since 2006, underpinned by close cooperation among local industry, academia, and government. Shimane University in turn aspires to be the education hub for Ruby education by tapping the experience of the involvement this regional effort^[9]. Backing to the educational challenges for novice and beginners in computer programming, the crucial question is whether effective Ruby education is different from that in general programming education or whether Ruby is appropriate to be used as first language students learn at the university education. While some insist Ruby is easy to learn and a voluntary yet influential Ruby organization promotes it as “a programmer’s best friend,” it is still unclear the ease and the friendliness can also apply to novice programmers. Addressing these issues will lead to breakthrough in designing systematic human resource cultivation from novice to expert with distinctive Ruby competence and consequently help IT industry development in the region. Besides, it is of interest whether attending regional economy course focusing on Ruby affects psychological and cognitive attitude toward Ruby programming course.

This essay documents the midterm achievement and reflection found in the classes during the past few years. We believe this report will be suggestive to two classes of readers. First class involves local government staffs who are thinking regional development in peripheral region, particularly IT industry development including human resource cultivation. Second class comprises teachers of programming classes and teachers and coordinators in charge of liaison activities. The paper is organized as follows. Section 2 briefs the progress of the regional effort in Matsue city and Shimane prefecture. Section 3 refers to the experiment in which the advanced/expert programmers were the subjects for assuring easiness of learning and productivity of Ruby. Section 4 reports the course and discusses the feedback from attending students and stakeholders. Section 5 concludes.

2 Progress of the Ruby-Centered Regional Effort

Exploiting open source knowledge like Ruby enables independent IT firms to grasp business opportunity free from vendor’s power, strategy and legal rights. Open knowledge is ubiquitous, and it is tested and grown mainly in virtual world. Given this very nature of open knowledge and the work style of programmers, any region can leverage on open knowledge for IT industry development yet it can hardly achieve and sustain competitive advantage as newly generated knowledge rapidly disseminate through the internet beyond geographical border. Besides, Ruby is technically a language or a tool for expressing knowledge. In this sense, Ruby City Matsue is a unique case trying to develop IT industry by emphasizing a language. Before the project commencement, the degree of IT industry agglomeration in Matsue city had been below national average but the municipality aspired to take full advantage of “Matz” residence and the presence of some active contributors for Ruby working together with Matz at Network Applied Communication Laboratory (Nacl) Ltd, where he has worked as an employee.

The project started by opening “Matsue Open Source Laboratory” for interaction between IT engineers and information sharing about open source software (OSS) in July 2006. Subsequently Open Source Software Society was established with the purpose of enhancing members’ skill and competence and cultivating competitive human resources through deepening interaction among practitioners, engineers, researchers and students who engage in open source software development. Although the municipality initially led the project, the active players came from firms and universities in Matsue city and attempted to enhance management capability of the local IT service firms by substantializing Bazaar style development in the region^[10], based on the collaboration among industry, academia and government. It should be stressed that while Ruby has played crucial role as symbol as well as tool, the underlying objective was to insulate dominant distributed project style observed often in the virtual world to the region.

Industry development program should create local market attractive enough to make companies join in the movement, particularly at early stage. Thus Matsue city and Shimane prefecture strategically ordered system development with specifying Ruby as the application programming language and consequently the local IT firms involved in these system developments enhanced the Ruby related technological competence and capability. Proactive municipal order subsequently led to autonomous IT

solution business development by the local firms and induced direct investment from outside the region for technology learning which implies competitive advantage in Ruby exploitation for business purpose.

Competent programmers and engineers development is crucial for sustainable IT industry development. Shimane prefecture commenced human resource development program specializing in Ruby and Ruby on Rails for practitioners in 2007 while promoting the introduction of OSS and Ruby courses at the regional higher education institutions. In response, Shimane University among started “Ruby Programming” course where students learn the basics of Ruby programming, web application development with Ruby on Rails and the lecture by engineers and developers adopting RUBY. The efforts have achieved magnificent outcome so far. During the first three years, the aggregate sales of IT service industry in Shimane had surged by 26.7% against 7.7% increase nationwide, while the number of the employees had soared by 50.7% despite 1.8% decrease in Japan. The success inspired other local governments, including bigger cities and prefectures having the breadth of resources and providing chances of widening Ruby applicable field, to examine exploring OSS and Ruby as industry development tool. For instance, Fukuoka prefecture, having highly regarded existing IT industry agglomeration initiated Ruby centered industry development in 2008. Strategic and distinctive HR development, by stimulating psychological and cognitive factors in addition to developing technological competence, will be one of the key success factors to compete against other regions and sustain growth for long.

3 Productivity of Ruby and Easiness of Learning for Experts

Ruby has been said to attain 10 or more times the productivity of Java. The amounts of the code description by Ruby are less than that of the other programming languages, and the grammatical composition is quite similar to human language, which make Ruby programming highly productive and agile. Presumably RUBY was adopted at earlier phase in Web application development field for this reason, as quick release and frequent changes are of utmost importance. It may suggests that even expert programmers who are familiar with specialized computer languages prefer more natural expression and switching to Ruby is relatively easy for them.

To investigate the capability of Ruby, Chugoku Region Ruby Business Development Forum, chaired by Noda, executed an experiment comparing the productivity among Ruby, Java, and Perl, another popular script language), cooperated with an IT company in 2009. Subject was requested to develop web applications that had the common functions (Message board systems that have functions of comments contribution, multiple contribution prevention, indispensable check, and the automatic deletion) by Ruby, Java and Perl, daringly without using web application frameworks. TABLE I is the result of the comparison of each programming language’s productivity.

Table 1 Effect of Language on Productivity

Languages	Java	Ruby	Perl
Lines	177	46	42
Man-Hour (Coding and Test)	Coding : 8 hours Test: 1 hours	Coding and Test: 2 hours	Coding and Test: 0.75 hours
Require Modules	19	2	4 (uses)
Operating Condition	Servlet	Http Server	Http Server
Operating Checking Server	Tomcat	Apache Anhttp	Apache Anhttp
Experience Years of Using Language	7 years	0 years	5 years
Experience Years of Development	7 years	7 years	7 years

As a result, Ruby far exceeded Java both in terms of the amounts of the codes and the man hour. Contrary, we could not conclude Ruby was not more productive than Perl. However, this ambiguous result was at least partially attributed to the experience of using language. In spite of the first experience to use Ruby, the subject could complete the program by the same amount of codes with that of Perl case, as the subject had five years’ experiences to use Perl. Though, the speed manufacturing time of Ruby engineers is slower than that of Perl engineers, if they are trained coding, the productivity will be expected much higher. Several factors can be conceivable for interpreting the subject using Ruby from the first time could do well. First, Ruby is truly natural and easy to learn with least jargons and peculiar syntax. Second, the Ruby system resembles (but perhaps more efficient) to certain language the subject

is familiar with. Third, the subject had built his career as programmer so that, as an expert, he was flexible and versatile enough to adapt to different language and explore the potential of the language at a high level. Presumably the experiment result reflected the combined effect of these factors along with others. From higher education institution's viewpoint, whether the first factor affect performance is of interest, as in that case it will possibly lower the hurdle to study computer language for novice and allow instructors to spend more time for nurturing their creativity and applicability.

4 Ruby Courses at Shimane University

4.1 Courses Outline and Students Attributes

Ruby centered courses, "Ruby Programming" and "Web Application Framework," and "Information and Region," are classified as multidisciplinary (selective) subjects among cultural subjects at Shimane University. In this sense, those are not compulsory course like CS1, rather applied and practical supplement. Multidisciplinary subjects aim to offer students opportunity to comprehend the role and character of each major with respect to a specific theme. In accordance with this aim, the Ruby courses are designed to let students learn recent environment and technology development in IT business with special reference to Ruby from guest speakers such as active engineer and researchers along with basic programming skill and knowledge. The two courses are interrelated as "Web Application Framework" builds on the knowledge and skill acquired in "Ruby Programming" course. "Ruby Programming," regarding Ruby as a local resource, intends to let students consider its potential and ferment a sense of intimacy along with studying basics. "Web Application Framework" is more technical course aiming to comprehend the whole web application development process with Ruby on Rails. While "Information and Region" where active businesspersons, IT engineers and municipal staff give lectures on OSS and Ruby expects broader audience, it is designed to complement the technical courses and let students examine the potential of Ruby and OSS in the context of regional IT industry development. The technical courses also offer focused discussion with those guests.

From technical viewpoint, adopting Ruby and Rails has four advantages. First, as it is an OSS, installation and version up can be made flexibly and at a minimal cost. Students can also install to their own PC and practice at home. Second, owing to high productivity, Ruby and Rails enable students with limited use experience of Ruby to complete preliminary web application development with limited number of classes. Third, Rails is an application framework so that programmers can develop application with lesser codes. Fourth, Rails is equipped with simple web server and database management system and students can easily execute operation check once installing Rails.

Whole the courses open to all the third or fourth year undergraduate students, most of the students taking the technical courses belong to the department of science and engineering. The number of the registered students has ranged approximately from 10 to 30 since the first year. While the courses assume a certain amount of programming experience, few students are found to be complete beginners, mainly social science students taking "Information and Region" course. Most experienced students use Java and C reflecting the languages used in regular programming courses at the university yet some students learn Ruby on their own. One third of science and engineering students attend "Information and Region."

4.2 Discussion

Learning script language such as Ruby at beginning in general cuts two ways. As mentioned above, students can complete entire development process within limited time range and the motivation for studying arises from a sense of accomplishment. Contrary, because novice programmers are limited to surface knowledge and lack detailed mental models^[11], the simulated success experience may prevent them from studying fundamental computer science as it takes much effort from psychological perspective, or in worst case harm problem solving competence. We believe programming education for computer science major should build on solid body of knowledge to be competitive expert thus we don't intend to replace current CS1 programming language by such practical and productive language but aim to complement those courses. As Ruby was written in C language, programmers who want to develop Ruby further needs to be capable of procedural language. Actually while the students attended "Web Application Development" course on average expressed their satisfaction as they relatively easily developed web application on their own with the application framework, some students seemed to confused with the difference from other languages and be indigested.

From regional development perspective, whether students having adequate potential are motivated by attending the courses and subsequently would like to work in the region or to keep contact with the local IT community even if they work in other place. In this respect, one of the important issues is to

nurture their cognitive vicinity to Ruby and local OSS community. Thus in addition to “Information and Region” course, we invite Matz and other key players in the region as lecturers in “Ruby Programming” course and let the students interact closely with competent experts and consider career as programmer or engineer. It is worth to be noted that one of the students was inspired by Matz’s lecture and commented he started to consider the possibility of working at SME.

We also observe synergy among Ruby related courses. Science and engineering undergraduate students are on average reluctant to take economic and business courses, while social science students have a prejudice against programming courses. Promoting Ruby as a regional resource succeeds to break down the cognitive barrier to some extent, although social science students tend to struggle at programming related courses. Another favorable observation is that students are inclined to regard those courses as advantage of studying at the university, implying cognitive linkage between Ruby and the university.

5 Conclusion

This paper reports our ongoing endeavor to cultivate human resources for serving IT industry development tapping Ruby and other OSS. We evaluate our efforts so far make success to some extent at least cognitive level as many students start to feel sympathy with Ruby and the some graduates taking the courses decided to work at local IT companies. We will have to continuously examine the objective and positioning of Ruby education at the university and collaboration with other institutions among region-wide Ruby education efforts. Though, we believe the utmost and immutable mission for computer programming education at university is to let students build solid foundation necessary for expert from the basics and enlarge their potential as we are not sure whether and how attending the Ruby courses affect to their career and competence development due to the limited samples.

Sustainable OSS focused IT industry development with competing against other regions largely depends on the agglomeration of good programmers, engineers and customers capable of understanding IT and OSS. In this sense, non-computer science majoring students do not need to have deep and wide knowledge about programming yet they are expected to acquire basic programming. Ruby programming course can be rearranged by examining the reasons of the Ruby’s easy to learn feature for that purpose. Besides, OSS project by its nature accompanies different development approach which in turn demands different personality and competence. Although this report doesn’t argue these aspects, introducing this development style into classroom will help nurture desirable human resources. These issues are investigated in future education.

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Reviewing Service Quality in Higher Education

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Abstract:The purpose of the present study is to review the conception of service quality in higher education and appraising various service quality models to identify issues for future research and provides directions to service quality researchers. In addition, the paper attempts to present useful information about measuring service quality in higher education based on studies, which selected from well-known databases, Also this research, try to highlight a linkage between the different service quality models.

Key words: Service quality; Higher education; Measuring instruments

1 Introduction

Service industries are playing an increasingly important role in the economy of many nations. In today's world of global competition, rendering quality service is a key for success, and many experts concur that the most powerful competitive trend currently shaping marketing and business strategy is service quality (Zeithaml et al. 1996). In recent years "Higher education has been increasingly recognized as a service industry and, as a sector, it must strive to identify the expectations and needs of its clients, who are the students" (Mello, Dutra, 2001). Prominently, the service quality has established itself as an important part of the higher education; Higher education institutions are constantly looking for ways to improve their offering for competitive advantage, Moreover Universities have realized that their long-term survival depends on how good their services are and that quality sets one university apart from the rest (Aly and Akpovi, 2001; Kanji et al., 1999), Therefore service quality highlighted as the critical element in higher education. (Sultan, Wong, 2010).Higher education is a pure service that requires greater amount of interpersonal contact. As higher education provision is a service and students are expected to fund their educational expenses, it seems appropriate that universities make a shift from being product-led, i.e. relying on the product to sell, towards a more customer-led approach (Angell et al., 2008).

Research has shown that good service quality in higher education depends on many factors. the concept of quality of education in education, is associated with the achievement of agreed standards, as well as consistency between the objectives of the program and the competence of graduates(Hanna Shauchenka,2010).Based on the Parasurman's perspective, The service quality is the size and the difference between the customers' Perceptions and expectations of the service (Zahedi & Biniaz, 2009). Measuring service quality and customer satisfaction has been one route to determine a service firm's deficiencies in order to make improvements. While this approach has become ubiquitous amongst firms, firms continue to search for other means to gain differential advantages. (Srinivas Durvasula, Steven Lysonski, A.D. Madhavi, 2011). A variety of methods are used to assess service quality, each has its advantages and drawbacks. There has been a continued research on the definition, modeling, measurement, data collection procedure, data analysis etc., issues of service quality, leading to development of sound base for the researchers.(Nitin Seth, S.G. Deshmukh, Prem Vrat, (2005)).

In this paper attempts to review the conception of service quality in higher education and assessing different kind of service quality models to determine identify issues for future research. Additionally, this study provides a functional source of information on measuring service quality in higher education.

2 Service Quality and Higher Education

The study of service quality has been hotly debated in the marketing literature for over Two decades (Brady and Cronin, 2001), But Quality in higher education is a complex and multifaceted concept and a single appropriate Definition of quality is lacking (Harvey and Green, 1993). According to Cheng and Tam (1997) "education quality is a rather vague and controversial concept" and Pounder (1999) argues that quality is a "notoriously ambiguous term". Also, there is a general perspective that Service quality is a multidimensional or multi-attribute construct (Parasuraman, Zeithaml,V. and Berry, 1985),however there is no general agreement as to the nature or content of dimensions.

Every stakeholder in higher education has a particular view of quality dependent on their specific

needs (Voss et al., 2007). According to Parasuraman *et al.*, it is only the customer who is qualified to evaluate service quality, and Other’s evaluation is not accurate and in this case, it's necessary to pay attention to student’s desires. The overriding value in measuring service quality in higher education lies in the identification of critical aspects of the service delivery (Abdullah, 2006). However, this presumes a customer-led strategy, whereby the student, as the buyer of the service exchange, is regarded as the customer (Owlia and Aspinwall, 1996). Numerous studies have attempted to explain the concept of quality in higher education Institution; Table 1 shows service quality dimensions as identified by various researchers in different countries. The findings of these studies suggest that dimensions of higher Education service qualities vary widely in the context of culture, university and even School or department, and one of the reasons for this is that student perception is shaped By culture, previous interaction, and experience and marketing communication Messages (Sultan, Wong,2012). Abdullah, (2006) suggest that the dimension access is the most important determinant of service quality in higher education In other words, students perceived access to be more important than other dimensions in determining the quality of service they received.

3. Measuring Service Quality:

In recent years, there has been an increasing amount of literature on measuring service quality. According to Rowley (1997) valid, reliable and replicable measures of service quality are needed, it is necessary to identify and implement the most appropriate measurement tool in order to gain a better understanding of the quality issues that impact on students’ learning, faculty’s teaching and the total student and teacher experience. This part begins by description of the important measurement tools of service quality in common use in the business sector; it will then go on to describe their application in higher education. The main instruments are SERVQUAL, Gronroos model, Servperf model, HEDPERF, PHed-model, ARCHSECRET and an integrated model

3.1 SERVQUAL

The most common model in service quality literature to measure the quality of services is SERVQUAL The first version of SERVQUAL was developed in 1985, based on a series of studies by Parasuraman and his colleagues who conceptualized service quality as the gap between customer expectations and perceptions (Ham et al., 2003; Parasuraman et al., 1988).Service quality are Influenced by five “gaps”:

Table 2 The SERVQUAL (1985) Dimensions

Dimension	Definition
1. Tangibles	Appearance of physical facilities, equipment, personnel, and communication materials.
2. Reliability	Ability to perform the promised service dependently and accurately.
3. Responsiveness	Willingness to help customers and provide prompt service.
4. Competence	Possession of the required skills and knowledge to perform the service.
5. Courtesy	Politeness, respect, consideration, and friendliness of contact personnel.
6. Credibility	Trustworthiness, believability, honesty of the service provider.
7. Security	Freedom from danger, risk or doubt.
8. Access	Approachability and ease of contact.
9. Communication	Keeping customers informed language they can understand and listening to them.
10. Understanding the customer	Making the effort to know customers and their needs.

Source: Zeithaml et al. (1990)

(1) Gap 1 indicates the difference between customer expectations and Management perceptions of customer expectations.(2) Gap 2 is the difference between management perceptions of consumer Expectations and the translation of these perceptions into service-quality specifications. (3) Gap 3 is the difference between the service actually delivered by frontline service Personnel on a day-to-day basis and the specifications set by management. (4) Gap 4 represents the difference between service delivery and what is promised in external communications to consumers.(5) Finally, Gap 5 is the difference between customer expectations and perceptions Gap 5 is influenced by Gaps 1-4, which are all within the control of an organization and Therefore need to be analyzed to identify any changes that should

implemented to reduce Or eliminate Gap 5. Parasuraman et al. (1985) argued that such “gap analyses” are critical For identification of discrepancies between the provider’s perceptions of service-quality Dimensions and the consumers’ perceptions of those dimension (Riadh Ladhari, 2009). The SERVQUAL questionnaire has two parts; one is related to customer Expectations in relation to a service sector and the other to evaluate perception in relation To a certain service company. To measure the customer's perception of service quality, Parasuraman et al. (1985) developed the SERVQUAL scale. The scale was based on in-depth interviews with executives and focus group interviews with consumers from four different service categories. They analyzed the data and concluded that customers evaluate service quality based on ten general criteria or dimensions. The name and definition of each of these ten dimensions are as indicated in Table 2.

In 1988, Parasuraman Refined the SERVQUAL scale by dividing the ten original dimensions into five. The reason was because there were considerable correlations among seven of the ten original dimensions in that study. Competence, courtesy, credibility and security were consolidated into one dimension called assurance. Access, communication, and understanding the customer were grouped into another dimension called empathy. The original SERVQUAL scale uses 22 questions to measure the five dimensions Of service quality: reliability, tangibility, security, empathy and responsibility. Brochado(2009) mentioned that in the context of higher education these dimensions include the appearance of the university’s physical facilities, equipment, personnel, and communication materials (tangibles), the ability of the university to perform the promised service dependably and accurately (reliability), the willingness of the university to help students and provide prompt service (responsiveness), the knowledge and courtesy of teachers and their ability to convey trust and confidence (assurance) and the caring, individualized attention the university provides its students with (empathy). The questionnaire of 22 items, which is administered twice: first to gain customers’ expectations and second to gain their perception of performance, is answered by customers on a 7 point Likert scale from ‘strongly disagree’ to ‘strongly agree’. The results of the two sections (perceptions and expectations) are compared to Reach a parameter (gap) for each of the questions, that is, the final score is generated by The difference between them (Parameter = Perception – Expectation). A negative result indicates the perceptions are below expectations, revealing the Service failures that generate an unsatisfactory result for the client. A positive score Indicates the service provider is offering a better than expected service (Seth N., Deshmukh, 2005).

3.1.1 Proposal for adaptation

Oliveria and Ferreria(2009), adapted version of the SERVQUAL scale for Higher education services, table3 shows the adapted questionnaire model that was used to conduct the quality expectations and perceptions survey in higher education.

Table 3 SERVQUAL Questionnaire Adapted to Higher Education Services

Tangibility	1 – Excellent Higher education institutions must have modern Equipment, such as laboratories. 2 – Higher education institution installations must be well Conserved. 3 – Employees and teachers at excellent institutions of Higher Education must present themselves (clothes, cleanliness, etc.) in an appropriate manner for their position. 4 - The material associated with the service provided in Excellent institutions of Higher education, such as journals ,Printed matter must have a good visual appearance and be up to date.	1 – Your Higher education institution has modern equipment, such as laboratories. 2 – Your Higher education g institution installations are well Conserved. 3 – The employees and teachers at your institution of Higher Education present themselves (clothes, cleanliness, etc.) in an appropriate manner for their position. 4 - The material associated with the service provided in your institution of Higher education, such as journals, printed matter, has a good visual appearance and is up to date
Reliability	5 – When excellent institutions of Higher education promise to do something in a certain time, they must do so. 6 – When a student has a problem, excellent institutions of Higher education demonstrates sincere interest in solving it. 7 – Excellent of institutions of Higher education will do the job right the first time and will persist in doing it without Error.	5 – When your institution of Higher education promises to do something in a certain time, it does so. 6 – When you have a problem, your institution of Higher education demonstrates sincere interest in solving it. 7 – Your institution of Higher education will do the job right the first time and will persist in doing it without error.
Responsibility	8 – Employees and teachers at excellent institutions of Higher education promise their clients the services within deadlines they are able to meet. 9 – The employees and teachers at excellent	8 – Employees and professors at your institution of Higher education promise you the services within deadlines they are able to meet. 9 – The employees and teachers at your

	<p>institutions of Higher education are willing and available during service providing. 10 – The employees and teachers at excellent institutions of Higher education will always show good will in helping their students. 11 – The employees at excellent institutions of Higher education are always willing to explain doubts their students may have.</p>	<p>institution of Higher education are willing and available during service providing. 10 – The employees and teachers at your institution of Higher education always show good will in helping. 11 – The employees and teachers at your institution of Higher education are always willing to explain your doubts.</p>
Security	<p>12 - The behavior of employees and teachers at excellent institutions of Higher education must inspire confidence in the students. 13 – Students at excellent institutions of Higher education feel safe in their transactions with the institution. 14 - The employees and teachers at excellent institutions of Higher education must be polite to the students. 15 – The employees and teacher at excellent institutions of Higher education must have the knowledge needed to answer student questions.</p>	<p>12 - The behavior of employees and teachers at your institution of Higher education inspire confidence. 13 – You feel safe in your transactions with your institution of Higher education. 14 – The employees and teachers at your institution of Higher education are polite. 15 – The employees and teachers at your institution of Higher education have the knowledge needed to answer your questions.</p>
Empathy	<p>16 – Excellent institutions of Higher education must have convenient business hours for all students 17 – Excellent institutions of Higher education must have employees and teachers who provide individual attention to each student. 18 – Excellent institutions of Higher education must be focused on the best service for their students. 19 – Excellent institutions of Higher education must understand the specific needs of their students.</p>	<p>16 – Your institution of Higher education has convenient business hours for all students. 17 – Your institution of Higher education has employees and teachers who provide individual attention to each student. 18 – Your institution of Higher education is focused on the best service for its students. 19 – Your institution of Higher education understands the specific needs of its students.</p>

Source: (Oliveria & Ferreria 2009)

This methodology operates by means of identifying “expectations” and “perceptions” with the aim of closing the gap between the two. These can be demonstrated in five dimensions in Relation to educational settings. (Roland K. Yeo, 2008). Brochado et al. (2009) mentioned that There are a lot of empirical applications of the SERVQUAL paradigm to measure service quality in HE (Hill, 1995; Anderson, 1995; Cuthbert, 1996a, b; Kwan and Ng, 1999; Sohail and Shaikh, 2004; O’Neil and Wright, 2002; Sahney et al., 2004; Ho and Wearn, 1995; Tan and Kek, 2004)

3.2 Gronroos model

Gronroos (1982, 1984) was one of the first authors to conceptualize service quality with the development of the perceived service quality model; he created a model that attempts to illustrate how the quality of a given service is perceived by customers. According to Gronroos (1982; 1984; 2001), there are three fundamental aspects to service quality: technical quality, an evaluation based on what the customer receives. In fact, these are the relatively quantifiable aspects of the service, which the customer and supplier can easily measure. Another aspect is functional quality, an evaluation based on how the service is delivered. Indeed, functional quality refers to how the service is provided and the interpersonal behaviors contributed by the service employee during the service encounter. Technical (or outcome) quality is evaluated after service performance while functional (or process) quality is evaluated during service delivery, and mental image, which could be referred to reputational quality. (Swartz and Brown, 1989, Gronroos, 1984). In addition, it is important for managers to understand how the technical quality a functional quality of a service is influenced, and how customers perceive these quality dimensions (Gronroos, 2007) to ensure perceived service quality is maximized.

3.3 Servperf model

Cronin and Taylor's (1992) questioned the gap between expectations and functionality as the basis for measuring service quality and proposed SERVPERF's measurement which evaluates the quality. Based on their studies, the concept of function-based scaling is the adjusted form of service quality measurement structure of SERVQUAL scale (Carrillat, Jaramillo, and Mulki, 2007). In fact, SERVPERF extended SERVQUAL with the addition of an evaluation of service performance embodied in satisfaction (Cronin and Taylor 1992). Comparing with SERVQUAL the SERVPERF uses a single set of questions concerning post consumption perceptions of service quality and does not seek to measure expectations (Cronin, 1992). Abdullah et al. (2005) mentioned that many authors concur that

customers' assessments of continuously provided services may depend solely on performance, thereby suggesting that performance-based measure explains more of the variance in an overall measure of service quality (Oliver, 1989; Bolton and Drew, 1991a, b; Cronin and Taylor, 1992; thus confirming that SERVPERF (performance-only) results in more reliable estimations, greater convergent and discriminate validity, greater explained variance, and consequently less bias than the SERVQUAL and EP scales (Cronin and Taylor, 1992; Parasuraman et al., 1994; Quester et al., 1995; Llusar and Zornoza, 2000).

3.4 HEdPERF

Abdullah (2005) proposed HEdPERF (Higher Education PERFORMANCE-only), a new and more comprehensive performance-based measuring scale that attempts to capture the authentic determinants of service quality within higher education sector. He states that the aim of this model is to capture a context specific view of service quality in higher education, enabling the whole student experience to be measured. The instrument measures 41-items and each item has been tested for reliability and validity, using both types of factorial analysis, exploratory and confirmatory (Abdullah, 2006). The HEdPERF scale is a four dimensional construct conceptualized on the SERVPERF scale (Abdullah, 2005). These 41-items consisting of 13 items adapted from SERVPERF, and 28 items generated from literature review and various qualitative research inputs namely focus groups, pilot test and expert validation.

The 41-items include: Promises kept, Sympathetic and reassuring in solve problems, Dependability, On-time service provision, Responding to request promptly, Trust, Feeling secured with the transaction, Politeness, Individualized attention, Giving personalized attention, Knowing student needs, Keeping student interests at heart, Knowledge in course content, Showing positive attitude, Good communication, Feedback on progress, Sufficient and convenient consultation time, Excellent quality programmers', Variety of programmers/specializations, Flexible syllabus and structure, Reputable academic programmers, Educated and experience academicians, Efficient/prompt dealing with complaints, Good communication Positive work attitude, Knowledge of systems/ procedures, Providing service within reasonable time, Equal treatment and respect, Fair amount of freedom, Confidentiality of information, Easily contacted by telephone, Counseling services, Student's union, Feedback to improve service performance, Standardized and simple delivery procedures, Eigen values, Percentage of variance, Cumulative percentage of variance. The comparative Sultan & Wong (2012) showed that the HEdPERF scale captures more variance relative to that of the SERVPERF scale.

3.5 PHed-model

Sultan & Tarafdar (2007) developed the performance based higher education service quality model. They claim that PHed-model is comprehensive approach compared to the HEdPERF model. Performance based attitudinal items are generated from review of literature of the relevant fields.

Of them, 13 items are adapted from the HEdPERF, which is also consistent with the SERVPERF and the SERVQUAL scales, and 54 items are developed from pilot survey focus group interview, experts' opinion and literature review. They determined eight independent variables including dependability (Depen), effectiveness (Effec), capability (Capab), efficiency (Effi), competencies (Compet), assurance (Assu), unusual situation management (USM), and semester-syllabus-grading (SSG). Also their study focus on ODL Universities which, shows the guidelines that are worth for measuring and ensuring the education quality in open and distance learning universities. Sultan & Tarafdar (2007) point out that the empirical results for the PHed model are significant and seems to play a greater contribution in performance based service quality measurement for the higher education institutions, a comparative study among PHed, HEdPERF and SERVPERF can produce relative strengths of these models.

3.6 ARCHSECRET

Vaughan & Woodruffe-Burton (2010) suggested new disabled service user-specific service Quality model called "ARCHSECRET". They try to empirically test this model, against a modified SERVQUAL model in the context of disabled students within higher education. Their research designed to compare ARCHSECRET and a modified SERVQUAL model in terms of their ability to predict and explain the variation in the service quality experience of disabled students in higher education. In the development of the ARCHSECRET model, the multi-attribute scale had been refined from 40 attributes to a set of 26 attributes, covering expectations, perceptions across ten hypothesized dimensions of the ARCHSECRET model. (Vaughan and Shiu, 2001). This scale contained 26 service quality items, worded in a positive format. The model Dimensions include: Access, Responsiveness, Communication, Humaneness, Security, Enabling/empowerment, Competence, Reliability, Equity, Tangibles. The model when presented to both operational and strategic managers of the collaborating social care organization was

affirmed as reflecting key service quality features and dimensions that were highly applicable to the organization’s internal quality systems. Further, the model was deemed to be a potentially powerful tool for management action in its identification of service quality shortfalls to ensure the most effective allocation of scarce resources Within the voluntary sector organization. (Vaughan&Woodruffe-Burton, 2010). ARCHSECRET service quality dimensions:Access (distinct from PZB) 3 attributes, Responsiveness 4 attributes, Communication 4attribute, Humaneness 3 attributes, Security 2 attributes, Enabling/empowerment 2 attributes, Competence 3 attributes Reliability 3 attributes, Equity1 attribute, Tangibles 1 attribute (Vaughan, Shiu, 2001). Vaughan claimed that ,ARCHSECRET was superior to the modified SERVQUAL in terms of its overall predictive power; ARCHSECRET key drivers were different and better in predictive power than those of the modified SERVQUAL; and ARCHSECRET was found to be reliable and valid for the measurement of the disabled student experience in higher education, while acting as a diagnostic tool for the identification of service quality shortfalls.

3.7 An integrated model

In their major study, Sultan & Wong (2012) attempted to develop and empirically test an integrated model incorporating the antecedents and consequences of service quality in a higher education context .they employed both qualitative and quantitative research methods. The model provides a good explanation of a university brand image, and perceived service quality was found playing an important role in this model (see Figure1). Universities intending to enhance their image are encouraged to consider focusing their efforts on marketing communication information, service quality, student satisfaction and trust. this study used 59 items.

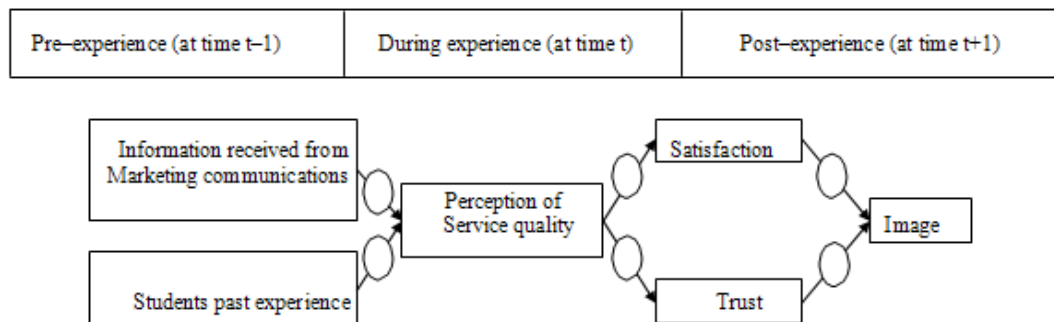


Figure 1 The Research Model

Sultan & Wong (2012) found that information (marketing communications) is more statistically Significant than past experience as the antecedents of service quality. The consequences of service quality are composed of trust, satisfaction, and image. Overall, the results suggest a good validity of the theoretical model and the key paths in the model are found statistically significant, except past experience affecting service quality. In fact, A modified five-factor structure of HEDPERF is put forward as the most appropriate scale for the higher education sector (Abdullah, 2006).

4 Conclusion

This paper has attempted to review and integrate studies on service quality of higher education in these areas: definition and concept of service quality in higher education institution and measuring models of service quality .Since the quality of service largely depends on human behavior, the quality dimensions of the measuring instrument differ in different service settings (Shauchenka, 2010). With considerable changes occurred in higher education institutions over the last two decade, it seems that higher education should be regarded as a business-like service industry, which focuses on meeting and exceeding the needs of students (Gruber et al., 2010) . Parasuraman (1985) was apparently the first to suggest the practical model for assessing service quality that called SERVQUAL; many researchers consider that SERVQUAL has undoubtedly a major impact on the business and academic communities as it reviewed in the literature. For instance, Cuthbert (1996), believes that the Q=E-P paradigm still appeared to be the most practical model for the measurement of service quality despite much criticism in the literature. Llusar and Zornoza (2000) argued that SERVPERF results in more reliable estimations, greater convergent and discriminate validity, greater explained variance, and consequently less bias than the EP scale. And Abdullah,2006 mentioned that, A modified five-factor structure of HEDPERF is put forward as the most appropriate scale for the higher education sector. Furthermore, Brochado (2009)

compares the some alternative instruments to measure service quality in higher education such as SERVQUAL, SERVPERF, HEDPERF, concluded that SERVPERF and HEdPERF Present the best measurement capability, but he admitted that is not possible to identify which one is the Best, his findings seem to be agree with other research like Clewes, 2003 that, there appears to be no definitive instrument that accurately measures service quality .Also, Abdullah (2006), points out a review of service quality literature brings forward diverse arguments in relation To the advantages and disadvantages in the use of these instruments. In general, the arguments make reference to aspects related to the characteristics of these scales notably their reliability and validity. The long practice and experimental application for modifying suitable instrument are essential for further research. More than fifty papers related to high education service quality measurement gathered from reliable sources are considered in this paper.

Table 1 Service Quality Dimensions in Higher Education

Author (date)	Items	Dimensions	Country/university
Sultan and Wong(2010)	67	Dependability, effectiveness, capability, efficiency, competencies, assurance, unusual situation management and semester-syllabus	Japan
Angell et al. (2008)	18	Academic, leisure, industry links and Cost	One university,UK
Abdullah (2006)	41	Non-academic, academic, reputation, access, program and understanding	Malaysia
Oldfield and Baron (2000)	21	Requisite, acceptable and functional Business and management faculty	one university, UK
Kwan and Ng (1999)	31	Course content, concern for students, facilities, assessment, medium of instruction, social activities and people	China and Hong Kong
Tsinidou, Gerogiannis and Fitsilis(2010)	40	the academic personnel, the administration, the library, the curriculum, the location of the institute, the available infrastructure the services and future career prospects.	Greece
Enayatī, Modanloo, Behnamfar, Rezaei (2013)	22	Tangibility, Reliability, Responsiveness, Assurance, Empathy	Iran
R.Jain,sinh and S.K.De (2010)	40	Academic Facilities, Non-academic Processes, Curriculum, Support Facilities, Interaction Quality, Industry Interaction, Input quality, Campus	India
R. J. Angell, T. W. Heffernan and Phil Megicks(2008)	38	Academic, Leisure, Industry links, Cost/Value for money	UK

Source: Based on Sultan & Wong (2012) table, extended by Author

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An International Comparative Study on the Features of University-Industry Linkage Modes

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Abstract: This paper analyses the international modes of university-industry cooperation in R&D abroad and attempts to give implications on the collaborations among the three sectors: universities, research institutes and enterprises in China. A comparative study on the university-industry linkage modes in America, Germany, Canada and Japan is conducted. Thus close combination, pragmatism-orientedness, learning-basedness and sound systems and institutions are the key experiences for China to fully develop university-industry cooperation. However, even though China has achieved great progress in combing the three sectors to stimulate technological innovations, it still lags behind for the lack of autonomy, vitality and adaptation of universities, running off numerous scientific resources and talents, unestablished relevant policies, regulations and coordinated sets of measures for university-industry cooperation. In the end the paper attempts to give implications on the measures about perfecting university-industry linkage mode in China.

Key words: University-industry linkage mode; Technological innovations; High-Tech talents; Comparative study

1 Introduction

The university-industry linkage mode in higher education aims at fostering students' overall qualities, comprehensive skills and competitiveness in job-hunting by taking advantages of the resources and environments at universities, research institutes and enterprises where classroom teaching and practical work can be combined closely to train students to meet the requirements from the society.

In the past two decades, with the shortened cycle of the transformation from scientific technology to productive force, higher education is required urgently to provide the wanted talents and technology to stimulate economic development. The university-industry linkage is an inevitable tendency in that universities are compelled to seek financial support from the industrial circle, which is eager to obtain talents and High-Tech research results from universities in turn so as to seize favorable opportunities in the market. Evidences prove that the university-industry linkage, as the major tendency of higher education, can cultivate practical talents effectively, facilitate the transformation and application of science and technology and serve economic development. This paper aims at achieving implications on how to promote the combination of the three sectors---universities, research institutes and enterprises and the application of it by analyzing the international modes of the university-industry linkage.

2 International Comparative Study on University-Industry Linkage abroad

2.1 American Mode

In the development of American university-industry linkage, the characteristics of the combination of universities, research institutes and enterprises show themselves in multiple levels, forms and large scales. The striking features of university-industry linkage in America can be listed as follows:

First, universities cooperated with the government closely. As early as the World War II, American universities had undergone technological innovations under the guidance of the government. Technological innovations were added to the function of American universities besides the traditional role of spreading profound theoretical knowledge, undertaking scientific researches and serve the society. In the 1980s, Reagan administration advocated cooperative research undertaken through the joint efforts of universities and enterprises by proclaiming the counter-measures to cope with the recession-- "We should stimulate domestic economy and rejuvenate the nation's prosperity".

Second, universities and enterprises undertook cooperative researches. To this end, research projects were chosen by two or either side and conducted by the alliance between universities and enterprises, which enables universities to extensively participate in technological innovations. The research projects were targeted for universally existing technical problems of some line of business to undergo explorative researches, which is regarded as applied research. The four first-rate research universities---Berkley Institute in California, Harvard University, Massachusetts Institute of Technology

and Stanford University are typical cases of the successful integration of industries and enterprises. Enterprises entrust universities with research and development and provide training bases for internship. The two sides assigned their own staff to co-build centers of researches, development and application;

Third, financial support is guaranteed through three major channels. Special funds are established to sponsor the cooperative research projects by the federal and state governments; subsidiaries, donation and cash donation for non-special programs given by profitable large companies, enterprises' transfer of scientific and technological equipments to universities by way of donating or charging symbolic fees and setting up researching or teaching posts for college professors to do research work in accordance with sponsors' projects and requirements whose salaries are paid by the enterprises; the funds obtained from local authorities and communities help cope with the training of local talents and problems.

Fourth, management branches are founded, whose main concern is to deal with contents of research and development, numbers and scales of training talents, arrangement of curriculum, management of finance and the mutual assignment of staff.

Therefore, close combination, extensive contents, long stability, financial guarantee and practical application are the leading features of American mode of university-industry linkage.

2.2 German Mode

Compared with American mode, German university-industry linkage focuses on consistency of targets, lasting processes and high efficiency, stemmed from vocational education---“the dual system” under which theoretical knowledge is laid as the solid base and application as the purpose; teaching activities are arranged alternately in universities and enterprises; it is the task of mutual sides to train practical talents. The operative framework can be illustrated as follows:

First, university-industry linkage plans come into being in accordance with vocational education laws, strengths in disciplines and needs of enterprises. The plans which deal with cooperative means, aims, programs, deadlines, investment of capital and sponsorship, mutual rights and obligations are proposed by enterprises and coordinate with relevant universities, therefore executive plans can meet expectations from both sides. Second, the training and cultivation of vocational talents are viewed as priority. As is stipulated in Germany vocational education law, it is a must that 80% of the young people receive vocational education at different levels. After finishing their fundamental education, most of the children become apprentices, receiving trainers' guidance in factories where teachers are assigned to give relevant theoretical assistance while learning theoretical knowledge at vocational schools where professionals come to negotiate curriculum and teaching, which greatly increase the efficiency of cooperation between universities and enterprises. Third, research and development are targeted for the market. Pragmatics is German people's way of doing things. Based on the market demands, enterprises proposed cooperation projects to universities who are responsible for research and development and then finish the trial of the whole project with staff of the enterprises before the products are put in the market. The right to use the cooperation funds sponsored by enterprises is entitled fully by universities under the supervision of them. For one thing, universities obtain resources, transform knowledge into productive force and become better acquainted with the market and accordingly they can adjust the arrangement of disciplines and specialties; for another, enterprises win the market and profits. Fourth, advisory cooperation system is held in esteem, which leads to the emergence of advisory cooperation system. Under such a system, teachers are required to assume the post of counselors for different lines of business; large or small enterprises authorize the right of counseling to professors of universities of technology and open an free access of information about them to professors.

Once the linkage between universities and enterprises is established, it will be long, stable and close, which aims at pragmatic efficiency. The renowned reputation for German products around the world is inseparable from their cooperation model.

2.3 Canadian Mode

There are two ways of cooperation in terms of Canadian university-industry mode.

One of the two features is the cooperation among universities, students and enterprises, the major feature of which is the combination of students' specialties with their practical work. The basic procedures are: after finishing certain courses, students are arranged to designated companies or enterprises to undertake paid work. The working hours should reach at 1/2 of the time spent in learning their courses. Universities are responsible for contacting enterprises which could offer traineeship program as well as fees for students; universities will follow up with the investigation on students' internship performance and enterprises will give guidance and appraisal in the traineeship program. Canadian universities reckon that the three sides participated in the cooperative model can gain benefits respectively: students can obtain practical relevant work experience, establishing a solid foundation for

their future career, and receive payments to cover their tuition; enterprises can discover and recruit excellent future staff by evaluating their working performance, thus reduce training expenses for their employees and have the possibility of hiring temporary workers; universities can be aware of the social requirements from graduates and adjust talents training strategies accordingly to recruit more competent students, enlarge the scale and profits of education by strengthening the bond between enterprises and the society. The other feature is to stimulate socialization of teachers, i.e., employees of the cooperative enterprises are encouraged to assume teaching post. For instance, 1,800 teachers at Algonquin College of Applied Arts and Technology in Ontario come from industrial or business fields. In order to grant the uniformity of teachers' content of teaching and the orientations of universities' cultivation of students, a council was set up, consisting of 17 committee members authorized by the authorities, the majority of who come from local enterprises and business sectors, to make important decisions and provide guidance to school teaching.

Canadian mode of cooperation views "learning" as the priority in the university-enterprise linkage, thus the function of talents who received higher education can emerge, which is the striking feature different from other models.

2.4 Japanese Mode

The cooperation in research and development between Japanese universities and enterprises started as early as post World War II. In 1960s, Japan's Economy Council issued a paper titled as "On the Requirements of the Newly Established Universities in Economic Society" in the memorial ceremony for the 10th anniversary of the foundation of the Association of University Standards, claiming that the first function of new universities is to train professionals and technicians for industrial circles; the second is to undertake applied and pragmatic industrial researches, which serves as the starting point of the development of university-enterprise linkage. The features of Japanese model include the following aspects:

First, cooperation in research and development between universities and enterprises is regarded as one of the basic state policies. The Japanese government advocates that higher education and academic research should be closed linked to the industrial circle. In order to promote cooperative research, Japan has taken measures to set up a series of systems to guarantee the development of university-enterprise linkage, as is stipulated in Fundamental Research and Technology Plans in July, 1996 and Educational Reform Programs in January, 1997, which mainly focuses on Japanese government's policies and strategies on how to promote the cooperation in research and development.

Second, measures about how to stimulate the bond between universities and enterprises are systematized. A variety of systems such as authorized research systems entrusted training system, donation and scholarship system, donation lectures, laboratory system, funds allotment and expenditure system, guarantee of research right system and mutual assignment of staff on both sides are the summary of Japan's experience and lessons after ten years' operation of this university-enterprise linkage model.

Third, universities and enterprises should strengthen their cooperation in training senior researchers and technical talents. The two sectors shoulder important educational responsibility in training talents. Postgraduates in Japan finish their studies on fundamental theories before they enter the cooperative firms which provide funds, workplaces and research topics, assisting them in achieving their degrees.

Fourth, universities establish hi-tech parks as carriers of the cooperation between university-enterprise linkages. Hi-tech parks have been built where universities, special research institutes and firms are densely situated to produce hi-tech talents and newly-developed products, University of Tsukuba being a good case in point.

Table 1 Features of International University-Industry Linkage Mode

Nations	Features
America	Close combination with the government and enterprises; guaranteed financial support; founding of management branches;
German	The dual system protected by laws; training of vocational talents as a priority; R&D targeted for the market; the application of the advisory cooperation system
Canada	Combination of students' specialties and their practical work; stimulation of the socialization of teachers;
Japan	The linkage guaranteed by state polices; systematized measures to promote cooperation; strengthened cooperation in training senior researchers and technical talents; establishment of hi-tech parks by universities.

The countries mentioned above have their own distinctive feature of university-enterprise linkage modes originated from their respective conditions and situations.: American university-industry mode features close combination, extensive contents, long stability, financial guarantee and practical application; German mode is pragmatism-oriented; Canada views learning as the priority in the university-industry linkage, thus the function of talents who received higher education can emerge; the bonds between universities and enterprises in Japan are more systematic and institutionalized.

3. Domestic Situation of University-Industry Linkage

3.1 Major modes of cooperation

After years' of university-industry cooperation practice, cooperative means are various, such as co-founded engineering and technology research centers, enterprises' technology centers, post PhD workstations, making full advantage of universities and research institutes to train technical talents and management employees. There are several major ways of cooperation between universities and enterprises in research and development.

First, technological innovation bases are built to stimulate production transforming. In the past decade, development and industrialization bases are constructed to center on the needs of the national economic development. There are all together 5,090 R&D institutes at universities, the fixed assets of which reach as much as 158,000,000 RMB. Besides, there are 106 key state laboratories and more than 50 national engineering research centers located in universities. What's more, universities, enterprises and local government co-built numerous university-industry cooperation centers, technology development centers and research development centers. Second, strengthening the cooperation with local governments to prosper the development of regional economy is another feature of university-industry linkage. According to the statistics of 2003, more than 80% of the large and medium-sized enterprises, the majority of provinces and cities have established full-scale cooperation in development and transferring of technological results. Third, hi-tech parks at universities are the incubators of hi-tech enterprises, training bases for innovative talents and platforms where all sources and elements are gathered. The state-qualified 22 hi-tech parks incubated 2,511 hi-tech enterprises, developed 3,561 new products, which help to better industrial structural adjustment, provide 100,000 employments workers, attract investments from different social sources, thus a multi-dimensional service system for hi-tech innovations is established.

3.2 Problems emerging in the cooperation

In terms of the domestic situation, China's style of economic increase hasn't achieved fundamental changes for the development and technology aren't geared to economic increase; besides, the allocation of educational and technological resources can't meet the needs of the market economy. Consequently, the problems mentioned above have become the major element that limits educational level, economic development and international competitiveness. The unfavorable elements that affect the university-industry cooperation include the following.

First, the lack of autonomy, individuality, vitality and adaptation because of historical reason make Chinese universities sealed off from the society and the industrial world. With the reform and opening-up, the conflict between the isolation of universities and the gradual establishment became intensified, calling for prompt changes to step out of the sealed condition. Through the university-enterprise linkage, the extensive cooperation with the social sectors and the industrial circle has made it possible to efficiently decide on research topics and technological innovation projects, preventing from sealing off from social practice. On the other hand, the teaching and research staff at universities have little awareness of research and development and they don't see the value of hi-tech products. Therefore, there is still a large gap between the projects oriented at obtaining quick returns required by small or township enterprises and the hi-tech research results and technological innovations. Most enterprises can't afford the long cycle, huge risks and large costs; whereas technological innovations are not mature enough in terms of technical equipment to be applied in production.

Second, even though the research capabilities of enterprises have been improved, but numerous scientific resources and talents are not gathered there, which is the key to the low competitiveness of their products. At the same time, enterprises are not willing to invest more capitals in the training of graduates, which is considered as wasting enterprises' resources and increasing costs.

Third, relevant policies, regulations and coordinated sets of measures haven't established. The fact that legislative work in terms of education and technology is still in its preliminary stage constrains the university-industry linkage. For the time being intermediary agencies for coordinating universities,

research institutes and enterprises are too scarce to function as a bridge to provide service in consultation and smooth the relations among the three sides. What's more, lack of capitals is another barrier to the cooperation in research and development.

4 Conclusion

The university-industry linkage is a complex system, involving interests, laws and the governments at all levels. Comprehensive measures should be taken to motivate the cooperation between universities and enterprises. The comparative study on the mode of university-industry linkage of different developed countries has given implications in the cooperative mode, setting up of government regulations and implementation.

First, the government's function in management and guidance should be strengthened. Governmental support is an indispensable element in promoting the rapid development of university-industry cooperation. The government should establish sound legal and institutional systems to serve as the rules to regulate market behaviors. Besides, it is of great importance for the government to support university-industry cooperative innovations in form of setting up scientific and technological plans, so as to avoid the risks brought by technological innovations to the enterprises, which can cover the shortage of the current national scientific and technological plans in supporting the university-industry cooperation.

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A Case Study on the Means of Distributed Innovation in Iron and Steel Industry

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Abstract: As a traditional pillar industries, the iron and steel industry are actively exploring the path of efficient innovation and resource sharing given the background of the continuous development of economic globalization and the IT era, and thus the distributed innovation are given more attention in the iron and steel enterprises. This paper analyzed the major modes and means of distributed innovation based on the case study of the typical steel enterprise, and further studied the features and management points of the distributed innovation in the iron and steel industry, so as to provide theoretical and practical guidance for the innovation management in iron and steel enterprises.

Key words: Iron and steel enterprises; Distributed innovation; Innovative approaches; Case study

1 Introduction

As the pillar industry of national economy, iron and steel industry still shows its vitality and vigor, after the rapid development in the 20th century. To keep the competitive advantage in the market and irreplaceable position of steel material, the world's major iron and steel enterprises all possess their own research & develop team and carry out all kinds of research projects to consolidate their market share. Distributed innovation (DI) has gradually become the most important way to improve the efficiency of research and development in many good iron and steel enterprises. Distributed innovation means the innovative activity between enterprises and its cooperative enterprises in different places, based on the principle of source sharing and with the help of the common network platform^[1]. Currently, the distribution innovation approaches in the international iron and steel industry mainly has the following ways: (1) cooperative innovation with institutions of higher learning and scientific research institutes; (2) cooperative innovation with government and social institutions; (3) cooperative innovation with industry chain (upstream, downstream and peers); Those distributed innovative approaches emerge in the iron and steel industry and display their vigor and vitality.

2 Industry-Academic-Research Cooperative Innovations with Universities

2.1 Case of cooperation between Arcelor Mittal Corporation and University

Constructed by Arcelor Mittal Corporation cooperated with the department of material science, chemical and mechanical in McMaster University, McMaster steel research center is a typical research center under the lead of enterprise¹ together with the university. The center is located in Hamilton, Canada (shown in Table.1).

Table 1 Projects Carried out by Arcelor Mittal Corporation Cooperated with McMaster University

Project	University	Project leader	research contents
Research on ferrous metallurgical process	McMaster University	Dr. Gordon Irons	Vacuum and electric furnace steelmaking
Research on ferrous metallurgical process	University of British Columbia	Dr. Matthias Militzer	Metallurgical process design for high grade steel--from casting to hot rolling finished product
Automatic control technology and information technology	McMaster University	Dr. John McGregor	Improvement of cost, buckling-strength coefficient, and quality with automatic control technology and information technology

As to the relationship between the Steel Corporation and McMaster steel research center, the R&D director in Arcelor Mittal said: “the cooperation with McMaster University and McMaster steel research center today is more important than any time before, because it affects whether or not our company could get continuous innovation in the long term groundbreaking research [2].” From the above case, we can conclude:

(1) Arcelor Mittal Corporation thinks very highly of the model of Industry-University-Institute

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Cooperative innovation in in the strategy level. In the current increasingly fierce international competition environment, it is impossible for enterprises not to take advantage of the “extended mind” to increase innovation capability and efficiency.

(2) The cooperation between Arcelor Mittal focuses on the basic research for iron and steel metallurgical process. This kind of research is the foundation for technology improvement in production filed and the research result is with a wide range of adaptability. As basic research has a longer period and higher requirement for academic background, it is very right to cooperate with universities.

2.2 Practice of cooperation research between Baosteel and Universities

(1) Car plate using technology joint laboratory constructed by Baosteel and Shanghai Jiaotong University

Baosteel and Shanghai Jiaotong University founded “Baosteel-Shanghai Jiaotong university joint laboratory for car plate using technology” in 2000. The laboratory is located in car body manufacturing technology center in Shanghai Jiaotong University, with two directors from Baosteel and Shanghai Jiaotong University respectively. Both directors are fully responsible for the joint laboratory work. The two cooperation sides assign its own communicator to take responsibility for the communication and contact with each other. The joint laboratory sets joint research projects according to the strategy development needs every year, in order to solve technical bottlenecks. With relatively fixed members, the laboratory will held joint conference every year to discuss the cooperation plan and development and some other important issues. Once a quarter, the research institute will held academic activity to communicate about the recent development for joint research project and relative technologies domestic and broad.

Nine years have passed since the establishment of the joint research. With complementary advantages, resource sharing, the research center carried out close cooperation in car plate design, manufacture, application field and close communication between staff from two sides. A number of theory, technology, method, and test specification with independent intellectual property rights are formed; Special software and experimental equipment are developed; The key technology in stamping simulation for automobile body covering parts is solved; Significant achievements has been achieved in the control of stamping scrap for large key covering parts, which promotes the application of high strength steel plate in the lightweight body^[3].

(2) EPM joint laboratory for electromagnetic processing of material founded by Baosteel and Northeastern University

The history of industry-university-institute cooperation between Baosteel and Northeastern university can be traced back to the 1990s. With the annual meeting system (the two sides held annual meeting at least once every two years), Baosteel and Northeastern university has lead a multi-level cooperation from the technical research and development, personnel training, *etc.* on a large scale. In 2000, Baosteel and Northeastern university built "Baosteel – Northeastern University electromagnetic process for material (EPM) joint research center", for the research of electromagnetic metallurgy technology. At present, the laboratory has reached the international leading level in the aspect of hardware and software facilities, and the electromagnetic continuous casting billet achievements has reached the international advanced level of similar research, which was awarded the first prize for 2002 year China metallurgical science and technology.

In order to better carry out the research work, Northeastern University built the new building for the laboratory and also especially set up a studio for Baosteel researchers, all of which provides a convenient environment for researchers. Since it was founded in 2000, the center assumed and completed a series of major national research projects in the field of material electromagnetic process, and carried out more than 180 cooperations in scientific research. In applied research, the iron making magnetic segregation cloth project replaced the Japanese technology and has implemented the industrial application. The industrial experiment research for electromagnetic soft contact continuous casting technology has reached the international level.

(3) “Key laboratory for metal functional materials development and application” founded by Baosteel and Tongji University

The lab's predecessor was founded in 1995, affiliated to the Shanghai iron and steel research institute, Shanghai key laboratory of metal functional materials development and application. Shanghai iron and steel research institute and Tongji University cooperated to build this lab in 2002. Shanghai iron and steel research institute was affiliated to five steel co., LTD, a branch company of Baosteel in 2003. Since then, Baosteel and Tongji University started to build the laboratory course. Cooperation field is mainly focused on the metal functional materials research & development, and gradually expands to the

inorganic, organic functional material research & development. The development goal is to become a comprehensive research & development of the national key laboratory of functional materials^[4].

After years of development, the laboratory has introduced the domestic and international advanced instruments and equipment and cultivated a group of senior materials research workers. It has become a first-class metal functional materials laboratory in Shanghai and across the country.

3 Industry-Academic-Research Cooperative Innovations with Government and Social organization

3.1 Case of Arcelor Mittal—OCAS research center

Arcelor Mittal OCAS R&D center is the world's top level of research and development center, founded by Arcelor Mittal and Belgium Flemish regional government and converted from the original company Arcelor steel flat material research and development center of Ghent. The center is located in Gent. The purpose of the local government investment is to push Belgium district economic development and technological progress^[5]. Figure 1 shows the shareholder structure.

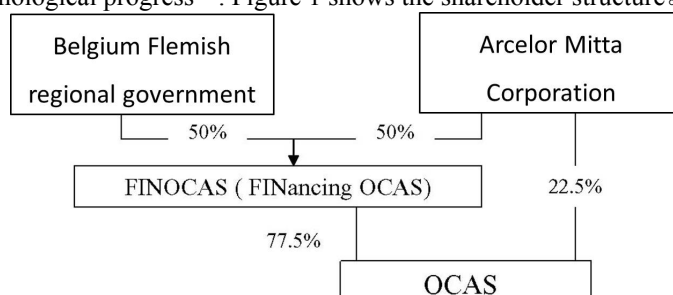


Figure 1 Shareholder Structure of OCAS R&D Center

From Figure 1, Belgium Flemish regional government and Arcelor Mittal paid 50% of the OCAS enterprise fund respectively, and the fund is managed by OCAS enterprise management (FINOCAS). This fund set up a joint venture with Arcelor Mittal to found OCAS R&D center, including OCAS enterprise funds accounted for 77.5% of total equity. The main R&D field of this center is for the ordinary steel used in industry---household electrical appliances, machinery, building and construction, pipeline, air conditioning, heat sinks, drum, furniture, electromagnetic application, energy generation, energy transfer and storage system *etc.* . The main object of service is for Arcelor Mittal's customers. Overall, the OCAS R&D center has the following features:

(1) OCAS R&D center is the product of government-industry-academic-research collaboration. The birth of it is due to the government's emphasis on scientific research. The main service object is Arcelor Mittal's customers, and it also played a role to promote regional economic development and technological progress in Belgium. So to speak, this collaboration achieves a win-win situation, so to speak.

(2) From the OCAS R&D center of shareholder structure, it can be found that OCAS is a marketable operation center and it must follow the market rules. It implements "all customer oriented" marketing strategy. All service points to the purpose of establishing long-term partnership with customers. The establishment of long-term partnership established the R&D center of market position, also brought Arcelor Mittal enterprises stable customers.

(3) The Center itself is also a teaching unit. The combination of teaching and research eliminate the transition from university to market and the result of research could serve for industry directly. Combining study with research is already very popular in foreign companies and many big companies can be independent to award degrees. Whereas at home, enterprise usually forms alliances with universities and talent is cultivated by enterprise and college together with common research and development project. The final degree is awarded by colleges or universities.

3.2 Global or regional innovation platform of cooperation innovation practice

The practice of innovation based on the plat form of the world steel association, the European Union, Japan iron and steel union and other international or regional cooperation is very rich. The innovative results also emerge in endlessly.

(1) World steel association

World steel collaboration for the iron and steel industry is the world's largest, most dynamic industry association, with more than 190 members, including iron and steel production enterprises,

national and regional industry association and independent steel research institutes. In this international innovation platforms, a large amount of project based cooperation innovation practice is under research, such as the breakthrough plan for CO₂, project for Living Steel, life cycle assessment, by-products of management, etc.^[6].

(2) The European steel technology platform

Driven by the European commission in 2004, initiated by Arcelor, the main stakeholders in European steel industry, namely the seven iron and steel enterprises, one industry association, four research institutes, 25 member states representatives, 47 universities, two unions, suppliers, and the European commission together, formally established steel technology platform in Brussels^[7]. Since it was established, the specific strategic goals were put forward: (1) Ensure the European iron and steel industry profits through innovation and new technologies; (2) Meet the needs of society through cooperation with relevant industrial partners quickly; (3) Attract and protect steel human resources; To achieve the strategic goal, the European steel technology platform set up six big working group for innovation, automobile, construction, energy, environmental, and human resources ,*etc.*.

4 Distributed Innovation of Industry Chain

4.1 Cooperative innovation practice in Arcelor Mittal industry chain

The strategic alliance of this new enterprise cooperation innovation mode in the iron and steel related industry chain between enterprises began to appear between the upstream and downstream enterprises in the 1990s, and presented the trend of more and more close and widely cooperation. Arcelor Mittal established extensive cooperative innovation relations with vast majority of global auto manufacturing and other downstream enterprises. Figure 2 and Figure 3 shows its cooperation with Global auto manufacturers and downstream users of other strategic cooperation.



Figure 2 Cooperation Innovation Between Arcelor Mittal and Automobile Manufacturer

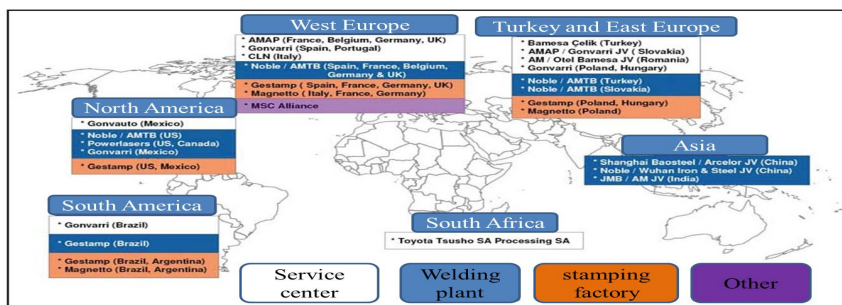


Figure 3 Cooperation Between Arcelor Mittal and Downstream Users

In response to the auto industry globalization and to meet the global supply system demand, Arcelor Mittal set up strategic alliance with Nippon steel in the car plate production and related business areas to develop a close technical cooperation. Both sides jointly established the "global strategic alliance steering committee" (GSC) and professional committee in the field of relative business. The chairman of the committee is designated by both sides, from one of senior vice Presidents from each company. Members of the committee consist of experts from both sides. In the core business areas of technical alliance - car plate production technology, Arcelor Mittal and Nippon steel, have adopted the following cooperation:

(1) Joint owned products and services: Both sides choose together about 100 varieties of products as the joint owned products, and establish mutual technology/product service system in Europe, Japan, North America, South America, China, and other regions. Through cross licensing, both sides supported each other in terms of products and services, and will not affect the normal competition between the two sides.

(2) Joint owned technology research: Both sides develop joint owned technology research in higher strength grade of steel, including the new steel grade development, squeezing and collision test simulation and development of welding technology.

(3) Cooperation to develop new technology: Both sides mainly conduct study about the new steel grade, new production processes and new steel solutions for research and development.

(4) Build joint venture plant: As China has become a global auto production country; the two sides will focus and target the market in China, and set up joint venture with Shanghai baosteel to provide high quality product for the Chinese car manufacturer, in line with the global standard.

Although the initial technical alliance between Arcelor Mittal and Nippon steel is limited to the car plate business, in recent years, with the deepening of cooperation, the cooperation has begun to set foot in other fields, such as raw materials procurement, utilization, joint development of new strategic business, etc..

4.2 United States Nucor and Australia's BHP, Japan IHI cooperative innovation

In 1988, Australia's BHP Billiton and Japan IHI company (formerly known as ishikawa island company) jointly developed Castrip technology (the technology has many advantages: less investment, lower operating cost, energy conservation and environmental protection, covers an area of less, flexible operation), named project M. Project M ended in 1999, in the ten years of development, the two sides overcame the technical difficulties, on the basis of Mr. Bessemer's original concept. Many process was improved and the total roll out was more than 30000 tons of steel, which are used in the roof, pipe and packaging, etc..

Although technical success was achieved, the feasibility of double roller rolling thin steel strip in industrialized mass production remains to be verified. BHP and IHI realized that they need an iron and steel enterprises as partners, to achieve double roll thin strip roll casting process for industrial application in the end. In March 2000, America's biggest steelmakers, Nucor steel company joint BHP Billiton and IHI Company, and the tripartite cooperation established the organization, Castrip LLC., for double roller cast-rolling Castrip technology development and application of the thin strip.

In May 2002, Castrip LLC successfully built the world's first set of all commercial double rollers rolling thin strip steel plant, used to produce carbon steel and stainless steel, at Nucor steel company Crawford's factory. It's the world's first commercial operation of this technology. The development process of Castrip process is shown in Figure 4.

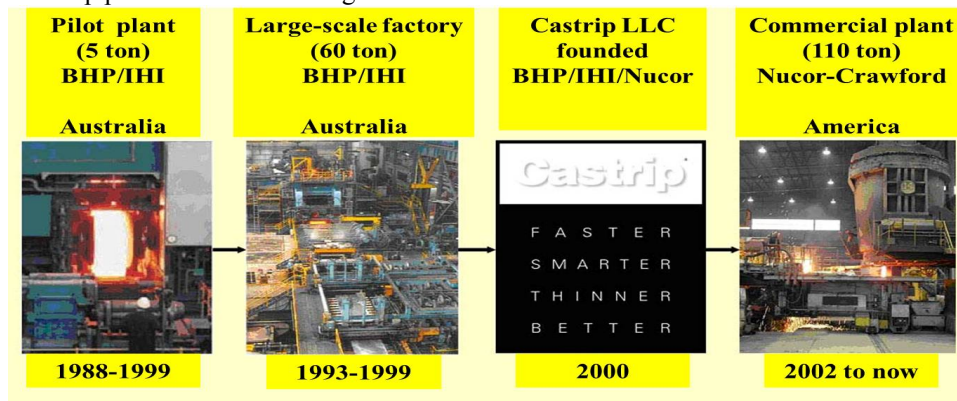


Figure 4 The Development Process of Castrip Process

4.3 ThyssenKrupp and JFE cooperation innovation practice

The distributed innovation practice between ThyssenKrupp in Germany and Japan JFE is in the form of technology strategic alliance. ThyssenKrupp and JFE are both strong in technical strength, but the production and sale of the two companies have their own certain regional, technical characteristics. JFE's production and sales are mainly limited in Japan and Asia, whereas ThyssenKrupp's production and sales are mainly in Europe. In response to the growing steel industry competitive environment and increasing trend of the globalization in the downstream of the automobile industry, the two companies

started the technology alliance for the performance of the cooperative innovation process in 2002.

In April 2002, ThyssenKrupp signed a cooperation agreement with NKK (at that time, Japan's second largest steel company) and Kawasaki steel (the third largest steel company at that time and in 2002 September affiliated into JFE group), visioning not only to jointly develop directly for global auto makers, but also to build a global supply network system, and constantly enhance their competitiveness through collaboration^[8]. In October 2004, with the goal of entering the mainland China auto industry market, the two sides agreed to exchange the researchers to complete a new generation of high strength automotive steel research and development work. In late 2004, ThyssenKrupp got JFE's authorization to produce JFE's Nano high tension steel plate (precipitation strengthening type), and JFE company can also produce ThyssenKrupp company's CP high tension steel plate (composite reinforcement type), thus the system in which the two company can produce the opposite side's product is built. Then, the two sides established the promote committee consisting of senior leadership from two companies to promote strategic cooperation issue, and high strength steel sheet, surface treatment, related application technology, and other working groups were set respectively under the promoting committee. In June 2005, JFE Steel Corporation formed a joint venture with ThyssenKrupp, named JEVISE new company, which is responsible for the coordination of both sides in the market and technical communication, by both parties each holding 50%, headquartered in Tokyo. In January 2008, the two companies announced the successful development of a new composite structure hot-rolled steel plate with high tension for car manufacture, and put forward the patent application for this technology.

ThyssenKrupp and JFE cooperative innovation is a typical combination of complementary advantages. Through the cooperative innovation, research and development efficiency is improved greatly, research and development achievement is outstanding, the cooperation process is full of trust, mutual benefit and reciprocity is strengthen, and ultimately a win-win situation is achieved.

5 Characteristic Analysis of Typical Distributed Innovation of Steel Enterprise

5.1 Characteristics of distributed innovation of Arcelor Mittal

Arcelor Mittal is an international iron and steel enterprises with the largest crude steel production in the world, merged by the world top two iron and steel companies, Mittal steel company and Arcelor steel company in 2006. Arcelor Mittal company research and development work is controlled by group management board members and senior executive vice President. All funds are collected by the enterprise internal financing and allocated directly by the President, used in products and technology, quality assurance and long-term strategic research and development.

As a super steel carrier with thousands of R&D centers, its industry-academic-research cooperation activities covered various forms. Due to its internal scientific secrecy and the limitation of information collecting channel, very detailed information cannot be got, but through the specific case, it is able to understand the characteristics of its production practice.

(1) Arcelor Mittal is a multinational enterprise group, with factories all over the world, thus its distributed innovation activity has obvious regional characteristics. The forms of cooperation are also varied with the OCAS research center cooperated with local government to participate, jointly research center with universities and other study alliance with other iron and steel enterprise.

(2) OCAS cooperation mode combines the development of enterprise with the progress of area economic and technical development. As joint-stock R&D, stabilizing and enlarging market share and helping customers to realize its value become the focus of the research and development work. Actually, OCAS research center is built on the basis of Mittal's industrial steel research center, thus there is overlap phenomenon in such aspects as personnel, equipment and workplace between the two research institutions. The cooperation mode takes advantage of Arcelor Mittal's research and development resources such as internal people, money, and goods and external funding. It is still good to promote the cultivation of talent and keep stability of human resource.

(3) The cooperation between Arcelor Mittal and universities is focused on the basic research for iron and steel technology. Joint research projects are not just confined to the above cases, and should be more widely and deeply. Due to the limitation for information acquisition, the detail is not discussed here.

(4) The establishment of strategic alliance for cooperation between enterprises of innovation practice by Arcelor Mittal can be rated as the model of the steel industry. The main strategic alliance is on the basis of technical cooperation, and established a relatively perfect operation mechanism, equipped with professional personnel. On the choice of strategic alliance partner, it also selected from

all walks of life with outstanding technical capabilities, on the condition that their business are with coordination or complementary effect. Strategic alliances not only bring benefit for users, but also create favorable conditions for the publicity for their own technologies.

5.2 The characteristics of Baosteel distributed innovation

Since the establishment in 1978, through the first, second, third term of construction and a series of joint reorganization after the adjustment and transformation, Baosteel has become China's largest and most advanced in technology and equipment among the integrated iron and steel enterprises. Its development has experienced three stages of technological innovation: the first stage set introduction, digestion and absorption as the main body; the second stage was to master imported technology to realize secondary innovation on the basis of comprehensive digest; the third stage or the current stage is based on the orientation of autonomous integration "open innovation". It is necessary to emphasize that the distributed innovation runs through the whole historical process. Figure 5 illustrates Baosteel strategic objectives for technology innovation and distributed innovation.

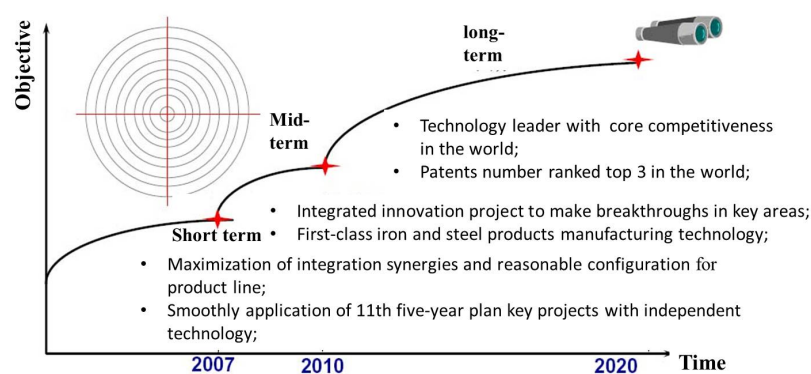


Figure 5 Baosteel Strategic Objectives for Technology Innovation and Distributed Innovation

In recent years, Baosteel makes full use of the scientific research resources at home and abroad in the exploration and practice of new model for distributed innovation and new method for process. With constantly tries to build platforms for the communication of knowledge sharing and cooperation, technology innovation has made considerable progress. Baosteel distributed innovation presents the following features:

(1) Industry-academic-research cooperation practice of Baosteel has been closely related to the company's technical innovation strategic target, and is an important part of company technology innovation system. Around a new round of development strategy, advantage colleges are carefully chosen by Baosteel as a strategic partner, which is based on specific projects, in various related fields, in order not only to ensure the input-output balance of scientific research project, but also to realize the industrialization of research results.

(2) Baosteel conducts widely international cooperation about Cutting-edge technology, high-end fields such as metallurgy technology, automotive steel, with Europe, North America and the Asia Pacific region scientific research organization. And it also takes an active part in the world steel association activities, carrying out the study of more than 10 public projects. Through the international technology cooperation, the technology and knowledge source of Baosteel were enriched. The technology innovation ability and the level of resources in Baosteel are improved. A huge knowledge communication network formed internal and external Baosteel.

(3) By cooperating with key colleges and universities to carry out laboratory, etc., Baosteel directly involved in the national technology research frontier subject. Except for the cooperation with northeastern university, Shanghai Jiao tong university and so on to build the "EPM joint research laboratory material electromagnetic process" and "use of car plate technology joint laboratory", Baosteel also actively participated in the construction of national engineering research center, undertake or participate in many national 863 plan, 973 plan, major industrialization projects and supporting high-tech engineering and project

(4) In terms of exchanges and cooperation about talent cultivation between colleges, "Baosteel professor", "Baosteel part-time tutor," "joint training graduate students", "Baosteel education fund" and other measures, all provide many excellent talents for enterprise.

6 Conclusions

The valuable experience of the above excellent iron and steel enterprise in the development of distributed innovation are worthy of reference and thinking. In order to further promote the enthusiasm and creativity of scientific research personnel in iron and steel enterprises, and build first-class research and development base, distributed innovation system construction of iron and steel enterprises in China should pay attention to the following aspects:

(1) Japan and South Korea's iron and steel enterprises existing patterns are more worthy of reference, considering organization mode of the distributed innovation. But Arcelor Mittal advanced development concept and R&D service market, customer oriented strategy, are worth learning and using for reference

(2) As the world's first-class national research and development center, the research and development strategy must be well designed hierarchically, considering not only the production process research plan, but also the next 5 to 10 year or even longer plan for the future of new technologies.

(3) Construction of higher level of professional research and development center. Strengthen technical collaboration between research and development center and allocate the R&D resources rationally.

In addition, in the process of actual operation and management innovation, experience should be drawn accordingly:

(1) The principle to choose cooperative innovation partner should be based on the outstanding technical capabilities and the complementary advantages coordinated with each other.

(2) Cooperation with universities or colleges should be based on actual project, with the principle of pragmatic to form stable cooperative system.

(3) Pay attention to strengthen industrial chain (including upstream and downstream, peers, etc.) cooperative innovation to form a stable mechanism of cooperative innovation and technology innovation chain.

(4) Take further cooperation and communication with foreign excellent steel enterprise, and use good steel enterprise's technology ability to achieve leapfrog development.

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Open Innovation: An Opportunity for Pharmerging Countries to Close the Technology Gap?

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Abstract: The pharmaceutical industry is entering a critical phase in its history, with declining profits and patent cliffs fallouts awaiting their former blockbuster drugs. It is in this context that this paper will address the opportunity emerging pharmaceutical markets could benefit from when this open innovation model is applied to the pharmaceutical industry. Mainly, we will discuss the integration of this strategy within big Pharma companies in their efforts to enter what is designated as “Pharmerging countries” in general with a special focus on one key global health market: China. We will discuss the impact of this innovation strategy could bring in terms of both tangible and intangible benefits and potential drawbacks.

Key words: Pharmaceutical Industry; R&D; Open innovation

1 Introduction

Current Pharma industry situation is critical according to most industry analysts, this new decade marks the start of a the dramatic yet predictable patent expiration wave for major drug blockbusters such as the anti-thrombosis drug Lovenox manufactured by French SANOFI-Aventis or Swiss Roche’s anti-cholesterol drug: Lipitor. The latter drug generated \$10.7billion in 2010 only, illustrating the crucial role these blockbuster drugs play in the big Pharma’s so far unprecedented profitability, peaking in the eighties and nineties ,a golden era for the Pharmaceutical industry worldwide where few Pharma Multinationals (Big Pharma) had a quasi monopoly on the global drug market.

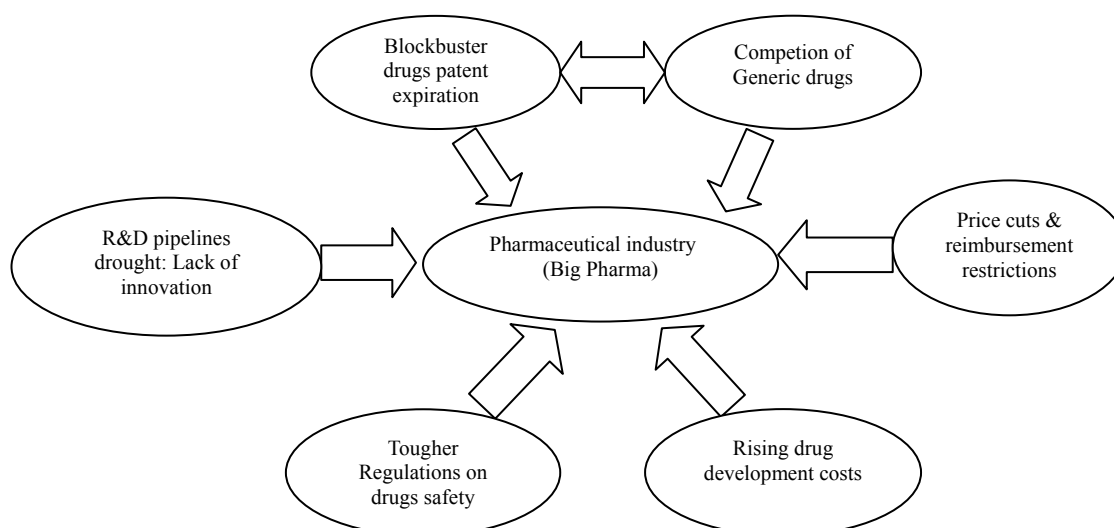


Figure 1 Challenges Hampering the Growth of the Pharmaceutical Industry

Today’s Pharma market is still one of the most profitable, with \$600billion in 2011 and a 6.5 percent CAGR essentially driven by a strong near-term growth in the U.S market and the rise of new drug markets in developing countries like China or India, where the size of the drug market is making Big Pharma salivate over colossal future profits. Nevertheless, we are currently far from the golden age of Pharma industry with Big Pharma ruthlessly dominating the market and earning astronomical return on investments with a few powerful patented drugs, namely the blockbuster drugs treating widespread conditions: Coronary diseases, Hypertension, Diabetes, Cancer...Etc. This clear blue sky is now threatened by the drug patent expiration storm and the generic drugs competition which are usually 30-80 percent cheaper than the original drugs and set to generate \$129.3 Billion USD in 2014 with a double-digit expected growth especially in Pharmerging countries (15-17 percent CAGR), also the constant pressure of price cuts governments are imposing now on the healthcare expenditures illustrated

by Austerity plans in EU countries affecting the healthcare reimbursement schemes & social security in many countries: France, Spain, UK or the Obama's Medicare plan in the US to curb health spending. Add to that the rising pressure of what some Pharma executives already qualify as an "over-regulated" industry. This refers to an increasing set of laws and regulations passed by governments through regulatory organizations such as FDA in the US and AFSSAPS in France. These organizations impose more control and transparency for clinical trials and new drug approval.

In the UK, the pharmaceutical industry faces tougher legislation on the disclosure of adverse events in clinical trials following the MHRA's thwarted attempt to prosecute GlaxoSmithKline for allegedly withholding information about risks of suicidal behavior in children and adolescents taking its antidepressant Seroxat (Paroxetine). Another example is the bill enforced by the congress in the USA allowing FDA new authority to impose safety requirements on medicines once they go on the market, including restrictions on consumer advertising. The bill also would require registration of clinical drug trials and their results in public databases. The FDA Amendment Act of 2007 has forced the FDA to increase the standards for approvals of new drugs introducing mandatory risk evaluation and mitigation strategies (REMS).

Another major issue that the Pharma players need to address is the constant increase in the bill to develop a new drug, Pharma companies have been spending more to develop drugs but with an attrition rate of 999/1000. These costs are starting to weigh on the Pharma companies budget especially when they will not necessarily lead to the next Blockbuster drug. A study conducted in 2003 in the Health Economics Journal showed that the cost of developing a new drug for Pharma companies average of \$802 million apiece to produce in 2000, or \$1 billion in 2011 dollars when accounting for inflation^[4]. Even if there has been some controversy about the validity of these results, an independent study has been conducted to verify the accuracy of these claims and it concluded that the costs are more or less accurate with 5 percent error rate for the 2003 estimated numbers. Yet, Pharma industry remains a profitable business when conducted well and based on a promising innovative drug R&D project. Hence, Pharma companies have been trying to figure solutions out to these rising R&D costs by outsourcing some of their operations in regions where operating and labor costs are cheaper: India, China, Brazil...etc.

Despite all the aforementioned challenges the industry is facing, the most critical factor that would seal the industry's fate is the adoption of a new R&D Innovation approach that would ensure the Pharma industry's sustainable growth. Developing promising drugs is a complex equation in which consequent human and material resources are combined to result into a new drug or therapeutic approach for a given disease. So far, this has been achieved throughout a closed model in which all stages of the drug development from the discovery of the potentially active molecule or compound to its commercialization in the market were handled in-house by the same Pharma Company. This generated the highly innovative and jealously protected patented drugs; these blockbuster medicines yielded considerable benefits to their manufacturers who invested considerable financial & Human resources to develop these products yet yielded colossal profits after it was out in the market.

Unfortunately for the industry players, this single or multiple blockbuster drugs based model could not indefinitely provide sustainable growth and profits this conundrum justifies the deep rooted restructuring the pharma industry is undergoing at various levels: organizational structure, operations, production processes, supply chain and most importantly the R&D model. The latter restructuring of R&D processes has been influenced by the ascension of a new innovation model, called 'Open Innovation', which has 3 key objectives throughout the process of its implementation within an R&D structure:

- Sharing the risks (and profits) associated with the drug development process
- Reduce time & costs related to a new drug development
- Provide a sustainable growth strategy for an industry facing a drying R&D pipeline

2 Open Innovation in Pharmaceutical Industry

2.1 The open innovation concept

The concept originally dated back to the 1960's with a special focus on inter-firm cooperation in the R&D departments. However, the open innovation and its applications in today's fast-paced business landscape is a model promoted by Henry Chesbrough, a professor and executive director at the Center for Open Innovation at the University of California, Berkeley, in his book *Open Innovation: The new imperative for creating and profiting from technology*. The concept is related to user innovation, cumulative innovation, Know-How Trading, mass innovation and distributed innovation.

“Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology”. The boundaries between a firm and its environment have become more permeable; innovations can easily transfer inward and outward. The central idea behind open innovation is that in a world of widely distributed knowledge, companies cannot afford to rely entirely on their own research, but should instead buy or license processes or inventions (i.e. patents) from other companies. In addition, internal inventions not being used in a firm's business should be taken outside the company (e.g. through licensing, joint ventures or spin-offs.)

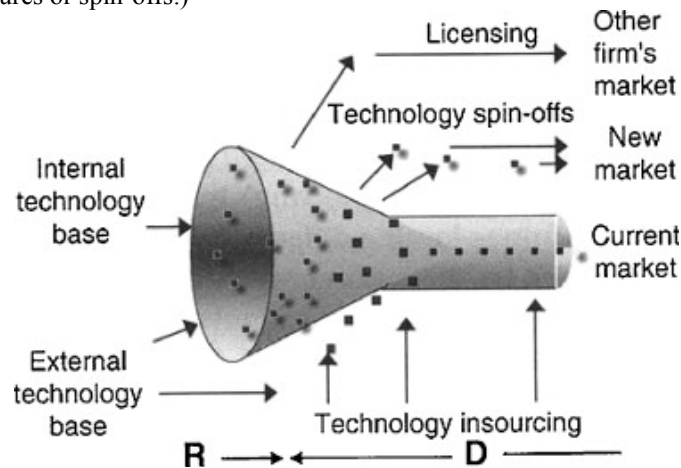


Figure 2 The Open Innovation Model (Chesbrough,2006)

2.2 Open innovation in Pharma industry-The necessary transition from closed to open model

Open innovation is more than just a trend for the pharmaceutical industry. Indeed, the sector is undergoing a critical phase in its history, with R&D pipelines desperately dry with R&D departments either unable or not dynamic enough to produce an innovative, safe and profitable drug. The Pharma sector is an industry where R&D is the core business unit within the organization and the rest of the departments' organization and size depend on how innovative and time efficient the research unit is. Until recently, the drug makers were solely operating on a very efficient “closed model” where all stages from research of active components, identification of the targets, pre-clinical, clinical trials and finally the registration and marketing of the drug were exclusively handled by the Pharma company, this would start off with consequent human and capital investment in the potentially successful compound or molecule, which eventually would yield a considerable return on investments due to its patent protection.

This patent would guarantee the exclusivity of the new drug, extending the protection from the active compound itself called “Princeps” to its adjuvants, its production processes and its therapeutic use all property of the Innovative Pharma company which discovered the drug for a duration that would vary from 10 to 20 years. After the expiration of this patent, the drug would experience what we call a patent cliff, illustrated in a steep drop in sales due not only to declining unit numbers, but also because of price erosion up to 70% within months mainly due to the introduction in the market of cheaper substitutes, with the same active ingredient, but with different adjuvants and/or methods of manufacturing. (Fig 2.2)

Patent cliff would essentially impact individual Pharma companies in the mid-term future within the period 2010 - 2014, the revenues of drugs whose patents will expire is around \$89.5 billion USD. In 2011, Lipitor, the bestselling drug of Pfizer will go off patent as will Plavix (anti-thrombosis drug), Actos the anti-diabetic drug as well as Sequel and Zyprexa, which are used to treat schizophrenia and bipolar diseases. The loss induced by patent cliffs could only be compensated by the launching of new products, for example, new indications such as osteoporosis, cancer, multiple sclerosis or respiratory illnesses. Hence, the urgent need for new drugs and treatments to limit the losses induced by these patent cliffs. Another way to minimize the damages of patent cliffs is to sell branded generics, which are the authorized version of the patented drugs as a mean to maintain the bigger market share even when the latter drugs would no longer be protected by their patents.

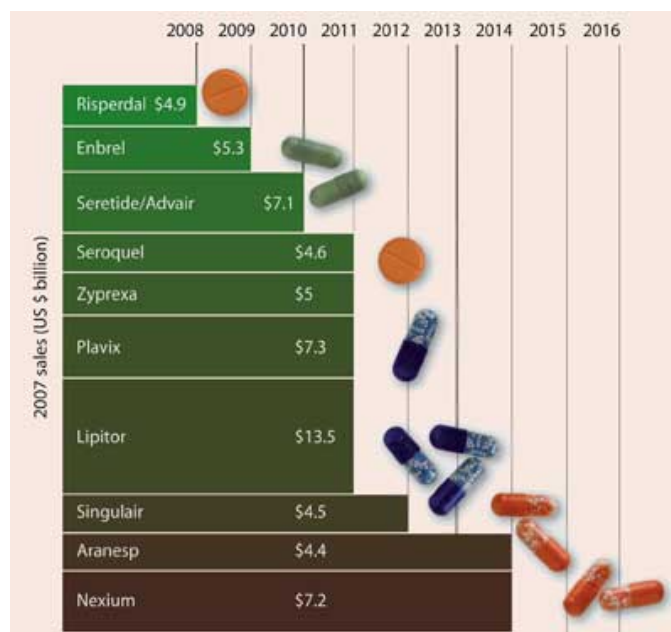


Figure 3 Illustration of Patent Cliff of Blockbuster Drugs (Royal Chemistry Society, 2009)

In a bid to retain as much revenue as possible from its Lipitor cholesterol pill, which lost patent protection in the US in May 2011 and now faces generic competition, the US Pharma giant, Pfizer is undertaking several unusual strategies. These include offering incentives to health plans and pharmacy benefit managers to favor its brand-name drug, providing consumers a co-pay card that lowers their cost significantly and partnering with a specialty pharmacy to mail Lipitor directly to patients. The gambit is being closely watched by other drug makers, payers, pharmacies and regulators for the implications as numerous best-selling meds also encounter generic rivals. Lipitor generated \$10.7 billion in sales last year: capturing even a small slice of ongoing sales is important to Pfizer. To gain some insight, Reimbursement Intelligence's recent market research showed that Pfizer would lose 54.5 percent of the market after 6 months and 75 percent after a year. Pfizer's aggressive strategy towards pharmacy retail stores and healthcare providers is a pioneer model, that if proved to be successful could be applied by other Pharma companies willing to stop the brand erosion they are facing and to some extent considerably slow down the roaring success of generic drugs in the global market. This latter strategy shows how desperate Pharma firms are in retaining as much revenue as they can from their star drugs.

The biggest issue in Pharma remains the lack of innovation. Where the long-term forecast is merely 1 new drug per company per year, productivity in the sector has declined by 20 percent from 2001 to 2007. This phenomenon could be the combination of many factors: after the M&A fever in 2009 that had resulted in a series of acquisitions of smaller biotech companies by Big Pharma trying to penetrate new markets by purchasing smaller generics manufacturers in this field USA leads the pack with over 114 deals made in 2010 including 8 worth more than \$500 million USD. These deals represent 50 percent of the deals made in 2008-2010 such as SANOFI-Aventis who boosted its presence in China in the OTC market by acquiring BMP Sunstone in 2010 for \$520million USD. Although these M&A activities might have their perks, it seems that it has become a brick in the "R&D wall" Pharma industry is hitting: several experts argued that the M&A might keep its promises in terms of market penetration and strengthen a firm's position in a new market. However, in terms of innovation it had to some extent failed to produce tangible results, the explanation could emanate from the fact that by merging and acquiring new firms Pharma companies simply lost in efficiency what they gained in size. The lack of inter-firms synergy between the mother company and the newly acquired ones, as well as the vertical structure of the decision making processes is affecting the R&D more than any other department, hence shifting the focus of these companies from innovation to deal with integration issues within the organization.

Over time, complexity becomes a drag on the quality and speed of decision making and there is a need to shift towards leaner models such as Virtual development which have been proven to be successful for Eli applying Chorus virtual model molecules through candidates identification and Phase

I at median cycle times that were 40 to 60 percent faster than the industry average.

Another issue hindering the development of new drugs is the heavy focus on biotechnology and small molecules, though they are promising for the future. So far, however, Pharma companies who acquired these firms have failed to translate these discoveries into concrete drugs or clear therapeutic indications. A recent analysis showed that out of 6,000 biotech projects available for late-stage licensing; only about 200 are likely candidates for larger Pharma companies and fewer than 100 have the potential to become top-sellers. Combined, these projects would account for \$30 billion USD in potential revenues. Another example of promising projects with so far meager results is the Human Genome Project, while undeniably a huge scientific achievement; results have fallen far short of expectations. The project simply has not yielded the sort of immediate benefits in terms of therapeutic treatments and diagnostics that had been hoped. New models for “data-driven” public/private collaboration are poised to transform industrial drug discovery. Pharma is then set to enter a new era: The open innovation era, based on what seems to be at first the very notion the industry has been jealously avoiding: data sharing and collaboration.

This shift towards a pre-competitive era is a necessity to foster creativity and ideas on a global scale and from this paradigm; it should profit everyone from drug makers, healthcare providers to patients desperate for new and efficient therapeutic solutions. This open collaboration has many forms, we can see it in the growing number of private-public consortiums of various kinds such as Merck’s SAGE initiative.

This acknowledges the common need to develop tools and frameworks able to analyze and integrate data from multiple sources and across disciplines (for interest in chemistry, biology and agriculture etc), fostering the innovative ideas from industry, academia and NGOs.

This SAGE initiative would rather account as an exception in the open collaboration field as it has non-profit purposes. But we have seen an increasing number of projects involving Pharma companies either with each other or with biotech firms to boost the drug discovery process and yield tangible results within shorter deadlines. Another case of this new model is illustrated by Lilly’s new open innovation platform designed to help build its pipeline and to identify new treatments for multi-drug resistant tuberculosis, which builds on the success of Lilly’s Phenotypic Drug Discovery Initiative (PD2), launched in 2009 to facilitate research on molecules around the world that have the potential to ultimately be developed into medicines. The Open Innovation Drug Discovery platform utilizes a secure website that offers Lilly’s proprietary computational and informatics tools to aid scientists in the design and selection of molecules. Once a scientist submits a molecule to the website and it meets certain specified requirements, Lilly tests it – free of charge – in a series of biological assay panels that evaluate it for its uniqueness and potential to be further optimized into a drug candidate. Comprehensive data reports are then provided to the submitting scientist. In the case of the cancer, endocrine, cardiovascular and neuroscience screenings, Lilly receives first rights to negotiate a collaboration or licensing agreement with the submitter in return for the data’s provision. If no such agreement is reached, the external scientist retains “no-strings-attached” ownership of the data and can choose to use it in publications, grant proposals or to further refine their hypotheses about the molecule’s potential as a medicine. In the case of the MDR-TB screening, promising data could result in collaboration between the submitting organization and the Lilly TB Drug Discovery Initiative. Lilly’s R&D operations, through this project recognized the “many untapped sources of ideas and molecules” outside the company.

The initiative is part of Lilly’s wider goal of raising R&D productivity with faster development times and lower costs. Another Lilly R&D project entitled Chorus, focuses on leaner development processes, and aims to reach decisions about 12 months earlier and at about half the cost of the current industry model. Novartis is another big Pharma company who believes in the potential of open innovation to thrive and sustain its growth strategies on a global scale.

GlaxoSmithKline, the UK based Multinational Pharmaceutical company, is putting thousands of possible malaria-treating drugs into the public domain in a move that the Wall Street Journal calls a ‘Linux approach’ to pharmaceutical screening. Of course, synthesis or discovery of new chemicals is cheap compared to efficacy and qualification studies, but this is a refreshing change from the current practice of providing no information at all until after all patents have cleared. J&J executives see the appeal of this new R&D model to enhance intellectual entrepreneurship and multidisciplinary collaboration to find solutions for healthcare problems. It has lately signed a deal with GE the powerhouse of medical imagery and diagnostics to joint their efforts in the Alzheimer disease research. Terms of this collaboration have not been disclosed but it would essentially combine the two companies ‘expertise in data integration, imaging, informatics and genomics in order to find a set of biomarkers as

a way to diagnose people with higher risk of developing the disease as they grow older. Also worthy of note is GE's efforts to advance breast cancer treatment through the open innovation platform in which they invested \$100million USD in collaboration with private Pharma companies, venture capital entities Kleiner Perkins Caufield & Byer venture capitals with a special focus on data. So whether it is competitors teaming up together for the research phase or Pharma collaborating with Academia like the collaboration announced in 2011, where 37 US universities and colleges were announced as the recipients of the British Council's New Partnerships Fund which would enable George Washington University to work with Oxford University and Tata Memorial Centre, Mumbai, India on cancer research), these partnerships whether for profit or non-profit motives are set to be the new way to perform research work in healthcare field at least for early stages research efforts to respond more proactively to the growing demand for innovative, ad-hoc therapeutic solutions. This paradigm enables Pharma companies and Academia research institutions or other partners to use each other's forces and combine them, with Pharma finally acknowledging that all talents are not necessarily part of their organizations, hence providing their expertise and financial support to those who might nurture promising ideas but fail to translate them into concrete drugs due to lack of funding or their inadequate infrastructures.

2.3 Open innovation impacts on the Chinese pharmaceutical industry

2.3.1 Overview of Chinese Pharmaceutical industry

With an absolute GDP of \$91trillion USD in 2009 and a pharmaceutical market that is estimated to drive \$40billion USD in growth through 2013, China is leading the pack of Pharming countries. Driven by aggressive government spending on healthcare and an increasing demand for drugs to treat chronic illnesses such as: Diabetes, Arthritis...etc. China's pharmaceutical market expanded at an astonishing 20percent in 2009. A landmark \$125billion USD incremental government funding is at the heart of the healthcare sector's transformation, targeting substantial improvement to the nation's healthcare infrastructure, a move which is set to double the size of China's pharmaceutical market by 2013. Nevertheless, the operating environment remains complicated and a challenge along with local competition, government intervention on drug pricing and uncertainty of healthcare reforms. Due to all these factors, big Pharma see China as their saving grace whether to increase their sales volume in the Asian region with the two ascending Pharma giants China and India injected \$180billion USD in the global drug market through drug sales; or to boost their research departments through collaboration with Chinese counterparts. Bayer's incremental growth is mainly attributed to investments in China and Turkey and its capacity to adapt to the local market environment by investing in products highly sought by these markets such as Glucobay for Diabetes and Adalat for hypertension, the company has achieved a dominant position in these high-growth therapy areas and now derives 3percent of global revenues from China and this number is likely to rise in the next five years.

2.3.2 SWOT analysis of Chinese Pharmaceutical industry

China Pharma industry is considered as a High-tech industry, where drug applications for patents ranks in the top 3 of the overall patent applications in China. The number of these applications is a good indicator of the innovative capacities of this sector and it has been increasing steadily for the period 1985-2005 and it is set to grow at an even faster pace. China has already made tremendous inroads as a manufacturing center for the world. But now it's making enormous investments in R&D to propel the country into the top ranks of world innovators. In his speech in January 2006, Hu Jintao the Chinese president expressed his aim to make China an innovative country by 2020. Pursuing that goal, China has already passed Japan for R&D spending, and is ranked 2nd with the R1D/GDP growing 1.67% between 2000 and 2007. And it's turning to companies like Sinovac to develop new drugs. Sinovac is pushing a new bird flu therapy. China's R&D budget is growing at a rate of 20 percent a year, making it likely that a lot more Sinovacs will be created in the years ahead. The neuralgic centers of Pharma are located around the Beijing-Tianjin area and the Yangtze River delta area with Beijing, Shanghai, Guangdong, and Shandong being the top 4 in the industry. So far, the industry heavily relied on traditional chemistry methods for new drugs formulation and biotech sector still lags behind. Nowadays, the Chinese Pharma industry is shifting its research efforts in the anti-tumor and cardiovascular drugs. The country gets also to play another card with drug development from natural extracts and from its millennial expertise in the TCM field. This tremendous source of knowledge could provide her a worldwide competitive and innovative edge. The government is pushing the industry towards innovation allocating 9-10% of their GDP to the R&D sector which represents \$10billion USD/year, adding to the financial involvement a

series of measure such as the “863” plan that focuses on the Pharma and drug industries resulting in measures to increase drugs affordability through investing approximately RMB 850 billion (\$124 billion) over the initial three years of the plan in the country as well as a growing number of modern biotech parks (more than 20) including the famous Zhang Jiang High tech park in Shanghai operating in China and generating series of support industries to boost the research progress. With the research and development centers of big Pharma MNCs like AstraZeneca, Roche, Novartis and GlaxoSmithKline (GSK) swarming to a once remote area in Shanghai, Zhangjiang Life Science Park has become a flagship for China's burgeoning biomedicine industry. Companies in the life science park realized total sales of 10.2 billion Yuan (US\$1.5 billion) in 2008, and the park management hopes to create more local innovations by opening a large 'incubator' to provide a well-equipped launch pad for Chinese start-up companies. China is also striving to get its patent law up-to-date to provide a safe and adequate environment for innovation in the Pharma industry, the Patent law who has been revised in 2000 and then in 2003 clearly guarantees all drugs manufactured in China with patent protection. This could provide the Chinese Pharma industry a serious competitive advantage over the Indian Pharma industry.

Table 1 Chinese Government Policies to Build an Innovation-Driven Pharmaceutical Industry

Innovation promotion policies	Goals
Increase direct investment in the Pharma industry	Combine industry, Academia and partner industries' innovation capacities
Tax credits or concessions speed up depreciation of R&D facilities & equipments	Encourage & support enterprises in setting up R&D centers with favorable measures
Establish and/or renovate Public technical support platform for Pharma industry	Help firms reach their innovation goals
Government purchasing of domestically produced drugs	Encourage local firms to provide effective and marketable drugs by demand encouragement measures
Investment in the renovation of TCM research facilities	Promote TCM drugs research to capture value

Another consequent advantage for China is the cheap labor and operating costs, as it requires 40percent less investment to develop a drug or to run a clinical trial in China than in Western countries which explains the booming number of CROs in China operating for Big Pharma laboratories and the investment in these structures is forecasted to rise in the next five years.

Another segment on the rise is the API production which makes up more than 50% of the export value of China's pharmaceutical trade. As a result, the Chinese market for APIs is rapidly growing and is estimated to witness a compound annual growth rate (CAGR) of 18% from 2010 to 2017. Ingredient suppliers in the Chinese API market will be keenly following the events in the pharmaceuticals industry, which is in the midst of integration. Apart from the sustained and rapid growth of the pharmaceuticals industry, the long-term use of multiple specialized drugs for an aging population and the reform of the Chinese medical system have also given a shot in the arm to the Chinese API market. As drug administrations in China put more effort into the supervision of the pharmaceutical industry, safety and environmental protection issues have become the areas of concern for the API producers. API producers in China are required to follow the guidelines such as the good manufacturing practice (GMP), which was revised by the Ministry of Health of the People's Republic of China in 2010. These manufacturers are also required to reach higher levels of standards and certifications, which are similar to the Japanese and European standards. These measures have resulted in interdisciplinary joint research projects between universities, research institutes and industry's local players which foster innovation and creativity in the country. All these efforts are designed to overcome major challenges still hampering the sector such as the counterfeit drugs scandals that are plaguing China's Pharma industry's image with the last one to date involving Colgate. The scandal follows the discovery of a shipment of Chinese-made contaminated with DEG toothpaste in the US. The US Food and Drug Administration (FDA) said DEG, which is sometimes used as a low-cost but potentially deadly substitute for Glycerine sweetener in cough medicines, posed a "low health risk" but did not belong in toothpaste. Palmolive-Colgate company's executives were quick to distance themselves from what turned out to be Chinese imitation destined to be exported to South American market. As a result, Two-thirds of multinational drug companies shared that they remained concerned about both IP protection and corruption in China. But drug makers have found some allies in the Chinese courts. Pfizer won a landmark trademark-infringement case in 2011 when a Chinese court ordered a domestic company to stop using

Pfizer's logo on its website and fined the offender \$25,000. Novartis CEO Daniel Vasella, for one, cites China's "enlightened" patent laws as the reason the Swiss drugmaker will continue to invest in China vs. India, where a court recently rejected the company's attempt to protect a patent on a leukemia drug. Therefore, Chinese Pharma industry has to work hard on polishing its image by tightening controls for the manufacturing and distribution process and quality control to make sure the products are high quality and safe to use for the consumer on both the local and global market. Adding to that the relatively poor input in medical biotechnology research which accounts for 1/500th of China's foreign counterparts investments and input, with 20million patent applications for the US between 1985-2005 are still from China's reach with a meager 90thousands applications. The lack of collaboration between domestic research institutes and drug companies, is also one other challenge the Chinese pharma industry has to overcome. Moreover, China's pharmaceutical industry still lacks independent and efficient research and development capabilities, with poor corporate support for new drug research. The sector is also challenged by a lack of intellectual property rights to effectively protect domestic innovation, contributing to destructive competition in the field illustrated by the Vitamin C case where a Chinese scientist discovered an innovative manufacturing process: the two-step fermentation but due to the lack of legal knowledge he did not patent his discovery and only published in a paper, a foreign firm acquired the rights for this method and patented it abroad with paying the scientist only few thousands of USD instead of the several millions this new technology was worth. That affected the Vitamin C exports of China as foreign firms were already using the same techniques and that resulted in huge losses for Chinese manufacturers of Vitamin C. Add to that the serious threat India is posing to China, with the huge pool of English speaking qualified staff and scientists the country is producing, the cheap labor and operating costs it provides for both local and domestic firms, and the aggressive M&A strategies implemented by Indian Pharma companies to go global such as the recent acquisitions by Ranbaxy laboratories in Germany, for all the aforementioned factors ,India will constitute the biggest threat, especially if the Indian government pushes toward a tighter control of IP and patent rights in the country reinforcing the existing Patent Act.

Table 2 SWOT Analysis of China Pharmaceutical Industry

Strengths	Weaknesses
<ul style="list-style-type: none"> -Government's support : "863" plan, healthcare system renovation, Biotech parks: Shanghai, Beijing & Tianjin -Solid patent protection system for drugs -Rapid growth of bio and natural extract patents -Cheaper labor & operating costs in comparison to the Western countries. -API booming market -Tax incentives for biotech & Pharma industry players 	<ul style="list-style-type: none"> -Poor outcomes & poor inputs in medical biotechnology research compared with USA or EU -Lack of management skills and entrepreneurship of Chinese R&D staff -Weak innovation capacity from firms and lack of synergy between academia and industry -Counterfeit drugs and quality control issues(Fake Insulin, Melamine contaminated milk scandals) -Out-of-date infrastructures & Low level of technology in drug patents
Opportunities	Threats
<ul style="list-style-type: none"> - New collaborative R&D model in Pharma industry through open innovation schemes -Growing and ageing population -Growing interest of Pharma MNCs in Chinese market - Growing interest in TCM integration& Modernization 	<ul style="list-style-type: none"> -Increase in patent applications by Foreign Pharma in China -Outflow of HR & output in Pharma and high turnover rate -Competition: India and other Pharmerging countries

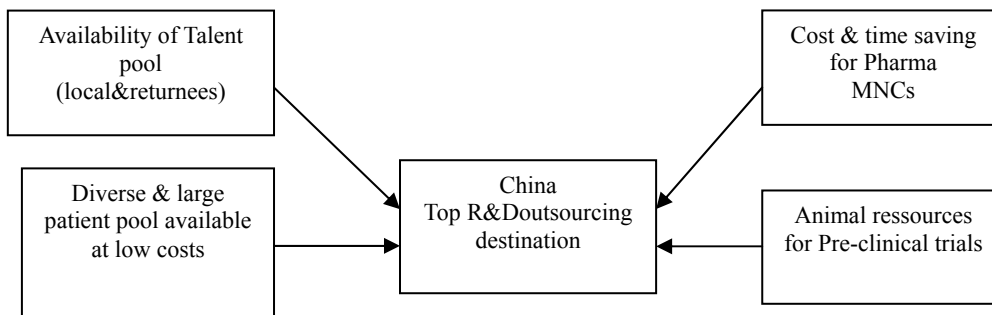


Figure 3 China: An R&D Outsourcing Destination of Choice

Despite all these challenges one huge opportunity looms ahead of the Chinese Pharma industry, following its entry to the WTO Chinese Pharma industry could benefit from international alliances and foreign investment opportunities. These goals would be achieved mainly through open innovation setting that could be carried out throughout the entire Pharma industry value chain. China is becoming a destination of choice for R&D outsourcing thanks to the several advantages the Chinese Pharma industry's landscape offers (see figure 2.3).

3 Acceleration of Open Collaboration Innovation in China

China is becoming a destination of choice for foreign firms to establish their R&D headquarters, considering the size of the population which has not been heavily medicated especially in villages; making clinical trials even more efficient and accurate when carried out in the Mainland. Adding to that the availability of various mammals for the clinical trials and the cost savings from operating in a low labor cost environment, constituting the main reasons why the industry in China is and will continue to flourish. The drought in Big Pharma R&D pipelines along with the attractiveness of the Chinese drug market is changing the dynamics of the drug research and development processes through open innovation model. Whether through the collaboration with Academia, independent or government sponsored Research institutes or partnerships with CRO's or with domestic Pharma companies in China, all these strategies would benefit the involved parties. Various collaborations projects are to be carried out between China and foreign Pharma companies or universities in several fields. Notably, the recent healthcare research partnership between the Dutch Imagery giant Phillips with West China hospital in Chengdu affiliated to Sichuan University. The project is designed to develop new medical imaging procedures for diagnosis and monitoring of certain types of cardiovascular diseases, cancer and mental diseases involving MRI(Medical Radioactive Imagery),CT(Computed Tomography),PET(Positron Emission Tomography),SPECT (Single Photon Emission Computed Tomography)scan images.This project would eventually benefit both parties, as it will allow the Phillips strengthen its position inside the Chinese market, especially in smaller provinces and villages where it lacks local market knowledge and adequate distribution channels. It permits them to produce innovative therapeutic solutions and devices to launch in the global market, if proven to be successful, with keeping development costs in control by carrying them out in a favorable R&D outsourcing country like China. As for the Chinese hospital in the Sichuan Province, the open innovation setting would allow them to use the industry leading imaging capabilities of Phillips and use it to leverage its outdated imaging system in these hospitals, another third party constituted by patients would reap the benefit from this open collaboration by accessing better diagnosis tools and thus better therapy approaches towards the diseases affecting them.

In June 2011, J&J opened a medical device& diagnostics R&D center in Suzhou, Zhejiang province in China focused on market-appropriate innovation with new product development & marketing as well as clinical research and regulatory and quality assurance and operations. This is a perfect example of the open innovation dynamics, where a multinational (J&J) opening its doors and sharing their know-how for marketing, management and legal framework in China and providing access to their database to advance research in specific fields such as Cancer which is the leading cause of death in China with just over 450 "cancer villages" spread across the Chinese territory. It is not a coincidence that R&D is and will be more focused on Asian specific diseases such as Cancer: Stomach, liver and lung and also cardio and cerebro vascular diseases considering the size of the Asian market and the incremental incidence of environment related affections worldwide. That would result in the acceleration of the development of more specific drugs by combining the experience of foreign firms in the treatment of these ailments and their technical & financial capabilities to nurture the innovation abilities and data provided by Chinese research institutes and hospitals which would be part of these strategic partnerships.

The French Pharma multinational Sanofi-Aventis has chosen the path of strategic partnerships with Chinese counterparts instead of the classical M&A strategy to enter the Chinese drug market by collaborating with the Institute of hematology and blood diseases hospital academy of medical sciences in Tianjin to carry out a study on stem cells in order to isolate acute myeloid leukemia stem cells and develop monoclonal antibodies.Sanofi-Aventis didn't establish collaboration or acquired CROs in China, but is relying instead on strategic alliances with universities and state-sponsored research institutions with a special focus on cancer and Rheumatoid arthritis drugs.Thus,the company provides its experience shepherding drugs through regulatory processes and nurture the already existing innovative ideas of

their Chinese partners to speed up the development and marketing of new and more efficient drugs for an increasing number of patients worldwide.

Recently, GSK the UK Pharma giant reaffirmed its commitment to China; with a total R&D investment in China has exceeded RMB1 billion in the past 20 years. Research focus adheres to the disease control priorities set by Chinese government, such as infections, diabetes, oncology and respiratory diseases. Along with economic development and increased healthcare core transformation in the Mainland, GSK is planning to develop a more comprehensive and robust R&D strategy to bring China into a key strategic center for GSK global R&D in near future. Including Clinical Research Centers in China with over 200 drug development projects conducted in collaboration with over 30 leading medical universities/hospitals focusing on hepatitis, asthma, diabetes, oncology and mood disorders in China. With also a substantial investment still dedicated to drug discovery and genetic research in leading medical universities and the Chinese Academy of Science. The latest to date open collaboration scheme is illustrated by a partnership program in the field of combinational chemistry with the Shanghai Institute of Materia Medica (SIMM). One year ago, Novo Nordisk committed up to \$100 million to expand its Beijing R&D center. As much as \$40 million of that will go to build new labs for diabetes research. The company also said it will add 200 new jobs by 2015. The Beijing center will become the company's largest R&D facility outside of its native Denmark.

Another project is set to deliver promising outcomes in the cancer research field, with the United States and China being international leaders in nanotechnology research, they have both launched national programs to support nanotechnology efforts. The accelerating trend of co - authorship among US and Chinese nanotechnology researchers demonstrates that individual scientists already recognize the potential for cooperation, providing a strong platform for creating additional partnerships in pre - competitive research areas. Mechanisms that could help to enhance US–China cancer nanotechnology partnerships include: developing new programs for bi - directional training and exchange; convening workshops focused on specific scientific topics of high priority to both countries; and joint support of collaborative research projects by US and Chinese funders. In addition to the accelerating scientific progress, expanded cooperation will stimulate important dialogue on regulatory, policy, and technical issues needed to lay the groundwork for US and Chinese scientists to move greater numbers of cancer nanotechnology applications into the clinic.

These various open innovation collaboration projects between Pharma International players and Chinese Partners would eventually benefit the Chinese Pharmaceutical industry in several ways:

- It will increase the financial investments whether governmental or private to further boost the industry. Also, the budget allocated to this industry is likely to rise in the near future considering the demographic data in the country allowing China to be competitive on a global scale.

- Both governments and private partners see the opportunity of these open collaboration projects could bring to the local players and thus will encourage the Chinese partners by supporting them financially and making them able to constitute qualified partners for Pharma partners.

- It also allows the research to shift its focus from the traditional chemistry-based techniques to more modern tools: Genomics, Biotechnologies, Nanomedicine...etc. The lack of focus on the latest technologies lie on the fact that most research centers in China do not have the necessary R&D tools and technologies to nurture their potential drug discoveries. By building R&D state-of-the-art facilities in China, Pharma MNCs make their technology available for Chinese scientists to carry out their research efforts.

- Improve the industry's image through more international exposure when cooperating with prestigious international organizations: Big Pharma, Harvard university, Swiss Federal Institute of Technology, MIT, GE...etc.

- Benefit Chinese patients who could not afford the treatments under non collaborative circumstances, especially in secluded rural areas such as the sinister "cancer villages" and tailor the drug development to the specificities of the Chinese population

- Provide the Chinese scientists with the necessary legal and management knowledge lacking in the Chinese research.

- Finance innovative and promising small Chinese biotechnology firms in drug research who would be carried out in a low-labor & operations costs environment.

- Help the promising TCM research sector thrive and modernize its structure through the TCM integration with Western Medicine and the update of TCM products R&D techniques.

- Set the right environment for the transition from "Made in China" to "Discovered in China" such as the Academy of Military Medicine which helped develop artemether-lumefantrine, considered the

most effective antimalarial drug on the market. One example among a rising number of other Chinese drug manufacturers operate in state-of-the-art production facilities and supply the U.S. market with high-quality products.

The open innovation strategy can also be carried away domestically between Chinese pharma firms and universities or research institutions. Lately, inter-collaboration between the public and private organizations in the healthcare sector to share data and encourage “domestic innovation” illustrated by the strategic partnership concluded between Simcere Pharma group, a leading manufacturer and supplier of branded generics and innovative pharma in China, with Sun Yat Sen University cancer center in order to develop innovative anti-cancer drugs that would benefit the University hospital patients with innovative therapeutic solutions and at the same time enhance Simcere R&D capabilities through this open collaboration.

The foreign firms or organizations participating in these open innovation projects can benefit from these initiatives in various ways:

- Cut their research and development costs through operating in a country where cheap, competent labor and APIs are available and where clinical trials cost 4times less of what they would cost in western countries.

- Fill up their R&D pipelines with external ideas and techniques instead of relying on in the house research from scratch that would take longer and cost more with a high attrition rate.

- Improve their position within the Chinese market profiting from their partners knowledge of the market needs, specificities and effective distribution channels especially deeper into tier 2& 3 cities alongside with rural areas.

- Speed up the drug discovery process by funding late stages clinical trials in innovative research areas that would yield lucrative therapeutic solutions.

4 Conclusions & Future Research Prospects

Open innovation is becoming an obligation rather than an option for out-of-ideas Pharma industry, with the new “innovate or dissipate” imperative the healthcare industry needs to join forces in order to accelerate the drug discovery pace. We have seen that through these strategic partnerships, the industry could achieve faster and more probing results while keeping R&D costs from soaring when operating in pharmerging countries especially in China, where the government is deeply committed to broaden healthcare coverage to the entire population and make the innovation a national priority both to be achieved by 2020.

China is so far an outsourcing destination of choice for some Big Pharma companies whether through partnering with CROs or with academia through open innovation settings to achieve tangible results faster and at lower costs.

Throughout this paper, we have seen that this open-collaboration model is set to yield benefits for both parties through scientific data sharing, their management skills and regulatory expertise in the research process provided by foreign partners combined with the innovative research projects carried out by Chinese scientists from both public and private sectors. Such as GSK’s global R&D Center set in Shanghai in 2007 focusing on research into neurodegeneration to create new medicines for profound medical needs as multiple sclerosis, Parkinson's disease, and Alzheimer's disease. The center will eventually direct the global discovery and development activities within its therapeutic area, from drug-target identification to late-stage clinical studies, while collaborating with research institutions elsewhere in China.

Nevertheless, the sustainability of Big Pharma’s strategy in China is questionable. So far, Chinese domestic Pharma industry is unable to contend with its foreign counterparts due to lack of financial assets, management and regulatory skills crucial in the industry. It is so far mainly focused on the production of generics, the “imitation” of patented drugs. But these companies are growing at a fast pace, they receive more governmental support through favorable policies and financial support, they see the benefits of collaborating with research institutions and universities in China which are the epicenter of innovation in the country, all these factors will provide China with the necessary experience and know-how to become an innovative powerhouse in the pharma industry and therefore rely less on the foreign expertise in its research projects. Or at least capture much more value from this open collaboration model which is so far mainly beneficial for the multinational pharma companies at least when it comes to financial returns on investments.

A major issue is looming ahead when implementing these pre-competitive strategies in China or elsewhere. We will see a rising number of IP disputes that would result from the discoveries made through this open innovation framework. Indeed, when a collaboration project yields discoveries that could result in blockbuster drugs the issue would then rise on the party who would have the right to market the drug discovered especially if the terms of the initial collaboration which lead to the discovery did not clearly address the intellectual property right attribution terms and conditions and this could lead to more delays in the drug development processes and new costs would be allocated to trials and legal fees for the two parties in case of disagreement.

Because of the length of the drug R&D processes, we cannot measure the impact this pre-competitive model in the pharma industry just yet.

But what will be apparent by then is whether open innovation and precompetitive collaborations and consortia, as applied to drug discovery, are just a passing fad or an alternative (and perhaps better) way of structuring and managing pharmaceutical R&D. The myriad of 'open' initiatives are only going to be impactful if they make drug discovery innovation system more efficient and equitable.

Open innovation has a long way to go when it comes to transparency and inclusivity which are the main issues to address when implementing this open innovation model whether in Pharma or any other sector. So far, all of the precompetitive initiatives between pharma/biotech companies and academia remain distinctly early stage, if not exploratory. So the main problematic in the future is to see how the industry will shape these new models of cooperation into more efficient ways of developing drugs and. What's more, open innovation, within the pharma industry at least, has been invoked to describe widely varying and often inexactly defined undertakings. Therefore, some pharma companies remain skeptical on the potential of this pre-competitive model as it might lead to projects where long-term cost is small but [where the outcome is also] unproductive.

The solution to make this collaboration model a sustainable R&D strategy, the solution might relate on the level at which this paradigm is applied to avoid conflict of interest, for the Pharmaceutical industry it would be translated in the collaboration with drug screening partners that would not have the ability to be involved in further research on the potentially active compound and could benefit from pre-existing data Pharma MNCs could provide for them, or with clinical trials organizations that would not be involved in the drug development process.

The other solution to the IPR war that would be triggered by the open innovation paradigm would be the inter-industry collaboration where the knowledge-transfer and exchange will benefit without overlapping both parties strategic goals prior to this collaboration. Further research is critically needed to assess the different impacts the open innovation would have on specific industry sectors, as the R&D outsourcing to cheaper operating countries is on the rising trend this model would likely become an imperative rather than an option, therefore, making it urgent to define the scope in which the open innovation model could be used at to what extent by tailoring it to a specific industry's characteristics.

To conclude this paper I would quote Mr. Werner Lanthaler, CEO of Hamburg, Germany-based drug developer Evotec which shared his thoughts on the open collaboration model in the pharma industry "Let's give it time—but not too much time," As the projects using this paradigm are on the rise, only time will tell whether it will reshape the R&D structure permanently rather than just a temporary phenomenon.

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Factors Impacting International Marketing: Configuring Strategies and Incorporating Co-Opetition

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Abstract: Innovative international marketing strategy is no longer an abstraction but a stark reality that virtually all firms face. In all business sectors there is the unabated pressure of global competition domestically and globally, regardless of size, they must configure strategies in the broader context of world markets to anticipate, respond and adapt to changes. Business entities initially testing international markets will be concerned with learning and selecting an appropriate arena to compete, and determining how to leverage core competencies to maximize returns. As firms stretch their tentacles internationally, they need to move from home based-centered strategies to improve integration and coordination, leveraging competencies and skills to develop. While traditionally the relationships among competitors were seen as based on competition, recently a new approach, called co-opetition sees the same relationships based on the cooperation among companies. Specifically, co-opetition is a concept that combines competition and cooperation, by simultaneously competing for market share. This paper will introduce the concept of international marketing, uncontrollable marketing environment and co-opetition.

Key words: Innovative marketing; Global competition; Core competencies; Co-opetition

1 Introduction

Marketing is arguably the most crucial idea in any institution and the most dominant force in any culture. Today the mass media saturated society has encapsulated our lives, satellite TV, broad band internet, instant messaging via web and hand held devices, all of which means message can reach you virtually any time and place. This means that international marketing pervades all aspects of society on a millisecond basis without territorial boundaries. In this era of drastic technological and business landscape transformation all enterprises stand at a point where the factory model marketing is no longer a sustainable and viable means to compete aggressively. Firms in order to strategically withstand the global reformation need to confront the pressure of internationalization and all forms of technological advancement to anticipate and remodel core competencies and strategies to integrate and establish presence. Organizations need to equip its marketing personnel on how to assimilate and disseminate innovative strategic marketing wealth by utilizing most advanced new emerging technologies and the forces of globalization to harness the impossibilities. Any organization engaged in international marketing are obliged to embrace critical thinking, problem solving, collaboration across nations, agility, adaptability, entrepreneurialism, effective communication, accessing and analyzing information and accepting new ideologies. In order for business to fully withstand the world wide waves of technology and globalization they need to be prepared to navigate and must become 21st century literate in marketing on multicultural aspect, media information, emotional, ecological, financial and cyber literacy's. After amassing the above mentioned skills the marketer can incorporate internal and external networking to provide a conducive marketing environment for innovation, value added creativity and techno-entrepreneurialism which will further develop new marketing insight to serving with quality and time effectiveness. When organization can achieve a level of internal satisfaction, enter, defend and increase market share and most importantly good customer relationship and loyalty then they can further forge ahead to establishing organizational co-opetition. With co-opetition each individual institution will still be competing for comparative advantage and gaining market share however the varying marketing tactics will make the difference once it's being done rigorously, efficiently and effectively by overseeing and accumulating market intelligence through innovation to meet the market demand.

2 International Marketing and Strategic Importance

Marketing personnel are eyeing the increasing necessity to develop the skills, attitudes and knowledge to rigorously compete on international scene. The emergence of a more open 21st century world economy, the globalization of consumer tastes and unabated expansion of Internet access globally all increase the interdependency and interconnections of nation economies (Ohmae, K. 1990). The

internationalization of the marketplace consists of a population of 7.2 billion people which is expected to reach 8.1 billion by 2025 and is expected to reach 9.6 billion by 2050 (un.org/en/development/desa/population). Global affluence is increasing and this is mirrored in increased demand. Increasing affluence and commercial dynamics has seen nations across Asia, Central and Eastern Europe and to some extent South America emerge as rising economies. Increasing affluence and demand means that consumers will actively seek variety, choice, and quality whilst paying attention to time factor (just in time) with the result that globally, competition is intensifying as companies compete to win the battle for emerging markets. Population growth and increased affluence together have helped create a ‘global youth culture’ – teenagers now account for 30 per cent of the population globally (World Population Prospects: The 1992 Revision). In many countries, more than half the population is pre-adult, creating one of the world biggest single markets, the youth market. When ‘virtual reality’ is commonplace, the world wide youth culture market will exceed all others as a premier global market segment. For organization to strategically position for global competitiveness companies are consolidating through mergers, acquisitions, and co-opetiting to reach the scale considered necessary to navigate the global trend.

3 Attribute of International Marketing

Marketing is the social process by which individuals and organizations obtain what they need and want through creating and exchanging value with others (Kotler and Armstrong 2010). International marketing has been defined as 'the performance of business activities that direct the flow of goods and services to consumers or users in more than in one nation (Kotler and Armstrong 2010)'. It is different from domestic marketing in as much as the exchange takes place beyond the frontiers, thereby involving different markets and consumers who might have different needs, wants and behavioral attributes. International marketing involves (a) focusing and analyzing the needs and want of the customers, (b) identifying the most feasible means of satisfying those needs and wants, (c) aligning the company towards satisfying those needs and want and finally (d) achieving the organizational goals (the institution best prepares itself to achieve competitive advantage in the marketplace). It then needs to strive to maintain this advantage by manipulating the controllable functions of marketing within the largely uncontrollable marketing environment made up of SLEPT factors: i.e. Social, Legal, Economic, Political and Technological. The conceptual framework is not going to change to any marked degree when a company moves from a domestic to an international market; however, there are two main differences. First, there are different levels at which international marketing can be approached and, second, the uncontrollable elements of the marketing environment are more complex and multidimensional given the multiplicity of markets that constitute the global marketplace.

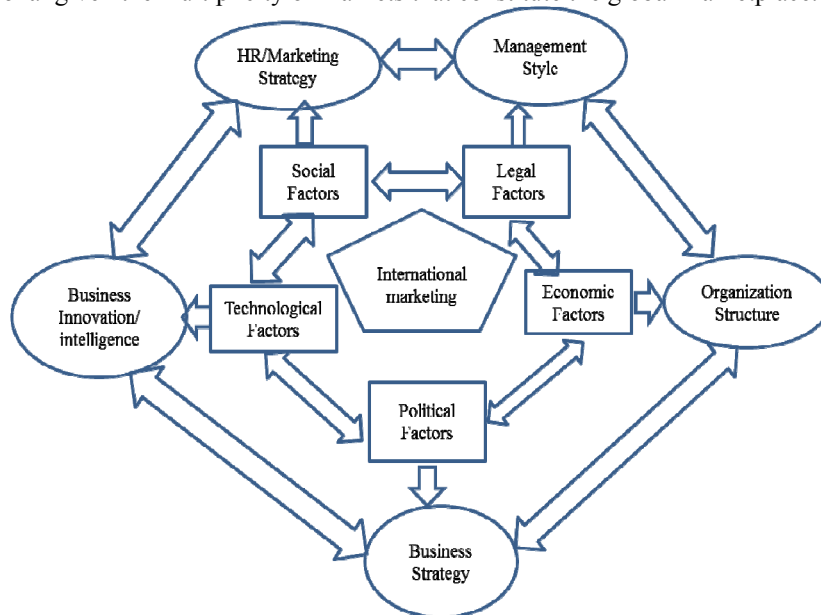


Figure 1 Relationship Of SLEPT and Business Operations

From fig.1 it is evident that the uncontrollable factors do not only impact on marketing itself but also on five major operational elements of the organization. The SLEPT factor which is the first layer from the core (international market) will adversely impact (1) HR and marketing strategy, (2) management style, (3) organizational structure, (4) overall business strategy, and (5) business innovation and intelligence. In the second layer each aspect on its own will also affect the organization in its operating environment. This means that everything surrounding international marketing must be properly tailored and align in order to achieve competitive advantage.

4 The Social /Cultural Aspect

The social and cultural influences on international marketing are immense. Differences in social conditions, religion and material culture all affect consumers' perceptions and buying behavior. It is these segments that determine the extent to which consumers across the globe are either similar or different and so determine the potential for marketing. A failure to understand the social/cultural dimensions of a market is complex to manage for example in China, though one country, its delicacies characteristics vary from regions. In the South the food is sweet, North salty, East spicy (peppery) and in the West it is sour. Therefore it means that any foreign food company for example McDonald or KFC would need to give consideration to the taste of the locals. Cultural differences and especially language differences have a significant impact on the way a product may be used in a market, its brand name and the advertising campaign. Initially, Coca-Cola had enormous problems in China as Coca-Cola sounded like 'Kooke Koula' which translates into 'A thirsty mouthful of candle wax'. They manipulated the pronunciation to 'Kee Kou Keele' which means "joyful tastes and happiness". Pepsi Cola had to change its campaign 'Come Alive with Pepsi' in Germany as, literally translated; it means "Come Alive Out of the Grave". Although there seems to be a conflict in translating in various countries this is expected to change as the world continues to integrate. For example iPhone 4 had a good introduction to the Chinese market except for some defaults however if the cultural aspect was as strong as when Coca-Cola was introduced that could have been problems because in China 4 is pronounced as death thus the customers would most likely refuse to patronize. Even with the construction industry some buildings do not have a 4th floor since customers would refuse to purchase an apartment on that floor for the same reason that 4 is pronounced as death in Chinese. In terms of marketing the marketer needs to pay attention to high and low context culture. At the early stage of internationalization it is not unusual for firms to experience what appear to be cultural gaps with their counterparts in Latin America and Asian countries as well as in different regions of those countries. Intellectuals argue that there are visible signs that social and cultural differences are becoming less of a barrier though there is a vast and, sometimes, turbulent mosaic of cultural differences, they believe there is evidence that a global integration is significantly reshaping the worldwide marketing boundaries.

5 The Legal Arena

Legal systems vary both in content and interpretation. A company is not just bound by the laws of its home country but also by those of its host country and by the growing body of international law. Firms operating in the European Union are facing ever-increasing directives which affect their markets across Europe. This affects many aspects of a marketing strategy – for instance advertising – in the form of media restrictions and the acceptability of particular creative appeals (e.g. Tobacco companies are supposed to give graphic images on tobacco products). Product acceptability in a country can be affected by minor regulations on such things as packaging and by more major changes in legislation. In the USA, for instance, Huawei, one of the earliest Chinese companies to seek globalization and has depended on markets outside the Chinese mainland was being treated as spies or on espionage fears (BBC news business 8 October 2012). This issue of Huawei seems to be an approach to protect the US technology and telecommunication companies. It is important, therefore, for the firm to know the legal environment in each of its markets. These laws constitute the 'rules of the game' for business activity. The legal environment in international marketing is more complicated than in domestic markets since it has three dimensions: (1) local domestic law; (2) international law; (3) domestic laws in the firm's home base.

5.1 Local domestic laws

The most feasible way to navigate through the legal ground in international markets is to use on the ground experts who is capable of handling separate legal systems and laws pertaining in each market targeted. For example there might be local institutions that may hold rights to certain inventions or

discoveries and if misinterpreted the new business may get into trouble with the law as in the case of the supreme court of the United State Bowen VS Monsanto Co.et al. Respondent Monsanto invented and patented Roundup Ready soybean seeds, which contain a genetic alteration that allows them to survive exposure to the herbicide glyphosate. It sells the seeds subject to a licensing agreement that permits farmers to plant the purchased seed in one, and only one, growing season. Growers may consume or sell the resulting crops, but may not save any of the harvested soy-beans for replanting. Petitioner Bowman purchased Roundup Ready soybean seed for his first crop of each growing season from a company associated with Monsanto and followed the terms of the licensing agreement. But to reduce costs for his riskier late-season planting, Bowman purchased soybeans intended for consumption from a grain elevator; planted them; treated the plants with glyphosate, killing all plants without the Roundup Ready trait; harvested the resulting soybeans that contained that trait; and saved some of these harvested seeds to use in his late-season planting the next season. After discovering this practice, Monsanto sued Bowman for patent infringement (certiorari to the United States court of appeals for the federal circuit .no. 11–796. argued February 19, 2013–decided may 13, 2013)

5.2 International law/trading blocs

There are all sorts of international laws that hinder organizations and their international marketing activity. Some are international laws covering intellectual and property rights; others are more international conventions and agreements and cover items such as the International Monetary Fund (IMF) and World Trade Organization (WTO) treaties, Caribbean Free Trade Area (CARIFTA), North American Free Trade Agreement (NAFTA), Asia-Pacific Economic Cooperation (APEC) patents and trademarks legislation and harmonization of legal systems within regional economic groupings, e.g. the European Union.

5.3 Domestic laws in the home country

The organization's domestic legal system is crucial for two reasons. First, there are often export controls which limit the free trading of certain goods and services to particular marketplaces, and second, there is the duty of the organization to act and abide by its national laws in all its activities, whether domestic or international it will be readily understandable how domestic, international and local legal systems can have a major impact upon the organization's ability to market into particular international market. Laws will affect the marketing mix in terms of products, price, distribution and promotional activities. Often firms operating internationally face ethical challenges in deciding how to deal with differing cultural perceptions of legal practices. In many mature markets they face quite specific and, sometimes, burdensome regulations. Some governments are reluctant to develop and enforce laws protecting intellectual property partly because they believe such actions favor large, rich, and multinationals.

6 Economic Development:

It is important that international marketer understand economic developments and how they impact on marketing strategy. This understanding is important at a global level in terms of the world trading infrastructure such as world institutions and trade agreements developed to foster international trade. Firms need to be conscious of economic policies of countries and the direction in which a particular market is developing economically in order to make an assessment as to whether they can profitably satisfy market demand and compete with firms that has been established. Another key challenge facing companies is the question as to how they can develop an integrated strategy across a number of international markets when there are convergent levels of economic development. Such disparities often make it difficult to have a cohesive strategy, especially in pricing. To examine these challenges further marketers divided the economies into developed economies and developing/less developed economies. The developed economies of the North American Free Trade Area (NAFTA), European Union (EU) and Japan account for 80 per cent of world trade. For many firms this constitutes much of what is termed the global market. In the European Union nearly 70 per cent of the international goods traded are traded within the European Union; in NAFTA, 50 per cent of goods exported are to other members of NAFTA. This leads some commentators to argue that most competition, even in today's global market-place, is more active at a regional level than a global level. It is from these developed economies that the global consumer with similar lifestyles, needs and desires emanates. However, emerging markets are now becoming more economically powerful and moving up the ranks, especially such countries as Brazil, Russia, India and China (BRIC).

6.1 Emerging economies

In countries such as Brazil, Russia, India and China, (BRIC economies) CIVETS (Colombia, Indonesia, Vietnam, Egypt, Turkey and South Africa), EAGLEs (Emerging and Growth-Leading Economies)(Source, Wikipedia: growing economies) : there is a huge and growing demand for everything conceivable from of products which are viewed as key growth markets where there is an evolving pattern of government-directed economic reforms, lowering of restrictions on foreign investment and increasing privatization of state-owned monopolies. All these emerging economies herald significant opportunities for the international marketing firm. Such markets often have what is termed as a 'dual economy'. Usually there tends to be a wealthy urban professional class alongside a poorer rural population. Income distribution tends to be much more skewed between the 'haves' and the 'have not's' than in developed countries. From negligible numbers years ago, China has a middle class of 100 million which is forecast to grow to 700 million by 2020 (An Hodgson July 25, 2007)

7 Political Environment

The political environment of international marketing includes any national or international political factor that can affect the organization's operations or its decision making. Politics has come to be recognized as the major factor in many international business decisions, especially in terms of whether to invest and how to develop markets. Politics is intrinsically linked to a government's attitude to business and the freedom within which it allows firms to operate. Unstable political regimes expose foreign businesses to a variety of risks that they would generally not face in the home market. At present the political arena is the most volatile area of international marketing. The tendencies of governments to change regulations can have a profound effect on international marketing strategy, providing both opportunities and threats. The instability in the Middle East, the Arab spring in Egypt, Tunisia, Libya, and Syria etc. and continued threat of global terrorism have served to heighten firms' awareness of the importance of monitoring political risk factors in the international markets. Lesser developed countries and emerging markets pose particularly high political risks, even when they are following reforms to solve the political problems. The stringency of such reforms can itself lead to civil disorder and rising opposition to governments, as has been seen recently in Kenya, Venezuela, Libya and Egypt. Political risk is defined as a risk due to a sudden or gradual change in a local political environment that is disadvantageous or counterproductive to foreign firms and markets (Kennedy, C. (1988): "Political Risk Management A Portfolio Planning Model", Business Horizons, Vol. 31, p.2). The types of action that governments may take which constitute potential political risks to firms fall into three main areas:

7.1 Operational restrictions

These could be exchange controls, employment policies, insistence on locally shared ownership and particular product requirements.

7.2 Discriminatory restrictions

These tend to be imposed on purely foreign firms and, sometimes, only firms from a particular country. The USA has imposed bans on imports from Libya and Iran in the past. Such barriers tend to be such things as special taxes and tariffs, compulsory subcontracting, or loss of financial freedom.

7.3 Physical actions

These actions are direct government interventions such as confiscation without payment of indemnity, a forced takeover by the government, expropriation, nationalization or even damage to property or personnel through riots and war. In 2001 for e.g. the Nigerian government claimed ownership of Shell's equipment and machinery without any prior warning. Investment restrictions are a common way governments interfere politically in international markets by restricting levels of investment, location of facilities, choice of local partners and ownership percentage. When Microsoft opened its Beijing office, it planned to use its Taiwan operations to supply a Mandarin language version of Windows. The government not only wanted such an operating system to be designed in China but also insisted on defining the coding standards for Chinese characters' fonts, something Microsoft had done independently everywhere else in the world. In a flurry of meetings with officials, Bill Gates argued that the marketplace, not the government, should set standards. But the Chinese electronics industry threatened to ban Windows and President Jiang Zemin personally admonished Gates to spend more time in China and 'learn something from 5000 years of Chinese history'.

8 Technological Environment

Technological environment is an incomparable driving force both in international marketing and in the move towards a more global marketplace. The impact of technological advances can be seen in all

aspects of the marketing process. The ability to gather data on markets, management control capabilities and the practicalities of carrying out the business function internationally have been revolutionized in recent years with the advances in electronic communications. Satellite communications, Internet, ISDN and cable as well as email advanced telephone networks have all led to dramatic shrinkages in worldwide communications. Shrinking communications means, increasingly, in the international marketplace information is power. Manufacturers wanting to know the price of X product or the relevant position of competitors in terms of their share price or new product activity have it at their immediate disposal. As wireless technology renders land cables and telephone lines redundant, developing countries are abandoning plans to invest in land-based communication. They are bypassing terrestrial communication systems, enabling them to catch up with and, in some cases, overtake developed countries in the marketplace. In emerging economies consumers are jumping from no telephone to the latest in global communications technology. Wireless application protocol (WAP) technology allows online services to be available to mobile phone users on the move, wherever they happen to be in the world. The use of Global System for Mobile Communications (GSM) technology enables mobile phone operators to determine the location of a customer globally to send them relevant and timely advertising messages. Increasingly companies are using India as a Centre for their global online customer service operations. The ease of hiring computer-literate graduates by the hundred, who are intelligent, capable, keen and inexpensive to hire, as is local property to rent, makes India an attractive location

9 The Role of Co-Opetition

It's no longer a mirage, business cannot survive in isolation and thus organizations need to come to the realization that in a networked economy business must cooperate and compete and thus making co-opetition an added factor impacting international marketing. The idea of co-opetition might soon be recognized as an added factor transformation SLEPT factors in SCLEPT factor in international marketing. The idea of co-opetition might be new but it requires companies to reconfigure strategies that capitalize on relationships in order to create value in the international market. On the international market co-opetition is a new model in which a network of companies co-operate and compete and is becoming the most significant business perspective these days. The explosion of technological advancement has made it feasible by enabling relationship through information dissemination as well as integration. In this era of competitive and rigid environment co-opetition will become a vital powerful tool for identifying market opportunities and configuring business strategies. The concept of co-opetition was expanded upon by Adam Brandenburger and Barry Nalebuff, professors at the Harvard Business School and the Yale School of Management respectively in their book entitled "co-opetition" in 1996". The information high way has significantly altered the barriers galloping competition in the international market. It has led international marketing to a point where time is becoming a critical factor and a scarce resource in term of analyzing, adopting, reacting and responding to drastic market changes. To reap the benefits of co-opetition, organization need to foresee and configure business strategy to get an over view of the companies possible network, i.e. customers, suppliers, competitors and complimentors. Today's sophisticated business network is demanding business to move away from the factory model strategy to a techno-model strategy to cushion the demanding business landscape. With the idea of co-opetition international marketing personnel can it as one of the most significant bargaining cheap to collect marketing intelligence to bring about new ethical approach to deal with the SLEPT aspect of marketing. Co-opetition will broaden the scope of business in all aspect to cushion the dilemmas business face when opening up to new and emerging markets. What business needs to do is to use it to strategize, compete and create added value to let its presence be known on the international business landscape.

10 Conclusion

The international marketing environment has and will continue to be transformed in par with technological advancement and will consists of factors external to an organization that will affect its marketing strategies/activities. Elements of the marketing environment are largely uncontrollable, although marketers with clear marketing vision have influence over some factors. The international marketing environment factors will continue to affect the size and development rate of markets and will influence marketing activities. Thus, changes in the marketing environment offer significant opportunities and threats to marketers. Identifying and responding effectively to these opportunities and threats is a major challenge but can be overcome or cushioned with configuring strategies as the

marketing landscape is being transformed. Marketing personnel need to keep up to date with the international marketing trend and take drastic measure if they are to succeed since quitting is never an option. Innovation, Techno-entrepreneurship, competition, collaboration and networking are the key elements for successful integration in the international marketing stage.

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A Theoretical Framework of the Knowledge Stickiness of Distributed Innovation*

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Abstract: From the perspective of practical activities, drawing on the theory of situational behavior patterns theory, activity theory and distributed cognition theory, this paper builds up a theoretical framework of Distributed Innovation (DI) and the sticky knowledge in it, and then analyzes the factors that influence the knowledge stickiness in the Distributed Innovation Network (DIN) to try to provide a theoretical reference for understanding and further study of the problem of knowledge stickiness in DIN.

Key words: Distributed Innovation (DI); Knowledge stickiness; Situational theory; Activity theory; Cognition theory

1 Introduction

Given the background of the economic globalization and the rapid development of the knowledge and information technology, DI, the innovation activities which is on the basis of the resource sharing in the enterprise and between the cooperative upstream and downstream enterprises in different regional and carried out based on the common network platform^[1], became into being. Due to the definition of innovation networks which are various institutional arrangements that bring about the characters of collaboration & mutually beneficial interaction of DI, each innovation base in DIN is one node of the network. While, the flowing processes of knowledge between different nodes are not smooth due to a variety of factors, but be sticky and difficult to move to the knowledge-receptors, which can be called knowledge stickiness^[2]. The knowledge stickiness seriously hampers the innovation efficiency of the DI.

Innovation is the product of practical activity, and DI is the innovative practical-activity with marked distributed character in the context of global ICT and across integrating heterogeneous technical knowledge\ cultural. There've been some studies on DI applying complex-network or knowledge fermenting theory which contributed to the explanation of DI; however, the theoretical framework of DI based on its nature of practical activity has not been formed. This paper argues that the theory of situated action, activity and distributed-cognition clearly explain the mechanism of knowledge sharing and creating of DI respectively from the perspective of situation, activity and cognition. This paper will respectively comb and integrate these theories and their nexus with DI, and then construct the "S-A-C" (Situation - Activity - Cognition) theoretical framework to provide a theoretical basis for further research of knowledge stickiness of DI.

2 Formation of "S-A-C" Theoretical Perspective of DI

2.1 The "Situation" perspective of DI

Table 1 The "Situation" Perspective and Its Lessons for DI

The "Situation" perspective of DI	Its lessons for DI (It is advisable....)
① DI concerns the situation of multi-site & multi-factors.	to take full advantage of the commutative complement and support between nodes to promote the efficiency of DI.
② The practical effect of innovation can also be improved by individual creativity or innovation through cooperatively integration and re-upgrade.	to focus on creating the atmosphere of interaction within the DIN to acquire or construct original knowledge and creative more effectively through cooperation and integration.
③The diversity of situations promote the view reflecting in DI activities.	to appropriately take use of contextual differences between different nodes in the DIN to stimulate the generation of innovation.

Suchman (1987) proposed the theory of situated-action which argues that human activity derive

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from the given environment rather than strictly in accordance with pre-planned^[3], in other words, it emphasizes the affect of special circumstances and unexpected emergency action on activities. Lave proposed (1988) to attach importance to the relationship between person and environment in analyzing the activity of persons-acting in setting. The situated-action gives a unique perspective to analyze the relationship between action and situations. In summary, the theory of situated-action provides such theoretical perspective for DI just as shown in Table 1:

2.2 The “Activity” perspective of DI

“Action” is effort the subjects make to achieve a particular goal. Kuutti (1997) argued that activity theory is an interdisciplinary study framework of human practice, including personal and social level, as well as the use of products^[4]. Rubinshtein. Etc have made contributions to the development of activity theory, the main ideas of which are as follows: 1) The analysis unit of activity theory is the activity system including 6 interactive elements which are subject, tool, object, labor division, the community and rules. The operating structure will change when the objective is constant but the acting situation changes (Leont'ev1974)^[5] because of the flexibility of activities (Bødker, 1989)^[6]. 2) It proposed a specific concept of situation which argued that the activities themselves are situations which are formed by the actions of participants and products. 3) A key concept is “products mediation” which refers to human control of products^[7]. 4) Activity is an object-oriented process^[8]. Generally, activity theory focuses on the social and situational relations between the individuals\groups, tools and collaborators in an activity, as well as the purpose, objective, and results of an activity^[8].

Activity Theory is a framework for understanding human practice activities, and is beneficial for analyzing DI. This paper advocates that activity theory is a descriptive tool rather than prescriptive theory, and so the DI from the “activity” perspective can be referred just as shown in Table 2:

Table 2 The “Activity” Perspective and Its Lessons for DI

The “Activity” perspective of DI	Its lessons for DI (It is advisable...)
①The DI activities are object-oriented.	to clear the object, including the requisite resources, the situational background and the main motivation of the DI activity.
②The analysis of DI activities should be expanded on the basis of the activity system.	to clear or deeply analyze the system of DI activity (including the participants, the exchange places, the expected innovation, etc.) and its structure which refers to the activity itself, the related sub-activities as well as the relationship between them).
③The DI activities are situational context themselves.	to focus on and take advantage of the specific situation and dynamic characteristics of the DI activities, such as the internal and external driving factors as well as the dynamic relationship between the members.

2.3 The “Cognition” perspective of DI

Ed Hutchins (1995) and his colleagues in UCSD proposed the theory of distributed-cognition^[9]. Hutchins (1991) proposed that cognition should be understood as distributed phenomenon, which is different from the traditional view that cognition was local phenomenon through information processing on a personal level. With the rapid development of cognitive tools and information and communication technology, distributed-cognition was attached more and more importance because that the interactive cognition between individuals and tools can’t be explained by the traditional individual analysis of cognition. According to the mainstream understanding of distributed cognition of scholars, distributed cognition emphasized the nature of cognition distributed in cognitive subject and environment, and it presents a new function system of “analysis unit”. This system involves not only individuals but also the collection of distributed interaction between people and products. “Products” is the core term which refers to tools, thinking and methods and so on.

Table 3 The “Cognition” Perspective and Its Lessons for DI

The “Cognition” perspective of DI	Its lessons for DI (It is advisable...)
① The polymerization force of cognition is composed of persons and products, and they are equal with individual, group and community.	to initiatively look for people, teams, businesses, communities, and infrastructure to build DI system, and to maximize the power of individual ,products and community
② Suppliers, manufacturers, innovators and distributors share knowledge, and thus produce the dynamic ability of quickly learning to overpower the competitors.	to create a widely distributed network for connection and interaction in order to achieve the huge overall advantage.
③ Information technology play a significant role in distributed cognition.	to take full advantage of ICT technology and other supporting infrastructure whose cost is getting lower and lower.

Combined with the features of Distributed innovative, this paper argues that the distributed cognition theory provide the important perspective of “Cognition” of DI just as shown in Table 3.

2.4 DI from the perspective of “S-A-C”

Based on the three theoretical systems above, DI can be interpreted from the perspective of “S-A-C” as: DI is a process of innovative cognition generating based on distributed innovative activities in the context of DI. The context of DI is the unity of the context of the DIN, between the nodes and in every node; the activity of DI is the combination product of situational background, orienting goal, products regulation and flexible coordination; the cognition generating of DI is the product of innovation composed by the subjects, environments and the systematic planning with the aide of products (Figure 2).

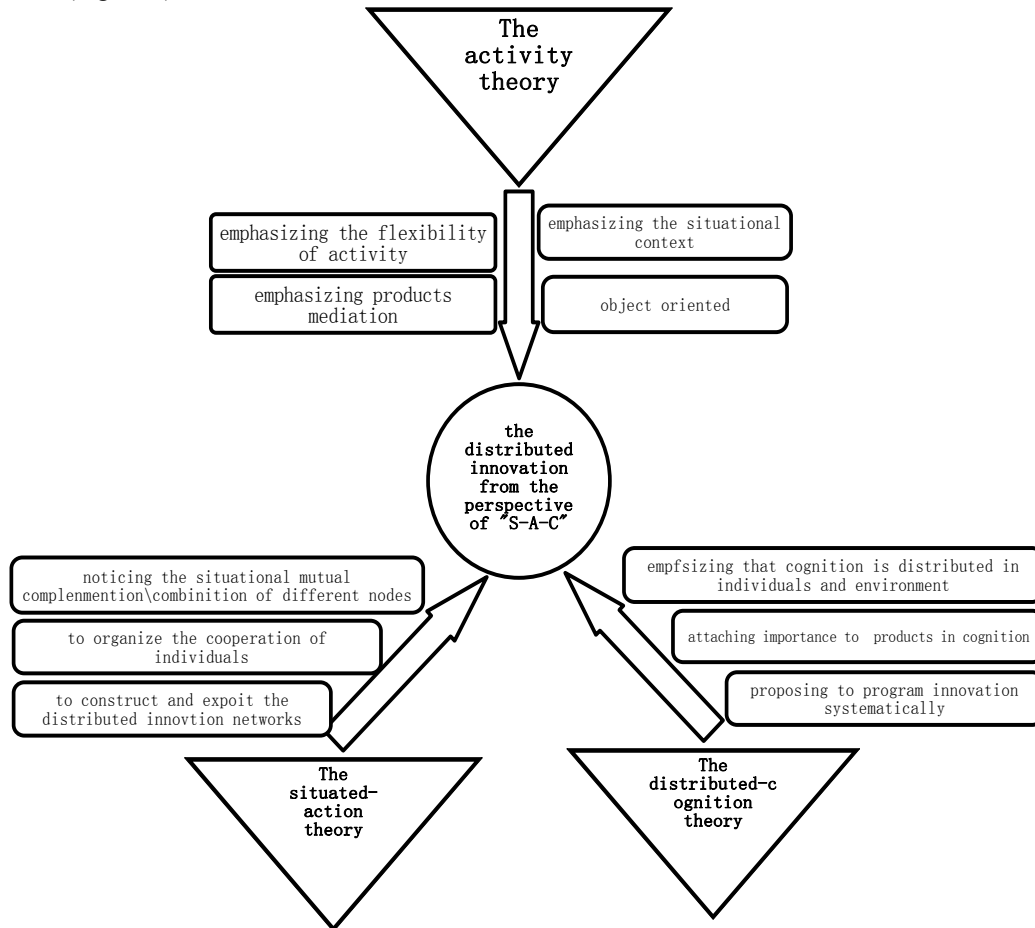


Figure 2 DI from the Perspective of “S-A-C”

3 Theoretical Framework of the Sticky Knowledge of DI from the Perspective of “S-A-C”

3.1 The conceptual conformation model of sticky knowledge from the perspective of “S-A-C”

According to the connotation of DI, knowledge sharing is not only the competitive advantage of DI, but also the guarantee of the efficiency of innovation. According to the above, it is not difficult to draw the following views: In the DIN, the flowing efficiency of knowledge between nodes is closely related to the situations, activities and cognitions of the network, and thus, it is necessary to probe the conformation of sticky knowledge in the three dimensions of situations, activities and cognitions from the three angles of structure (by “situation”), process (by “activity”) and behavior (by “cognition”).

Thus, this paper built “The conceptual conformation model of sticky knowledge from the perspective of ‘S-A-C’” (Figure 3). This model assumes that: 1) any process of innovation in DIN is impacted by the situations of all nodes involved as well as the situation of the entire network; 2)the activities within the network include the independent behavior of one node as well as the interaction of

the nodes; 3)the sticky knowledge conforms gradually in the process of knowledge flowing in activities of DI with the influence of multiple situations in the DIN. It is not difficult to draw that the conformation of sticky knowledge in the DIN is affected by the sticky layer of situation, activity and cognition, and all the sticky knowledge in the network constitute the network knowledge stickiness.

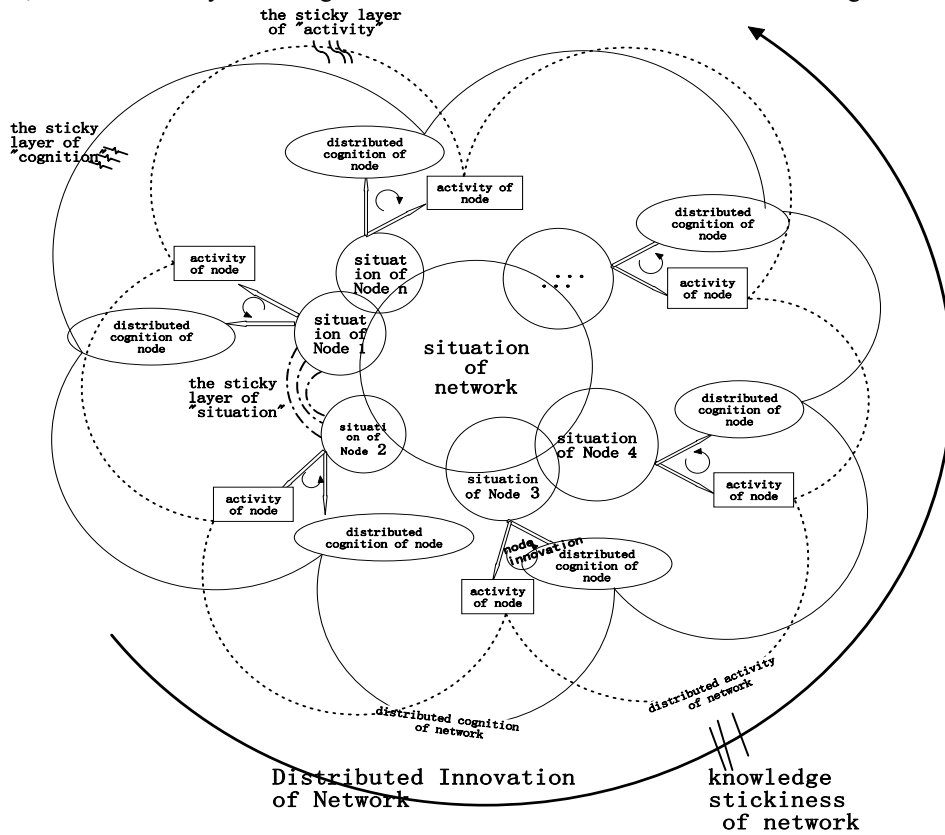


Figure 3 The Conceptual Conformation Model of Sticky Knowledge from the Perspective of "S-A-C"

3.2 The factors of each sticky layer and the framework constructing

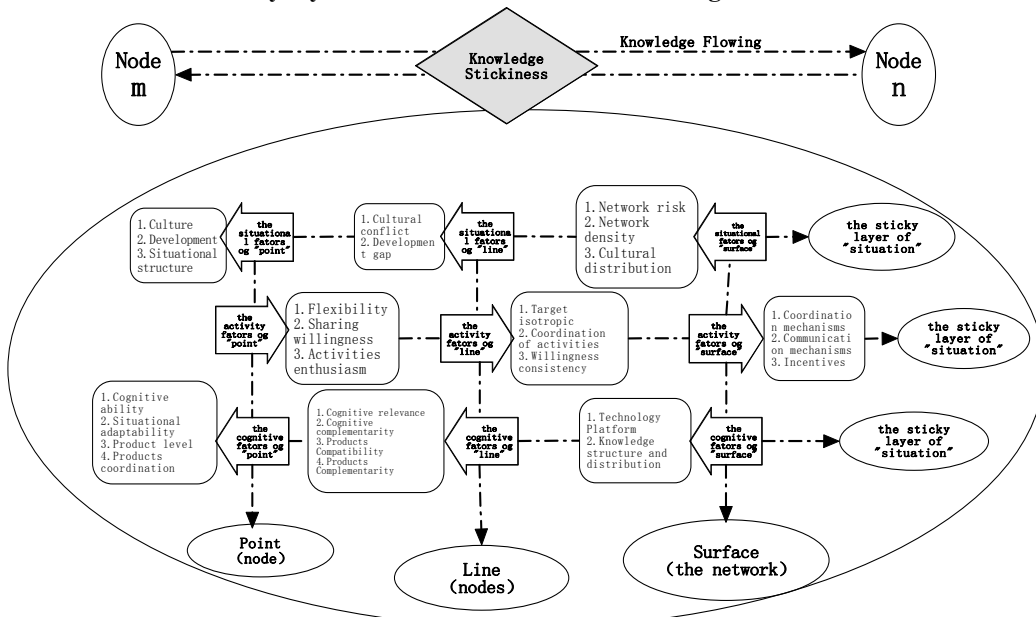


Figure 4 The Sticky Layers and Their Influencing Factors from the Perspective of "S-A-C"

The knowledge in DINs is no longer within the enterprise, either a linear or parallel distribution, but is mesh & three-dimensional distributed to “point-line-surface” in the network. “Point-line-surface” respectively refers to each node in the network, the communication and cooperation between the nodes and the set of lines with various directions. The knowledge sharing of the network is often reflected by the “surface” which is determined by the systematic role of “line” and “point”. Based on the theoretical perspective of “S-A-C”, the processes of knowledge creating and flowing in “point” “line” and “surface” are all affected by the related factors of “situation” “activity” and “cognition”, which means that this three sticky layer is respectively constituted by the sticky factors of “situation” “activity” and “cognition” in the level of “point” “line” and “surface” (Figure 4).

3.2.1 The sticky layer of situation and its influencing factors

On the level of “point”, the sticky layer of situation is mainly reflected in the cultural openness, innovation and flexibility of node, as well as its organizational development and internal structure^[10]. On the level of “line”, the sticky layer of situation is mainly reflected in the cultural conflict (or coordination), knowledge differences in the structure (such as the core technology and the difference in the field)^[11] and the development gap between the nodes^[12]. On the level of “surface”, the sticky layer of situation is mainly reflected in the risk, density and culture of the Network. The risk of the network which will affect the knowledge sharing of nodes comes mainly from the open and dynamic nature of DIN, such as the exit & joining of nodes. The density of network which will make member nodes more actively to protect their reputation and abide the guidelines due to the constraints of cooperation model proposed by Coleman refers to the surrounded situation by the main third-party with the contact and link from the network^[13]. Many studies consistently show that similar culture is an important factor for efficient and cost-effective knowledge flowing, however, for DIN which is bound to be diverse and balance in cultural, compatibility play a crucial role in the process of knowledge flowing and sharing.

3.2.2 The sticky layer of activity and its influencing factors

On the level of “point”, the sticky layer of activity is mainly reflected in the flexibility of objectives, plans and implementation^[14]. On the level of “line”, the sticky layer of activity is mainly reflected in the coordination of objectives, plans and implementation^[15], as well as the synchronization of their willingness and frequency of knowledge sharing. On the level of “surface”, the sticky layer of activity is mainly reflected in the setting and running of the mechanism of coordination, communication and incentives of the network^[16]. For the nodes in DIN, their cooperation is dynamic and complex which calls for better mechanism to coordinate to avoid conflict, collision, risks and opportunism. Good communication is necessary because it helps each other to discover the advantages of avoiding disadvantages, and constantly optimize the content and direction of the knowledge flowing to improve the efficient of knowledge sharing. Besides, the mechanism of incentive is better to be based on all the nodes and target satisfying them to stimulate effective and beneficial knowledge sharing^[17].

3.2.3 The sticky layer of cognition and its influencing factors

On the level of “point”, the sticky layer of cognition is mainly reflected in the cognitive abilities of the node, the cognitive subjects, the coordination of the situation, as well as the development of the tools, theory and technology^[12]. On the level of “line”, the sticky layer of cognition is mainly reflected in the correlation of cognitive ability of the nodes, complementary of their tools, databases and other products, as well as the coordination of their culture and other multi-directional scenario^[18]. On the level of “surface”, the sticky layer of cognition is mainly reflected in the technology platform and the distribution structure of knowledge. Technology platform refers to the shared information retrieval tools, databases, exchange and sharing system services within the range of network. Besides, the difference of depth and width of knowledge affect the efficiency of knowledge transferring^[21].

4 Conclusions

This paper constructed the “S-A-C” theoretical framework of DI and the knowledge stickiness of it, and further analyzed the factors and composition of knowledge stickiness. Generally, the followings are advisable for the weakening management of knowledge stickiness:

- 1) Make technology become the innovative tools that can be controlled and used by innovators, and thus innovators will more effectively lead and coordinate innovation activities by dominantly taking full advantage of a variety of technical features;
- 2) Considering the importance of original knowledge or techniques in economic development and the status of China, DI activities should be positioned in promoting the innovators to develop high-level innovation capability and implement creatively innovation, as well as supporting their independence, cooperation, researching and reflection;
- 3) It is

advisable to study the cognitive development given the interaction of internal and external factors.

Finally, it is necessary to call for further correction and empirical for this "S-A-C" theoretical framework although it was derived from mature theories.

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A Study on Influence Factors of Uncertainty of the Enterprise Financial System

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Abstract: Understanding and grasp of the corporate financial system with uncertainty is helpful for avoiding the financial risks of enterprise, improving the economic efficiency of enterprises and realizing the enterprise health and sustainable development. This paper discusses the enterprise financial system in which exist objective uncertainty and subjective uncertainty, and analyzes the factors affecting enterprise financing system of objective uncertainty and subjective uncertainty, which is of significance in reducing and avoiding financial risks, and then strengthening enterprise financial management.

Key words: Enterprise financial management system; Objective uncertainty; Subjective uncertainty; Influence factor; Strategy

1 Introduction

From the viewpoints of management, enterprise financial management is constructed by the four activities of raising funds, long-term investment, working capital and corporate profits allocation and then form the cycle of financial contents as shown in Figure 1. As for the working procedures, it is necessary for an enterprise to make financial forecast, financial decision-making, financial budget, financial control, financial accounting and financial analysis and then form the cycle of financial processes as shown in Figure 2. The cycles of content and process of enterprise financing are faced with the perplexing, changing the macro environment and micro environment, which causes a lot of uncertainties for enterprise financial management, and increases the risk of business financial system. Therefore, the analysis of uncertainties in business financial system can identify the financial risk, control financial risk control and realize the financing goal.

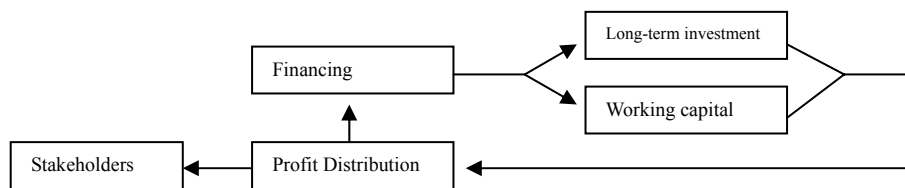


Figure 1 The Cycle of Financial Contents

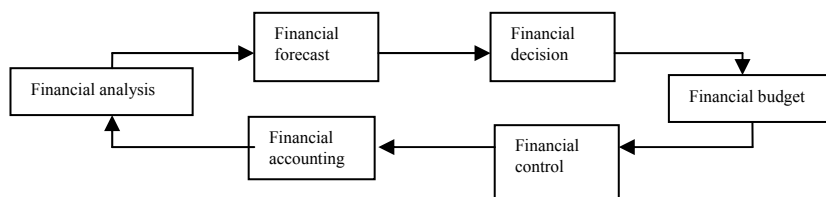


Figure 2 The Cycle of Financial Processes

When it comes to uncertainty, people will immediately think of risk. Then what is the relationship between uncertainty and risk? On the relationship between uncertainty and risk, there exist two kinds of views of the theory of identity and the theory of difference. Identity theory believes that the risk is the same as the uncertainty. But most scholars hold the theory of difference and assume the risk and uncertainty are two different concepts. In decision theory, the decision-making problem of state probability is known as risk decision-making, and the state probability of the unknown called the decision uncertainty decision. Obviously, this distinction between risk and uncertainty is in need of mathematical modeling. This paper thinks that the uncertainty and the risk are not synonymous with each other. Uncertainty is one of the causes of risk, but is not all reasons, at the same time, some uncertainties can create risk, but some other uncertainty can not. The uncertainty can be subdivided into

objective uncertainty and subjective uncertainty. Objective uncertainty is a reflection of the objective nature of uncertainty. For example, Burkart thought, uncertainty is an impossibility certainty that can be definitely determined by research and development project. Daghfous and White assumed that uncertainty the accurate information of the research project. These two definitions can reasonably reflect that the objectivity of the essence of the uncertainty is the objective uncertainty, which can also be known as the narrow sense of uncertainty; subjective uncertainty stems from the shortage of the decision-making body in ability to obtain recognition and process the objective information. Both subjective and objective uncertainty is collectively referred to as the generalized uncertainty. Enterprise financial system covers both objective and subjective uncertainties. The author thinks, objective uncertainty of enterprise financing system refers to various kinds of financial factors in the financing process. Objective certainty has the following characteristics: (1) It is existed in future events. In the present moment, only when we forecast the future activity objective uncertainty would appear accurately. Let t be the current time, t_m is future observation time, when $t < t_m$, the existence of objective uncertainty; when t is greater than or equal to t_m , there is no objective uncertainty due to past and current events or factors have happen or occur. (2)The objective uncertainty of enterprise financing system not only refers to the uncertainty, but also the emergence of various "factors" in each stage of enterprise financing process. Subjective uncertainty of enterprise financing system refers to incomplete information about the understanding of the subjective and objective reasons of all kinds of financial factors in the financing process. When $t \geq t_m$, and there is no objective uncertainty, but the existence of subjective uncertainty. The study on the uncertainty of enterprise financial management system refers to the study on uncertainty of the generalized, namely objective uncertainty and subjective uncertainty.

There are objective and subjective uncertainties in enterprise financial system because in the enterprise financial management system, there is a breeding soil and conditions for objective and subjective uncertainties. The study of the macro environment facing the enterprise financial management system and microcosmic environment of enterprise financing system of objective uncertainty and subjective uncertainty, is very important for us to identify the financial risk source, control financial risk, intercept financial risk conduction, cut off the path of financial risk conduction, and realize the key steps of financial risk management.

2 Analysis of Objective Uncertainty of Enterprise Financial Management System

Objective Uncertainty of Enterprise Financial Management System is presented as in Figure 3.

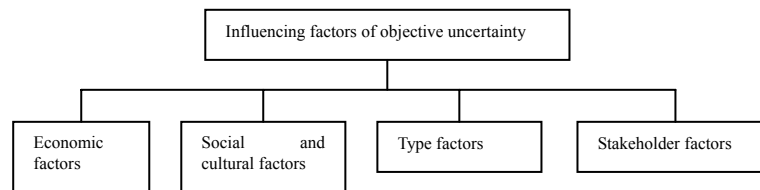


Figure 3 Objective Uncertainty of Enterprise Financial Management System

(1) The economic factors of objective uncertainty of enterprise financial management system

Economic factors can affect the objective uncertainty of enterprise financing system mainly include: the economic cycle, economic system, economic structure and resource conditions, market and price, financial market, financial revenue and other factors. These factors have a significant impact on enterprise financial management system, investment and financing distribution caused by the financial activities. A small change in these factors will give a great change on marketing, production and supply objectives, and then cause a series of uncertainties.

(2) The social and cultural factors of objective uncertainty of enterprise financial management system

Social and cultural factors include education, science, literature, art, press and publishing, radio and television, sports, health, environmental protection, world view, moral beliefs, customs and social system to adapt with the rights and obligations of concept, moral concept, organizational discipline idea, concept of value, labor attitude. These factors have a direct impact and indirect effect on corporate finance, and some effects are very little, the most important factor is: education and scientific factors.

In the educational factors, due to the application of enterprise financial management involves a large number of words, math and modern management tools and means. If the education is in the backward situation, the quality of financial personnel is low, it is hard for enterprises to improve the level of enterprise management, and it is difficult for them to adapt to complex and dynamic environment, which will lead to a

lot of uncertainties in the enterprise financial activities. This situation in the modern management method, financial network, e-commerce application is more and more popular, some enterprises will be difficult to adapt to the financial risk is everywhere, its loopholes appeared one after another.

In the scientific aspects, firstly, the scientific development is conducive to the improvement of enterprise financial management theory. Besides, the development of enterprise financial management theory is not isolated, many areas of development economics, mathematics, statistics, the modern science of management, accounting, are developing financial theory to a certain extent. Secondly, the development of science has created favorable conditions for the enterprise financial management work, for example, application of computer, and the popularity of communication equipment have also promoted the improvement and innovation of financing method. Besides, changes of scientific factors will cause different degree of enterprise financial management concepts and management means, if the enterprise cannot keep pace with the times, master science and technology, modern method and means, will cause the enterprise financing activities there are a number of uncertainties.

(3) The type factors of objective uncertainty of enterprise financial management system

Type of business is usually divided single proprietorships, partnership enterprises and companies. At the same time, enterprises can be further divided into giant enterprises, large enterprises, small and medium enterprises. Different types of enterprises have the different financing risk, especially small and medium enterprises, which have the poor ability to take risks and then are confronted with financing problems, so there are different degrees of uncertainty in the enterprise financial activities.

Type of enterprise also can be classified as technology-intensive enterprises and labor-intensive enterprises.

Technology-intensive enterprises always use more fixed assets but few production workers. A large amount of funds are occupied in fixed assets, which requires this enterprise to raise sufficient long-term funds to meet the investment in fixed assets; on the contrary, if the enterprise is labor-intensive enterprises, and then more short-term funds should be consumed. Moreover, ship and aircraft production enterprise have the longer production cycle and more long-term funds are used; food production enterprises have the shorter production cycle and more short-term funds are used. The different types of enterprises will influence the enterprise financing activities and result in the existence of different degree of uncertainty in the financial activities of enterprises.

(4) The stakeholder factors of objective uncertainty of enterprise financial management system

Enterprise financial management is actually dealing with economic relations among stakeholders. Stakeholders mentioned here refer to the enterprise internal or external interest groups involved. It not only refers to a natural person, also refers to legal entities as follows.

The first are owners or shareholders. The owners or shareholders are the owners of enterprises, and then the enterprise should protect the owner's investment value. The owners of enterprise have great influence on decision-making and the implementation of financial activities such as financing, enterprise long-term investment, liquidity, profit distribution.

The second are creditors. Creditors such as bondholders and loan bank lend money to the enterprise. Enterprise financial management has the responsibility of repaying debts to the creditors, if not, the default will affect the credibility of the enterprise, and even lead to the bankruptcy of the enterprise.

The third are employees. The employee is refers to the staff employed in enterprise production and management activities. The enterprise must provide favorable wages and good working conditions to meet the needs of employees, to mobilize the enthusiasm of employees, and to create wealth for the enterprise; otherwise, the production and operation targets. will be affected.

The fourth are customers. The product and service quality of enterprise are up to the customers to test. Therefore, the success or failure of the enterprise, in the final analysis depends on customer. In order to better meet the needs of customers, enterprises should do a good job in advertising, strengthening the after sale service, in good faith service, to ensure high quality and inexpensive products, improve customer satisfaction and loyalty, to enable enterprises to sustainable development.

The fifth is he governments at all levels. There exist some interests between government and enterprises, the main is the enterprise must be in accordance with the law and pay taxes timely. The enterprise finances enough capital to meet the needs of tax.

The last one is society. Corporate social responsibility also has a significant impact on the financial management of enterprises. For example, corporate make donations to religious or education agencies, this will reduce the enterprise funds or profit. Besides, environmental pollution caused by enterprise should require the enterprise to invest in clean up pollution, which leads to changes of enterprise capital demand.

3 Analysis of Subjective Uncertainty of Enterprise Financial Management System

In the process of financing, due to the incomplete and inaccuracy understanding of corporate financing and its various elements and results related to, a lot of uncertainties are caused in enterprise financial system for financial decisions and judgments, which is defined as subjective uncertainty for the enterprise financial management system.

Information asymmetry of enterprise financing activities on enterprise production and management activities will lead to the uncertainty of financing activities. As the founder of information theory, Shannon said the information is the elimination of uncertainty. Enterprise must grasp more information in order to reduce uncertainty. Business forecasting, financial system process of decision-making and budget work, should be to master, choosing the right direction, to avoid mistakes, the pursuit of efficiency for the purpose, adopt all sorts of ways to increase the amount of information to reduce uncertainty, reduce financial risk, realize the goals of financial management. Of course, reduce financial risk objective is to minimize the risk of loss, and access to information need to spend a certain price, including the information acquisition cost and time investment. Therefore, enterprise should trade off the loss of information due to cost and uncertainty risk.

According to the theory of dissipative structure, open system far from equilibrium state will exchange the material, energy and information with the outside and then from change the disorder state into order state. Enterprise financial management system is an open system, which needs to know a lot of information from the outside world such as the fund-raising, investment forecast, decision-making, budget. The disorder in enterprise financing system is actually the response to an uncertainty. When the enterprise financial system becomes ordered system, the information of this system will be grasped by tall or most of the operators or policymakers. If enterprise financial system is open, financial management will be a process of information continued to be increased, and then uncertainties will continue to be reduce. Therefore, access to information is crucial to the subjective uncertainty of reducing enterprise financial system. That is to say, the amount of information is sufficient or not is crucial factor in subjective uncertainty of enterprise financial management system.

4 Conclusions

(1)The cycles of content and process of enterprise financing are faced with the perplexing, changing the macro environment and micro environment, which causes a lot of uncertainties for enterprise financial management, and increases the risk of business financial system.

(2) The factors that can affect the objective uncertainty of enterprise financing system include: economic factors, social and cultural factors, stakeholder factors as well as enterprise type factors.

(3) The main factors affecting the subjective uncertainty of enterprise financing system refers to information asymmetry.

Understanding and grasp of the corporate financial system with uncertainty and its reasons can help enterprises to use financial management theory to correctly and effectively solve the uncertainty for the sake of reducing or avoiding the financial risks of enterprise, improving the economic efficiency of enterprises and realizing the enterprise health and sustainable development.

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Research on the Driving Mechanism of Intermediary Business Development of Chinese Commercial Banks

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Abstract: Commercial banks can broaden the scale of intermediary business and improve its economic profits while balance sheet is not changed currently; the intermediary business in Chinese commercial banks is in primary development stage and far behind the developed countries. It is urgent for Chinese commercial banks to find a way to accelerate the development and innovation of the intermediary business, to realize diversified operation and expand the new growth points. From the view of driving mechanism, this article has an analysis and comparison between intermediary business development and its driving factors in international commercial banks, combining the national conditions and the features of intermediary business in commercial banks, and puts forward driving mechanism model “6+1+1” effecting the innovation and development of intermediary business in Chinese commercial banks on the basis of TRICK model.

Key words: Commercial banks; Intermediary business; TRICK model; Driving mechanism

1 Introduction

The intermediary business in Chinese commercial banks is in development stage, facing unprecedented opportunities and challenges. In China, many problems exist in the process of the intermediary business development. To keep the intermediary business in Chinese commercial banks sound, rapid and sustainable development, it is necessarily urgent to form the operation and innovative mechanism of the commercial banks' intermediary business suited to China's national conditions, based on the research on the innovative mechanism.

2 The TRICK Theory under the Western Mode “5+1”

Regarding to the driving mechanism of intermediary business's innovation and development of commercial banks, TRICK theory, an authoritative research result in western countries, obtained by the seminar on asset securitization of the deposit institutions and the development and risk of intermediary business held in the U.S. in February 1987.

This theory explains the reasons of the appearance and development of intermediary business:

TRICK + rational self-interest = intermediary business's development + securitization

Above that formula, T in the TRICK is Technology, R is Regulation, I is Interest Risk, C is Competition for Customers, K is Capital Adequacy (the first letter of capital is K in German).

TRICK mode can be understood in this simple way. This mode formulates the driving factors effecting the innovation and development of intermediary business as a 5+1 mode. It means that the development and securitization of intermediary business is driven by the elements in TRICK from the external driving factor, while self-restraint and motivation made by the commercial banks for seeking more profit opportunities and development space can be internal impetus. The model indicates that the banks' intermediary business facing the outside pressure, like financial regulation, risk of interests, competitive force and the request of minimum capital fund from financial regulatory authority, or even all of above.

It has to point out this model illustrates the driving mechanism of intermediary business's innovation and development based on mature marketing environment and operation mode of commercial banks' intermediary business in western countries and the model is also not perfect. Applying this model to Chinese commercial banks' intermediary business shall be subjected to the test of Chinese financial market and need to be further improved.

3 The Comparison of External Driving Factors Affecting the Innovation and Development of Intermediary Business Between China and Foreign Countries

Here it is the comparison of 5 external driving factors affecting the innovative development of intermediary business between China and foreign countries

3.1 Technological Progress

It is apparent that the contribution of technological progress to intermediary business's innovation and development. The high technology, especially the widespread application of computer technology and communication technology to financial industry not only fundamentally change the way and efficiency of operation of commercial banks' intermediary business, but also make formerly impossible products of intermediary business happen, it also dramatically reduce transaction cost for suppliers bank, and make more convenience for customers. The typical example is appearance of bank cards and internet bank products

In China, it is prevalent to apply modern high technology to the financial industry. Banking industry has been one of the digital and electronic profession in high degree. All commercial banks in China have installed their data base, thereby sharing information with other commercial banks and the government departments, which lay a solid technological foundation for the development of commercial banks' intermediary business. But comparing with developed countries, the high technology, in particular the application of electronic technology in Chinese financial industry still fall behind, reflected in development and application of software lags behind business development, slow computerization.

3.2 Financial Regulation

The theory of driving effect produced by financial regulation in the development of financial innovation originates from the theory of regulation evasion of Kane and Mishkin. According to this theory, the financial institutions evade regulation through financial innovation to gain the profits from outer regulation. Developing or innovating intermediary business products is the best approach to avoid the financial regulation and increase returns.

The act of financial regulation is prevalent in China. It has the strict rules in interest rate, exchange rate and capital adequacy ratio. From the perspective of widespread financial regulation, China's financial environment is beneficial to the promotion of intermediary business's development. Currently, China is the country in the socialist market economy system, which should be an environment for financial innovation, but in fact, no effect has been achieved, the reason to that is the way of implementation of regulation. The regulation is enforcement acts that can be carried out not only by legal means, also by administrative means, while the difference between China and abroad is the adopted means. Taking the example of US and China, Federal Reserve in American Central Bank adopts legal means to regulate financial market; the features of legal means are stability and more operation room for banks, lower risks. While China regulates the financial market by means of administrative order made by Central Bank or China Banking Regulatory Commission, some new financial products are banned to be developed by bank, which lead to the commercial banks' failure of expected effect to products' development. Undoubtedly, it is a killer for commercial banks' initiative to develop the intermediary business products.

3.3 Interest Rate Risk

Interest rate risk promotes intermediary business' innovation and development of commercial banks. In theory, the rate of interest and exchange fluctuates in financial market, which not only can increase the risk of interest rate and exchange rate, but also increase the demand of intermediary business that be able to transfer price risk. For example, developed countries witnessed the fluctuation of the rate of interest and exchange in a frequent and dramatic way in 1970s-1980s, which led to the emergence and development of intermediary business products.

However, Chinese situation is different from developed countries. China have been adopting official interest rates system, after WTO entry, the country allowed interest rates to fluctuate within limits, but according to the national conditions, the state still have a strict restrictions on interest rates, the real interest market in China is not fully formed. Currently, the foreign exchange market in China is not truly exchange market, just a exchange market among the banks. Although this system of rates of interest and exchange plays a relatively positive role in stabilizing Chinese financial market, but it curbs the innovation and development of intermediary business product in financial derivatives in order to avoid risk.

3.4 Horizontal Competition

Taking an American example, due to the development of American financial market, especially the intermediary business in 1970s, the type of financial structure increased and a large number of non-bank financial institutions stormed into the market that belong to banking financial institutions. For example, Prudential Financial, the largest American insurance company and Merrill Lynch stepped into banking businesses. Prudential Financial made use of subdivision engaging in intermediary business, like deposit, credit cards, mutual fund, security and mortgage loan. While Merrill Lynch has more securities

operation, except for bond and mutual fund, it also works on consumption loan, credit cards, corporate finance and life insurance that belonged to business of banks or insurance companies. Moreover, even some non-financial institutions start to engage in financial business. For instance, Ford Motor Company set up Ford Finance Company, the special agency, to run financial service, and this company has become one of the top ten American Credit Cards companies and Mortgage companies. The fierce competition results in shrink of deposits and loans business in American commercial banks, which weaken the banks' competitiveness. Confronting this situation, the commercial banks have to explore new business and innovate the intermediary business so as to keep competitive and pursue new growth opportunities.

There are their own characteristics in Chinese commercial banks' competition. First, state-owned commercial banks play a dominant role in banking industry, it substantially outnumber joint-stock commercial banks in terms of asset size, capital fund, network distribution and technology. Though, recent research shows the market structure in China's banking industry transformed from oligopoly-monopoly to monopoly competitiveness, thus, our banking industry still lacks of competitiveness comparing to the developed countries, which is bad for the innovation and development of commercial banks' intermediary business.

3.5 Capital Adequacy Ratio

After Basle Report released in 1980s, all banks were required that the minimum CAR of capital risk reach 8% in the end of 1992. This rule plays a positive role in preventing global financial crisis, but has a negative influence on the development of assets business of commercial banks that under fierce international competition. Under this circumstance, financial industry appears the phenomenon of on-balance-sheet in off-balance-sheet clothing in America and other western countries, and transfer the profitability from asset business to intermediary business then continue to expand. It reflects that commercial banks avoid the requested CAR, which promotes the innovation and development of intermediary business.

Chinese government accepted the rule about CAR made by Basle Committee. Central bank introduced many measures for adding the capital of state-owned commercial banks to reach the rule of Basle Committee. But Chinese state-owned banks is still in monopoly, facing lower pressure of competition and increasing capital ratio, adding that CAR is not mandatory, so the banks lack of motivation to develop banking business due to the escape of CAR regulation.

4 “6+1+1” Driving Model to Innovate and Develop Chinese Commercial Banks' Intermediary Business

It is clear that emergence and content of TRICK theory has characteristics of times, which is manifested by the effect of CAR rules on the innovation and development of intermediary business. It is unavoidable that the foundation and application of this model has limitation because of different countries and different national conditions. Current China is far different from 1980-1980s' and US, so researching the innovation and development of Chinese commercial banks' intermediary business with the use of TRICK theory should take national conditions, social and economic environment, international environment into consideration. From this point, it is necessary to improve the original TRICK theory.

It is proved that the 5 driving factors of external pressure mentioned by TRICK theory in “5+1” model promoting the innovation and development of commercial banks can provide the motivation to study the innovation and development of commercial banks. So did the internal driving factors of self-interest maximization pursued by the commercial banks, as a microeconomic individual. But in my opinion, the driving mechanism of the innovation and development of commercial banks' intermediary business described by TRICK theory need to be complemented and perfected according to Chinese conditions. Here is the discussion and supplement to the original TRICK model

4.1 The external driving factors for market demand

At present, China saw the rapid economic development. No countries can compare to China in terms of the scale or potential scale of financial market, potential vitality of financial market and some special situation appeared in the development of financial market. In regard to the external driving factors for the innovation and development of Chinese commercial banks' intermediary business, huge market demand for intermediary business is an impetus to promote its innovation and development. It is discussed from the 3 aspects.

Firstly, the demand of 1.3 billion people is a factor to promote the innovation and development of Chinese commercial banks' intermediary business.

For 1.3 billion Chinese people, after 30 years of reform and opening up, their pursuit for material and spiritual culture is different comparing to before. All kind of services are demanded for commercial banks' intermediary business and it facing a huge demand, which can substantially drive the innovation and development of commercial banks' intermediary business for individual.

Take the market of credit card in Shanghai as an example; the citizens own 50.2 million credit cards in Shanghai till the end of August 2006, which means every resident owns 3 credit cards on average. As the advancement of national networking, the foundation and improvement of credit investigation system, it cannot imagine the potential of market of credit cards in China.

Secondly, the disparity between poor and rich stimulate the innovation of commercial banks' intermediary business.

It is an unavoidable fact that the reform and opening up in China and continuous rapid development of economy caused the increasing gap between rich and poor, which indicates about 80% wealth is owned by 20% population, and the number of these people is huge. In addition, the so called "middle class" is coming into being. The several resident groups in different degree of affluence promote the innovation and development of commercial banks' intermediary business, due to the huge demand of all kinds of groups.

Thirdly, the population structure of aging speed up the rapid innovation and development of Chinese commercial banks' special intermediary business.

China, with a considerable number of senior citizens, has entered aging society, which will certainly promote Chinese commercial banks to innovate and develop the special intermediary business aiming to these elderly people. As the economic development and social progress in China, the elderly people have an increasing economic income and independent economic capability as well as consumption ability. The national working committee for elderly people investigated the senior citizens' consumption ability in 13 provinces, found that their consumption ability had a rapid growth annually and predicted it would reach 2000 billion RMB in 2010. Thus, it can be seen that the market of personal finance and intermediary business for senior citizens has a substantial potential.

At present, elderly people's demand to financial products is management of cash income, trust service and financial counseling etc. The financial institutions should make innovations in financial products for elderly people. For example, combining savings business with medical insurance to set up the product aiming to medical treatment needed by the elderly people; developing the financial product that meet senior citizens' demand made by weakening resource intergenerational transfer of family; developing the care insurance product for elderly people and individual financial counseling business etc.

4.2 The influencing factors of the social credit system

The social credit system in financial market constitutes financial institutions and clients, which is a system of bilateral relations. The sound credit system has a dynamic effect on stimulation of financial business' innovation and development and acceptance of financial products positively. Appositively, unsound social credit system do harm to the interests of financial institutions and customers. It can be illustrated that there are bank credit problems, such as information asymmetry, lack of transparency when commercial banks introduced some businesses, like finance products and principal agent business, which is the big concern to clients who tend to buy these products. In the current Chinese financial market, clients have a considerable demand to the products of intermediary business, but bank credit problems hamper its development, as a result banks and clients need to bear the losses that caused by banks credit problems to some extent. Hence, with regard to the innovation and development of intermediary business, its credit system construction is either the impetus or the obstruction, which is different from mentioned some external driving factors. So the author research on the supplement to TRICK model, setting this factors out of six external driving factors and internal interests driving factors effecting the innovation and development of the intermediary business.

5 Conclusions

The western mode "5+1" created in 1980s has its limitation when applied to 21st century China. At present, no countries can compare to China in terms of the scale of financial market. And some special situation has appeared in the development of financial market, such as the great disparity of wealth between the rich and the poor in the process of "middle class" formation, a considerable number of senior citizens and unsound social credit system. Because of this, research on the driving mechanism of intermediary business development should consider these factors.

In summary, the factors that affect the innovation and development of the intermediary business in

commercial banks consist of six external driving factors, a factor of impetus or hamper that affect bilateral relations and the internal driving factors of the benefit maximization pursued by commercial banks. The driving mechanism of the emergence and the development of Chinese intermediary business can be come down to a multiple function model “6+1+1”:

$$Z = F ((T, R, IR, CC, CA, D) +CS +SI)$$

Z represents Driving Power; T represents Technology; R represents Regulation; IR represents Interest Risk; CC represents Competition for Customers; CA represents Capital Adequacy; D represents Demand; CS represents Credit System; SI represents Rational Self Interest.

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The Level of Development of the Inland Open Economy in Central China

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Abstract: Evaluation indicator system of inland open economy is established from three aspects, which are intra-regional, inter-regional and international. We analyze the development level and trend of inland open economy in central China, and compare with the eastern and western regions as well as the national average. The results are as follows: comparing with the eastern and western regions of China, the development level of open economy is middle in central region, but the growth rate of development level of open economy is highest in central region.

Key words: Inland open economy; Evaluation indicator system; Central region; Degree of openness

1 Introduction

“Inland open economy” is the opposite to the conception of “coastal open economy” (Xiao Junfu and Lin Yong, 2009). The development mode of inland open economy refers to inland region make full use of the advantages of resources, environment and lower labor costs to vigorously carry out foreign economic activity and to introduce capital and technology of advanced countries and coastal regions. The inland regions away from the port, and have their own distinctive features in the choice of resources and logistics. Therefore, inland regions can not simply copy the successful experience in coastal regions. Ascani et al. (2012) argue that the process of globalization is progressively increasing the importance of regional processes and the role of local actors in shaping development trajectories. Therefore, economic development patterns are characterized by strong spatial concentration at the regional level and that distance and geography do matter in a global world (Brakman and van Marrevijk, 2008). Fast-growing locations are not closed and independent economies, but rather they are most likely those areas hosting MNEs and their international investment which crucially connect the region with foreign markets and resources (McCann and Acs, 2009). This is particularly the case of developing countries where the bulk of available information is locally produced rather than imported from exogenous sources and, thus, such an external knowledge tends to play a primary role (Pietrobelli and Rabellotti, 2009).

2 The Evaluation Indicator System for the Inland Open Economy

2.1 The established principles of evaluation indicator system

There are some basic principles and approaches before we establish the evaluation indicator system for an inland open economy, which based on the reality development of the study object. The main principles are as follows:

1) The principle of feasibility. Feasibility is the most important principle in the establishment of evaluation indicator system. Although there have more scientific statistical indicators, the application scope and practicality of the indicator system will be greatly hampered if the data acquisition don't have or have low feasibility. Therefore, the indicators should take into account the availability of the data.

2) The principle of systematicness. Open economy is a concept which is broad, integrated and systemic that the indicator system should be reflected. Therefore, each indicator in the evaluation indicator system could reflect the development level of one's open economy, and an organic link exists in the indicator system.

3) The principle of independence. Independence between the various indicators is an often overlooked problem when scholars establish the indicator system (Li Yanqing, 2009). There are many indicators to reflect and measure the development level of an open economy, and there indicators may be have a closely relationship. For example, there have highly positive correlation relationship between international investment and international labor cooperation.

4) The principle of openness. There are many factors to affect the development level of open economy in reality. Therefore, we must see the economic openness as the center point, and excluding some indicators which have no directly relationship with the development of open economy. According to the concept of inland open economy, reflecting the regional economic openness from three perspectives which are marketing openness, factor openness and informational openness.

2.2 The establishment of evaluation indicator system

According to the concept of inland open economy, the economic openness of a region are mainly the flow of the goods (tangible and intangible) and the factors of production (capital, technology and labor) in inter-regional and inter-national, which contains many content, such as the division of production, factor mobility. Therefore, the flow of goods and factors are the firstly reflected elements when we measure the development level of inland open economy. Besides, the open foundation of the intra-regional, such as economic base, technology and infrastructure, is also the important factors that reflect the development level of inland open economy.

Table 1 The Evaluation Indicator System for the Inland Open Economy and Weights

Sub-system	Indicators	Index weights	
		Sub-system	Indicators
Open foundation of the intra-regional I₁		0.2367	
	Economic base I₁₁		0.0991
	-Level of economic development I ₁₁₁		0.0640
	-Proportion of non-state-owned economy I ₁₁₂		0.0351
	Technological base I₁₂		0.0509
	-Activity in technology market I ₁₂₁		0.0158
	-R&D capabilities I ₁₂₂		0.0351
	Infrastructure I₁₃		0.0867
	-Telecommunication capacity I ₁₃₁		0.0348
	-Transportation network density I ₁₃₂		0.0519
Degree of openness of the inter-regional I₂		0.2367	
	Market openness I₂₁		0.0966
	-Activity in commodity market		0.0507
	-Tourism market openness		0.0199
	-Cargo density		0.0260
	Factors openness I₂₂		0.0966
	-Degree of capital flows I ₂₂₁		0.0507
	-Degree of technology flows I ₂₂₂		0.0260
	-Degree of labor flows I ₂₂₃		0.0199
	Information openness I₂₃		0.0434
	-ease of information dissemination I ₂₃₁		0.0154
	-Activity in information exchange I ₂₃₂		0.0280
Degree of international openness I₃		0.5267	
	Market openness I₃₁		0.2038
	-Dependence on foreign trade I ₃₁₁		0.0494
	-Dependence on foreign investment I ₃₁₂		0.0546
	-Degree of foreign economic contribution I ₃₁₃		0.0667
	-Dependence on international tourism I ₃₁₄		0.0331
	Factors openness I₃₂		0.2180
	-Degree of capital flows I ₃₂₁		0.0864
	-Degree of technology flows I ₃₂₂		0.0809
	-Degree of labor flows I ₃₂₃		0.0507
	Information openness I₃₃		0.1048
	-Internet penetration I ₃₃₁		0.0723
	-realm name penetration I ₃₃₂		0.0325

Therefore, there must have open foundation of the intra-regional and degree of openness inter-regional and international when we measure the development level of inland open economy in central China (Ying Jian and Zhang Guolin, 2002). The openness of international is to strengthen ties with the world and to improve the development level of open economy through the forms of

international trade, attract foreign investment, outward investment and participation in the international market competition. The openness of inter-regional is to strengthen economic and technical contact with the eastern and western provinces, and to undertake the transfer of industries of eastern which to promote the rational flow of factors and to improve environment of trade and investment, and the final goal is that to comprehensively improve the level of competitiveness and development. The open foundation of intra-regional is the basis of implementation of inter-regional and international, including the economic base, the level of technology and infrastructure.

There are three aspects (openness of market, openness of factors and openness of information) both in the openness of intra-regional, inter-regional and international. The evaluation indicator system of inland open economy is shown in Table 1.

2.3 The Index weights of evaluation indicator system

The degree of each index is obtained by questionnaire, and then, the indicator weights in the evaluation indicator system are calculated by the analytic hierarchy process (AHP), which the advantages is the judgment matrix could through the consistency test. There are four steps to calculate the indicator weights: building the hierarchical model, construct the judgment matrix, single-sort and consistency test, hierarchy of sorting and consistency test. The hierarchical model is seen Table1. The important degree of each index takes number 1 to 9 and its reciprocal in constructing the judgment matrix. Based on the questionnaire, we use Yaahp 0.5.2 to empower the indicators, and take the scaling methof of $e^{(0/5)} \sim e^{(8/5)}$. Besides, the average random consistency values of judgment matrix are less than 0.1, which illustrate through the consistency test. Table1 gives the results of the index weights.

3 The Level of Development of Inland Open Economy

3.1 Data sources

Our sample data from 2000-2009, and the data sources are in Table 2.

Besides, in order to eliminate the dimensionless impact on the value of the indicators in the evaluation indicator system, we select Min-max standardization to dimension the original data. The formula is as follows:

$$x'_i = \frac{x_i - \min\{x_i\}}{\max\{x_i\} - \min\{x_i\}} \tag{1}$$

x_i is the actual value of i ; x'_i is the standard value of i ; $x'_i \in [0,1]$; $\min\{x_i\}$ and $\max\{x_i\}$ are respectively the minimum value and maximum value of i .

Table 2 Data Sources of Indicator

Data	Sources
exchange rate, cargo turnover, total length of transport routes, retail sales of social commodities, foreign industrial output, industrial output, tourism earnings, technology market turnover, number of internet access, length of long-distance optical fiber cable, post and telecommunication service (2001-2009), fixed and mobile phone users (2001-2009)	China Statistical Yearbook
regional GDP, per capita GDP, total investment in fixed assets, investment in fixed assets of state-owned enterprises, investment in fixed assets in the self-financing (2004-2009), foreign direct investment (2009), import and export of goods	Provinces Statistical Yearbook
foreign direct investment, domestic tourism revenue, business volume of post and telecommunications (2000), fixed and mobile phone users (2000)	China Compilation of Statistical 1949-2008
foreign contracted projects (2000-2004), foreign labor service cooperation (2000-2004)	China Foreign Economic Statistical Yearbook
foreign contracted projects (2005-2009), foreign labor service cooperation (2005-2009)	China Trade and External Economic Statistical Yearbook
flowing of domestic technology market, introduction of foreign technology market, R&D expenditure	China Statistical Yearbook on Science and technology
change number of labor, movement number of labor	China Labour Statistical Yearbook
number of realm name	CNNIC
population	China Population & Employment statistical Yearbook

3.2 The analyze of the development level of central China's inland open economy

From the Figure 1, we can see that the development level of open economy in eastern region is much higher than the level of development of the central and western region, even higher than the national average level. Specifically, in 2000-2009, the development level of open economy in eastern region is more than 1.5 times than the national average and more than 2.5 times than the development level of open economy in central and western region. This phenomenon is similar to the economic development of eastern region. Since the reform and opening, the eastern region relying on its unique geographical advantage, a good industrial base and infrastructure, the economic development of eastern regional has made unprecedented achievements, which become the most flash area in China's economic development, and its degree of market openness is up to the top in China. Therefore, the development level is the highest in eastern region. Besides, the development levels of open economy in central and western region are lower than the national average level. And the development level of open economy in central region is slightly higher than the western region. In 2000-2009, the development level of open economy in these two regions reached only the two of three of the national average level.

However, in 2009, the development level of open economy in central and eastern region increased by 1.23 times and 1.17 times compared with 2000, which is higher than the 1.14times of eastern region. This phenomenon shows that the level of economic development and degree of opening up are lower than the eastern region, but their speed of economic development and opening up have show a strong upward trend under the support of national policies and their own efforts. Therefore, the region's economic development strategies, such Rise of Central China and West Development, have achieved initial results, and further demonstrate the reality is significant in this paper.

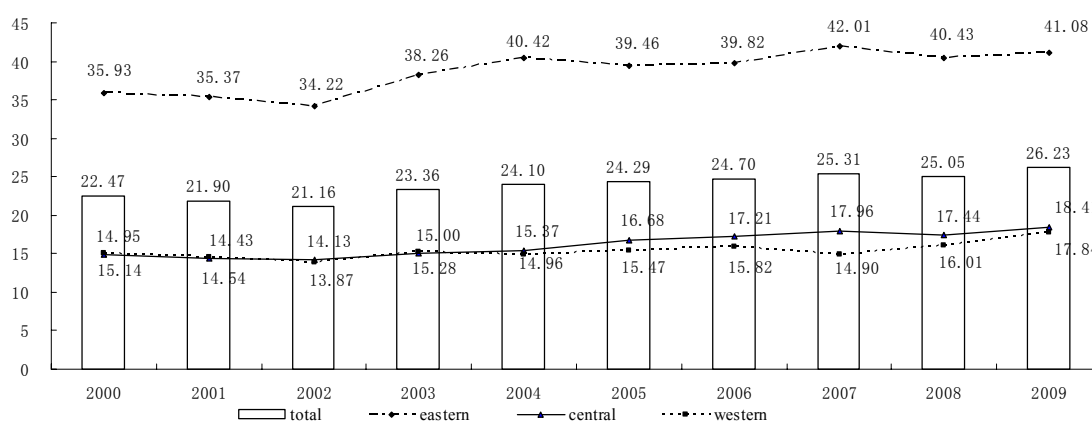


Figure 1 The Level of Development of Open Economy in Central China

4 Conclusions

The strategy of Rise of Central China made great achievements of economic and social development in recent years. We establish evaluation indicator system of inland open economy from three aspects, which are intra-regional, inter-regional and international in this paper. And take the data from 2000 to 2009, we analyze the development level and trend of inland open economy in central China, and compare with the eastern and western regions as well as the national average. The results are as follows: the development level of open economy is highest in eastern region, the lowest in the western region. However, the growth rate of development level of open economy is highest in central region. In the future, the central region should further expend levels of opening and cooperation.

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Evaluation of Cultural Tourism Competitiveness Based on Catastrophe Progression Method

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Abstract: The goal of this research is to establish an evaluation system of the competitiveness in cultural tourism industry. Based on the Catastrophe Theory and Catastrophe Progression Method, this paper has established an evaluation system, which presents three main indicators to evaluate the cultural tourism competitiveness, including the contribution capability, the development capability and the supporting capability. An empirical analysis is conducted by collecting the information from 8 cities located in western Hubei eco-cultural tourism circle. From the experiment, the author analyzes the cultural tourism competitiveness in each of the 8 cities and puts forward suggestions to each city with the purpose of enhancing their cultural tourism competitiveness.

Key words: Catastrophe theory; Catastrophe progression method; Cultural tourism competitiveness

1 Introduction

Competitiveness evaluation is the basis for tourism development. The research on the competitiveness of tourism is not only a simple description of the current situation, but also a contribution to cultivating and promoting the comparative advantages of tourism industries in different regions.

In recent years, the research on the competitiveness evaluation mode system has increased by domestic and foreign scholars. Metin and Mike (1999) built up the index system of tourism destination competitiveness^[1]. Ritchie and Crouch (2000) updated their first version mode of destination competitiveness (1999). A new mode of destination competitiveness and sustainability was established by 5 main factors, i.e. qualifying and amplifying determinants, destination policy, planning and development, destination management core resources and attractors, supporting factors and resources^[2]. Enright and Newton (2003) surveyed tourism practitioners in Hong Kong, and rated both the importance and relative competitiveness, in a method consistent with importance performance analysis (IPA).^[3] Dwyer and Kim (2004) developed a model of destination competitiveness that would enable comparison between countries and between tourism sector industries. Wilde and Cox (2008) conducted focusing group discussions with tourism industry stakeholders in a mature destination on the East Coast of Australia. Their study indicated competitiveness factors related to three fundamental elements identified by respondents.^[4] WAN Xianjin and LIU Yalin (2006) combined regional industry competitiveness determinant model with the features of the tourism to establish the regional tourism competitiveness determinant model.^[5] LI Chuanxin, MA Yaofeng and LI Zhenting (2007) introduced an entropy evaluation method and Analytic Hierarchy Process to realize the cluster analysis and comparative analysis in tourism competitiveness of 31 provinces in China.^[6] LI Jia, CHENG Shengkui and GAN Hong (2007) constructed the evaluation index system of regional tourism competitiveness including four decisive factors, i.e. production factor, market, industry and support competitiveness. Principal Component Analysis (PCA) and Analysis Hierarchy Process (AHP) were applied to calculate the values of competitiveness of the provinces in Southwest China.^[6] LI Chuangxin, MA Yaofeng and GAO Jun (2008) used PCA to establish the regional tourism competitiveness based on multi-index comprehensive evaluation. They applied systemic clustering method to the evaluation unit difference analysis and clustering analysis.^[7] WANG Zhaofeng (2008) analyzed previous literatures of tourism competitiveness and constructed the regional tourism competitiveness valuation model including tourism resources, tourism management and tourism environment competitiveness.^[8]

From the discussion above, it appears that great progress has been made in this field. Different methods have been used to analyze the tourism competitiveness, e.g. Analysis Hierarchy Process (AHP), Principal Component Analysis (PCA), Fuzzy Comprehensive Evaluation (FCE) etc. However, there has not been generally accepted evaluation system for tourism competitiveness. In this paper, the Catastrophe Progression Method (CPM) will be adopted to establish the evaluation system of cultural tourism competitiveness. An empirical analysis will be conducted about 8 cities in western Hubei eco-cultural tourism circle. As some methods have defects with subjectivity on weight decision or have

extremely complex processes in calculation, Catastrophe Progression Method (CPM) has an advantage of avoiding the subjectivity on weight decision by only taking the relative importance of indicators into consideration. CPM has advantages in solving problems of fuzzy multiple object decision because the catastrophe progression is a multidimensional fuzzy membership function. With these characteristics, the method is easier and the results are relatively precise.^[9]

2 Catastrophe Progression Method

Catastrophe Theory was advanced by Thom and further developed by Zeeman. It is a special topic within the broader domain of nonlinear dynamical systems that pertains to sudden discontinuous changes of events. There are 7 fundamental catastrophe types, in which 3 common types are usually used, including Cusp Catastrophe, Swallowtail Catastrophe and Butterfly Catastrophe. The relevant functions are shown in Table 1.

Table 1 Common Used Catastrophe Model and Functions.

Common type	Potential function	Bifurcation equation	Normalized formula
Cusp Catastrophe	$f(x) = x^4 + ax^2 + bx$	$a = 6x^2$, $b = 8x^3$	$x_a = \sqrt{a}$, $x_b = \sqrt[3]{b}$
Swallowtail Catastrophe	$f(x) = \frac{1}{5}x^5 + \frac{1}{3}ax^3 + \frac{1}{2}bx^2 + cx$	$a = 6x^2$, $b = 8x^3$, $c = 3x^4$	$x_a = \sqrt{a}$, $x_b = \sqrt[3]{b}$, $x_c = \sqrt[4]{c}$
Butterfly Catastrophe	$f(x) = \frac{1}{6}x^6 + \frac{1}{4}ax^4 + \frac{1}{3}bx^3 + \frac{1}{2}cx^2 + dx$	$a = 10x^2$, $b = 20x^3$, $c = 15x^4$, $d = 5x^5$	$x_a = \sqrt{a}$, $x_b = \sqrt[3]{b}$, $x_c = \sqrt[4]{c}$, $x_d = \sqrt[5]{d}$

As shown in Table1, the $f(x)$ means the potential function of some state variable x in a system. The coefficient a , b , c and d are the control variables of x . How to choose the catastrophe type is based on the number of the indexes decomposed. The bifurcation equations are derived from the potential function in different systems. We get the normalized formula of every system after transformation and derivation of the bifurcation equations.

3 Establishing Evaluation System Based on Catastrophe Progression Method

According to the purpose and the underlying mechanisms of the evaluation system, we decompose the cultural tourism competitiveness evaluation system into a multi-layer system which includes a number of indicators. In this condition, it only needs to know the data of the lower sub- indicators. The number of every layer’s indicator and single indicator’s sub-indicators should be no more than 4 in a common catastrophe system. Evaluators could determine the importance of every indicator according to one’s own experience when the evaluation index has been done. The relatively more important indicators are put in front of the system, while the less important ones are put after them^[10] shown in Table 2.

Table 2 Cultural Tourism Competitiveness Evaluation System.

General indicators	Abstract indicators		Concrete indicators
	First level	Second level	
Cultural Tourism Competitiveness, a	Contribution capability, b_1	Tourism income, c_1	Domestic tourism income, d_1
			Tourism foreign exchange income, d_2
			Tourism gross income, d_3
			Per capita tourism consumption, d_4
	Tourist reception, c_2	Quantity of domestic tourist, d_5	
		Quantity of inbound tourist, d_6	
		Inbound tourist days, d_7	

			Quantity of gross tourist, d_8	
		Economic contribution, c_3	Income ratio of GDP, d_9	
			Increasing rate of income ratio of GDP, d_{10}	
	Development capability, b_2	Scenic resources, c_4	Quantity of national 4A-level and 5A-level scenic spots, d_{11}	
			Quantity of national below 3A-level scenic spots, d_{12}	
			Quantity of industrial and agricultural demonstration sites, d_{13}	
			Quantity of advanced units in developing tourism, d_{14}	
		Cultural resources, c_5	Quantity of cultural heritage, d_{15}	
			Quantity of national relic protection unit, d_{16}	
			Quantity of national historical and cultural city, town and village, d_{17}	
		Receiving tourist capability, c_6	Quantity of above 4-star hotel(4 star hotel included), d_{18}	
			Quantity of below 4-star hotel, d_{19}	
			Quantity of travel agencies, d_{20}	
		Supporting capability, b_3	Economy environment, c_7	Consumer Price Index, d_{21}
				Retail Price Index, d_{22}
				Fundamental construction investment, d_{23}
				Total investment in fixed assets, d_{24}
			Traffic environment, c_8	Volume of passenger transportation, d_{25}
	Passenger transport amount, d_{26}			
	Highway density, d_{27}			
	Ecological environment, c_9		Built-up area green coverage rate, d_{28}	
			Built-up area green space ratio, d_{29}	
			Number of days exceeding grade-2 of air quality, d_{30}	
			Per capita green area, d_{31}	
	Publicity capability, c_{10}		Quantity of tourist festival and event, d_{32}	
			Tourist festival and event duration, d_{33}	
			Keyword search result, d_{34}	

4 Calculation with Data

Firstly, we need to process the original data in dimensionless method and make the value of the processed data range from 0 to 1. All the concrete indicators can be divided into cost-type and benefit-type, and be calculated by the formula 1 and formula 2.

$$\text{Cost-type: } y_{ij} = \frac{x_{ij} - \min x_{ij}}{\max x_{ij} - \min x_{ij}} (0 < j < n)$$

$$\text{Benefit-type: } y_{ij} = \frac{\max x_{ij} - x_{ij}}{\max x_{ij} - \min x_{ij}} (0 < j < n)$$

Among the formula 1 and formula 2, i means the number of indicators, j means the number of evaluation objects.

Secondly, we deal with the original data collected from *Hubei Tourism Statistical Yearbook* (2012), *Hubei Statistical Yearbook* (2012), Hubei Tourism Administration's official website, the official websites of the tourism administrations in western Hubei eco-cultural tourism circle et al. The non dimension

data of the 8 cities in western Hubei eco-cultural tourism circle is shown in Table 3.

Table 3 Dimensionless Data of the 8 Cities.

Indexes		Yichang	Shiyan	Xiangy- ang	Enshi	Jingzho- u	Jingmen	Suizhou	Shennon - gjia
c_1	d_1	1.0000	0.8374	0.8347	0.5864	0.4697	0.3436	0.3304	0.0000
	d_2	1.0000	0.7014	0.3952	0.6059	0.1443	0.0000	0.2875	0.2952
	d_3	1.0000	0.8334	0.8220	0.5830	0.4561	0.3286	0.3228	0.0000
	d_4	0.7403	0.5738	0.5909	0.3574	0.4557	0.2845	1.0000	0.0000
c_2	d_5	1.0000	0.9659	0.9399	0.7031	0.5651	0.4980	0.3417	0.0000
	d_6	0.8673	0.4341	0.1209	1.0000	0.0801	0.0147	0.0000	0.2744
	d_7	0.5779	0.3508	0.2669	1.0000	0.0652	0.0000	0.0227	0.2018
	d_8	1.0000	0.9592	0.9285	0.8325	0.5587	0.4904	0.1802	0.0000
c_3	d_9	0.0170	0.1348	0.0000	0.2405	0.0185	0.0017	0.0726	1.0000
	d_{10}	0.4103	0.5273	0.4025	1.0000	0.4700	0.0000	0.4239	0.5055
c_4	d_{11}	1.0000	0.6000	0.0000	0.8000	0.2000	0.3000	0.1000	0.2000
	d_{12}	0.5217	1.0000	0.8261	0.6522	0.2174	0.1304	0.0870	0.0000
	d_{13}	0.7273	0.0000	0.0909	1.0000	0.0000	0.1818	0.0000	0.0000
	d_{14}	1.0000	0.3333	0.5000	0.6667	0.1667	0.3333	0.0000	0.1667
c_5	d_{15}	1.0000	0.5714	0.0000	0.0000	0.2857	0.1429	0.0000	0.0000
	d_{16}	0.3333	0.0000	0.6667	1.0000	0.3333	0.0000	0.3333	0.0000
	d_{17}	0.5000	0.2500	0.2500	0.7500	1.0000	0.2500	0.2500	0.0000
c_6	d_{18}	1.0000	0.3750	0.0000	0.7500	0.1250	0.1250	0.3750	0.0000
	d_{19}	0.8246	1.0000	0.3684	0.6140	0.6316	0.7368	0.0351	0.0000
	d_{20}	1.0000	0.6038	0.4057	0.5566	0.2170	0.1604	0.0000	0.0283
c_7	d_{21}	0.3333	0.3333	0.4286	0.4762	0.6667	0.5238	1.0000	0.0000
	d_{22}	0.5200	0.7200	0.4400	0.0000	0.6400	0.4400	1.0000	0.7600
	d_{23}	1.0000	0.3814	0.7582	0.2376	0.6187	0.3823	0.2886	0.0000
	d_{24}	1.0000	0.4315	0.9530	0.2542	0.6436	0.4896	0.3140	0.0000
c_8	d_{25}	0.8875	0.7784	0.9921	0.4012	1.0000	0.6965	0.3824	0.0000
	d_{26}	0.9428	0.4705	1.0000	0.1724	0.7287	0.5508	0.3903	0.0000
	d_{27}	0.9193	0.5330	1.0000	0.4309	0.9924	0.5914	0.3123	0.0000
c_9	d_{28}	0.8029	1.0000	0.7412	0.0000	0.7118	0.7154	0.5838	0.3603
	d_{29}	0.6980	1.0000	0.8294	0.0000	0.6796	0.6156	0.6140	0.5901
	d_{30}	0.0000	0.9351	0.2987	0.6883	0.6623	0.6364	0.6753	1.0000
	d_{31}	1.0000	0.9314	0.5515	0.0000	0.6642	0.8456	0.5539	0.7843
c_{10}	d_{32}	0.0000	1.0000	1.0000	0.6667	0.0000	0.3333	0.3333	0.0000
	d_{33}	0.0882	0.1765	0.4412	0.1471	0.0000	1.0000	0.3235	0.7059
	d_{34}	1.0000	0.2420	0.1963	0.1918	0.3014	0.0594	0.0000	0.2192

According to the Catastrophe Theory, if the indicators with the same objective are not complementary, the principle is to choose the smallest value and if the indicators with the same objective are complementary, we choose the average value. Here, the City of Suizhou is taken as an example to demonstrate how the calculation of the competitiveness evaluation is done in this paper.

We can get that c_1 , i.e. the tourism income, should be calculated on the basis of the four indicators through the Butterfly Catastrophe Model. Since the four indicators are complementary, we have:

$$c_1 = \frac{\sqrt{d_1} + \sqrt[3]{d_2} + \sqrt[4]{d_3} + \sqrt[5]{d_4}}{4} = \frac{\sqrt{0.3304} + \sqrt[3]{0.2875} + \sqrt[4]{0.3228} + \sqrt[5]{1}}{4} = 0.7472$$

We can get that c_2 , i.e. the system of tourist reception, should be calculated on the basis of the four indicators through the Butterfly Catastrophe Model. Since the four indicators are complementary, we have:

$$c_2 = \frac{\sqrt{d_5} + \sqrt[3]{d_6} + \sqrt[4]{d_7} + \sqrt[5]{d_8}}{4} = \frac{\sqrt{0.3417} + \sqrt[3]{0} + \sqrt[4]{0.0227} + \sqrt[5]{0.1802}}{4} = 0.4206$$

We can get that c_3 , i.e. the system of economical contribution, should be calculated on the two indicators through the Cusp Catastrophe Model. Since the two indicators are complementary, we have:

$$c_3 = \frac{\sqrt{d_9} + \sqrt[3]{d_{10}}}{2} = \frac{\sqrt{0.0726} + \sqrt[3]{0.4289}}{2} = 0.5103$$

Since the three indicators, c_1 , c_2 and c_3 in the sub system of contribution capability b_1 are complementary, based on Swallowtail Catastrophe Model, we have:

$$b_1 = \frac{\sqrt{c_1} + \sqrt[3]{c_2} + \sqrt[4]{c_3}}{3} = \frac{\sqrt{0.7472} + \sqrt[3]{0.4206} + \sqrt[4]{0.5103}}{3} = 0.8196$$

Following this procession principle, we can get the results of the others, as shown in Table 4:

Table 4 Results of Calculation of Suizhou.

c_1	c_2	c_3	c_4	c_5	c_6	c_7	c_8	c_9	c_{10}
0.7472	0.4206	0.5103	0.1898	0.4668	0.3133	0.8815	0.6989	0.8523	0.4213
b_1			b_2			b_3			
0.8196			0.6532			0.9071			
			a						
			0.9163						

We can respectively calculate the other cities' results using the same method and steps. The evaluated results are shown in Table 5 and we can get the rank of each column.

Table 5 Evaluation Results of The 8 Cities.

City	Yichang	Shiyan	Enshi	Xiangyang	Jingzhou	Suizhou	Jingmen	Shennongjia
c_1	0.9854	0.9135	0.8250	0.8749	0.7215	0.7472	0.5302	0.1665
c_2	0.9564	0.8753	0.9506	0.7920	0.6446	0.4206	0.4544	0.3300
c_3	0.4367	0.5875	0.7452	0.3692	0.4568	0.5103	0.0205	0.8983
c_4	0.9321	0.6443	0.9209	0.5895	0.4368	0.1898	0.6277	0.2865
c_5	0.8448	0.4877	0.6435	0.5269	0.7426	0.4668	0.3617	0.0000
c_6	0.9792	0.8313	0.8599	0.5050	0.6313	0.3133	0.6299	0.1367
c_7	0.8454	0.7762	0.5372	0.8347	0.8702	0.8815	0.7844	0.2281
c_8	0.9673	0.8382	0.6667	0.9987	0.9660	0.6989	0.8437	0.0000
c_9	0.6958	0.9923	0.2277	0.8569	0.8866	0.8523	0.8892	0.8479
c_{10}	0.4817	0.7541	0.6687	0.8090	0.2470	0.4213	0.6903	0.5249
b_1	0.9303	0.9293	0.9402	0.8800	0.8451	0.8196	0.6251	0.6909
b_2	0.9685	0.8482	0.9287	0.8061	0.8193	0.6532	0.7985	0.3811
b_3	0.9215	0.9418	0.8050	0.9584	0.9119	0.9071	0.9326	0.5791
a	0.9779	0.9652	0.9642	0.9527	0.9441	0.9163	0.9004	0.8095

5 Conclusion

From the evaluation results, we can see that some of the scores and rankings of sub systems are not consistent with the final results of the overall system, with even a sharp contrast. But cultural tourism competitiveness evaluation results are consistent with the real situation. The final results of 8 cities can be divided into 4 categories, as shown in Table 6.

Table 6 The 4 Categories of The 8 Cities.

Categories	Classification standard(the final results)	Area(the 8 cities)
I	≥ 0.9600	Yichang, Shiyan, Enshi
II	0.9400—0.9600	Xiangyang, Jingzhou
III	0.9000—0.9200	Suizhou, Jingmen
IV	≤ 0.9000	Shennongjia

Yichang, Shiyan, Enshi are the top 3, their results are more than 0.9600, and these cities belong to the category of I. Yichang has the strongest competitiveness with obvious comparative advantages. Its result is much higher than the others'. Its contribution capability and development capability rank in the top 3 and its environmental supporting power ranked the 4th. We can affirm that Three Gorges of the Yangtze River and the Three Gorges Dam have brought lots of benefits for Yichang, and Yichang has remarkable achievements in developing cultural tourism resources and its receiving tourist capability. Relatively speaking, the indicator of the ecological environment of Yichang has a relatively low score due to the score of the quality of air. Shiyan's contribution capability, development capability and supporting capability all rank in the top3. The indicator of evaluation of economy environment relatively has a relatively low score. Shiyan should contain the excessive price growth and boost the investment. Enshi is the 3rd place. Its score is almost the same as Shiyan's. Its contribution capability and development capability results have outstanding performances. But its economy environment and traffic environment results rank the 7th. We can get that Enshi has to increase investment, contain the excessive price growth, and improve their transport facilities.

Xiangyang and Jingzhou belong to II. Xiangyang's supporting capability ranks 1st, while its contribution capability and development capability respectively rank 4th and 5th. Xiangyang should maintain its comparative advantage of traffic environment and its publicity capability. And Xiangyang needs to enhance its tourist reception capacity. Jingzhou is in the 5th place. Most of its evaluation results are in the lower middle position, but 4 sub indicators rank in top 3, i.e., cultural resources, economy environment, traffic environment and ecological environment. Jingzhou should deeply develop the scenic resources and improve the quality and increase the quantity of the tourism festivals.

Suizhou and Jingmen belong to III. Suizhou's score of economy environment rank 1st, but the other indicators' scores are generally low. The most important thing for Suizhou is to explore the connotation of Emperor Yan culture and other precious cultural resources and to build a batch of large scale tourist scenic areas. It is also important to strengthen the tourist reception capability and enhance the publicity. Jingmen is in the 7th place. We can get that Jingmen needs to upgrade the tourism infrastructure construction, improve the tourism comprehensive environment, and focus on the development of characteristic agricultural tourism.

Shennongjia's evaluation results rank at the end. Shennongjia has a high quality of ecological resources, which is suitable for developing outdoor, adventure and other special tourism. But it is not appropriate to develop large-scale modern artificial landscape. Shennongjia should accelerate the traffic infrastructure construction to improve the traffic environment and promote the reception facility to meet the tourism demand.

The Catastrophe Progression Method (CPM) is used to evaluate the cultural tourism competitiveness of the 8 cities in western Hubei eco-cultural tourism circle. It can remedy the disadvantages of the static assessment methods, reduce the subjectivity of weight assignment and avoid the uncertainty of subjective judgment. However, this method can only deal with problem with no more than 4 control variables. So it is inevitable to make some induction and division in setting the indicator system. In this paper, some indicators can only be replaced or cancelled due to the difficulty of obtaining data. Therefore, the evaluation results are influenced and we hope there will be improvement in the future.

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Empirical Study on Interactive Development Between Manufacturing and Logistics Industry in Hubei Province of China

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Abstract: This article designates manufacturing and the interactive development in logistics industry in Hubei province as the object of study, and finds out that there isn't an interactive development relationship for promoting and influencing each other between manufacturing and logistics industry at the moment in Hubei by means of quantitative and qualitative analysis on the current condition of the interaction. And then it puts forward that government ought to strengthen the guidance and create a good management environment for the interactive development by taking measures like developing relevant encouraging policies, and industry organizations should fully play their important role in various aspects, including standardizing market competition order, strengthening industry self-discipline, introducing logistics technology and so on. Moreover, manufacturers should separate off logistics business by means of integrating and optimizing business processes, and logistics enterprises need to have an insight into manufacturing supply chain model and improve the ability of logistics services to strongly promote the development of manufacturing.

Key words: Manufacturing industry; Logistics industry; Interactive development; Empirical study

1 Introduction

Logistics is an important means to enhance the core competitiveness of manufacturing enterprise, and manufacturing lays the basis for development demand of the logistics industry at the same time. The state council has put forward many requirements in "adjustment and revitalization plan of logistics", including actively expanding market demand for logistics, vigorously promoting logistics socialization and specialization, pushing the interactive development between logistics enterprises and manufacturing enterprises, and boosting an organic combination throughout the supply chain.

Thanks to the outstanding regional advantages in transportation, the logistics industry in Hubei province has an extremely important strategic position in the national development. It is necessary to attach more strategic significance to the development of logistics industry to turn Hubei into an important strategic fulcrum aiming at promoting the abrupt rise of mid area. However, the logistics industry in Hubei still has a long way to go. In order to promote the leap-forward development of logistics industry throughout the province, the logistics need to build an interactive development relationship with manufacturing industry and boost an organic combination of each link of the supply chain as well as strengthen the infrastructure construction for logistics and create a good business environment, which is of great significance for the adjustment and optimization of industrial structure and the shift of economic growth mode.

Until now, the theoretical research on relationship between manufacturing and logistics industry has been relatively mature, and the interactive development between the two industries has also been well studied. However, most of the literature put emphasis upon the necessity of the interaction between them and the major problems existing in the interactive development at present in our country. The empirical study on the interactive development between manufacturing and logistics industry is quite rare, and it remains a blank as for the research on the interactive development between the two industries in Hubei province. This article designates Hubei province as the object of study and proposes corresponding countermeasures and suggestions by means of quantitative and qualitative analysis on the interaction between the two industries, which is of certain originality.

2 Analysis on the Current Condition of the Interactive development Between Manufacturing and Logistics Industry in Hubei Province

2.1 The current condition of the interactive development between the two industries in Hubei province

2.1.1 Government attaches great importance to the interactive development between the two industries

The interactive development project between manufacturing and logistics industry has been

designated as one of the key projects during the 12th five-year plan period. The government will encourage large-sized and medium-sized enterprises, especially the state-owned ones, to integrate and optimize the business processes, separate off the logistics assets and business and make innovation in the logistics management pattern. In addition, government will speed up the transformation from the traditional transportation, warehousing and freight forwarding enterprises to modern logistics enterprises to improve the capacity and the level of the service for manufacturing industry offered by the logistics. Government will also fasten the construction of the information sharing mechanism of logistics and promote the process of the interaction between the two industries with informatization. Moreover, the government intends to formulate relevant policies and organize and carry out a number of demonstration projects and key items to promote the organic combination and the interactive development between modern manufacturing and logistics industry.

2.1.2 The logistics business still deals predominantly with self-support trading in the large-sized and medium-sized provincial enterprises, while there is a relatively low proportion of outsourcing business (Ran Baosong, 2012)

The manufacturing industry is the foundation and support for the productive service industry and can create space of demand for it. According to relevant materials, however, the power of manufacturing industry for driving up the productive service industry development is inadequate, which can be confirmed from the fact that the proportion of provincial three industries is 13.6 percent, 49.1 percent and 37.3 percent respectively in 2010 with quite an obvious feature that the economic growth relies mainly on secondary industry. Moreover, the ratio of logistics outsourcing is less than 15 percent in manufacturing enterprises in Hubei. With a few exceptions that many car-manufacturing companies like DPCA choose the logistics outsourcing, the majority of large enterprises, including WISCO, Wuhan tobacco group, Huaxin Cement Company, Yihua group, Jingmen petrochemical company, provincial energy group and so on, are engaged in self-support logistics.

2.1.3 The level of logistics outsourcing is quite low in manufacturing industry

Among manufacturing enterprises choosing logistics outsourcing, the majority have confined themselves merely to outsourcing the basic logistics services such as transportation, warehousing and so on, while manufacturing enterprises remain dominant in operation and management of logistics, which makes transporting and warehousing enterprises just follow their requirements to provide logistics services. Meanwhile, the lack of platform for information communication and exchange among manufacturing enterprises and transporting and warehousing enterprises has caused many problems. On the one hand, it prevents the links from closely locking into each other so that the logistics resources can't be well integrated with a low utilization rate. Moreover, they tend to shirk responsibility to each other when anything goes wrong, which results in poor operation efficiency in integral logistics. On the other hand, it makes it even harder for manufacturing enterprises to manage logistics suppliers.

2.2 The main restrictive factors for the interactive development

2.2.1 The fact that the manufacturing industry deals predominantly with self-support logistics leads to the insufficient social demand of Third Party Logistics

It is widely recognized that manufacturers should focus on their core business and outsource the non-core services. From the perspective of logistics operation model in Hubei, however, there are many limiting factors on outsourcing as follows. Perception is one of the factors. The leaders in a number of manufacturing enterprises equate logistics with the basic steps like transportation and warehousing and invest little in logistics as a result of the lack of knowledge about the modern logistics. Even though some manufacturers' leaders have recognized that logistics is "the third profit resource", they still reject the socialized logistics mode. Another factor is management system. Specialized logistics management department is normally not available within a great many manufacturing enterprises resulting from the influence of enterprise management model. Since the raw materials purchase, production, product sales, accessories and other services are respectively managed by purchasing department, production department, sales department and after-sale service department, logistics enterprises need to communicate with multiple departments if they introduce the third party logistics, facing the high difficulty of coordination and the difficulty in accurately calculating the cost. The last factor is the high cost of quitting self-support logistics. As the large-sized manufacturers, especially the state-owned ones, have built their own logistics system by investing heavily in the construction of logistics facilities and equipments and placing many employees there, logistics outsourcing may mean the sale of assets and relocation of workers and can cause significant changes in the management structure of the company. And then it may create a series of operating risks and make the cost of quitting self-support logistics high (Liu Wen, 2011).

2.2.2 The ability of logistics service needs to be further strengthened

In recent years, the logistics industry in Hubei has presented a state of developing quickly, and the logistics industry scale has been continually improved. From an overall perspective, however, the ability of logistics service remains weak in several ways as follows. Firstly, the logistics service level is relatively low with a lack of innovation capacity. Take the highway freight as an example. The majority of logistics enterprises just provide the simple transport services according to customers' requirements, while there are significant inadequacies in many aspects such as making special transport plans for customers, selecting rational vehicle, optimizing routes and so on. Secondly, there are few integrated logistics enterprises that can offer full one-stop service. For the moment, the majority of third party logistics enterprises are the transportation-based and warehousing-based ones on the logistics market in Hubei, most of which even just can be called freight transport enterprise or a warehouse. The last shortcoming is the general low management level and informatization degree among logistics enterprises due to many factors like operation philosophy and shortage of funds (Li Jingyu, Jia Jinzhu, 2009).

2.2.3 The interaction mechanism is unsound

The unsound interaction mechanism shows up in many aspects. First of all, the distribution of interests is unfair. Since manufacturer, who is always in dominant and strong position in the cooperation and considers problems or treats the cooperation primarily from its own point of view, tends to maximize its own interests and drive hard bargains, the profit margins that logistics enterprises deserve are reduced, which seriously restricts the development of logistics enterprises. The second performance is the weak credit consciousness. For the moment, many logistics enterprises lack integrity, and various problems often take place in these companies such as absconding with the funds, offering services inadequately and so on. As a result, a great many manufacturers refuse to outsource logistics or outsource the entirety of logistics to avoid being controlled by others or just in fear of the information leakage, which then restricts the interactive development between the two industries. Finally, there is a lack of logistics service standard. Currently, the logistics service standardization evaluation system has not been established in our country, which seriously affects the normative and ordered development of logistics and makes it difficult to coordinate the various benefit relationships between upstream and downstream enterprises. And then the interactive development between the two industries is restricted to some extent.

3 Empirical Study on the Interaction Relationship Between Manufacturing and Logistics Industry

3.1 Variables selection and data description

This paper intends to adopt the Granger Causality Test to conduct empirical research on the interactive development relationship between manufacturing and logistics industry in Hubei province, aiming at finding out whether there is a sustainable long-term development relationship between them and whether this relationship is the interaction relationship for influencing and promoting each other.

In the econometric analysis, this article chooses the value added as the output indicator to evaluate the development of manufacturing and logistics industry in Hubei. Since manufacturing is the main part of industry in Hubei, the article replaces value added in manufacturing with industrial value added to reflect the development level of manufacturing, taking the availability of data into consideration. Besides, IND and LOG are used to respectively represent the time series in the value added indicators of industry and logistics. Because of the heteroscedasticity in time series, logarithmic form is applied here for the data transformation to steady the variance of time series and reduce the series volatility, and the series trend will remain at the same time. Therefore, natural logarithm of the time series data on IND and LOG is taken, and the natural logarithm treated indicators are denoted by LIND and LLOG. The selected statistical data is from the statistical yearbooks over the years of Hubei province or collated from the network data, as shown in Table 1.

Table 1 Data on Value Added in Industry and Logistics from 2001 to 2010 in Hubei

Year	IND(100 million Yuan)	LOGI(100 million Yuan)
2001	1072.8	316.58
2002	1170.5	347.84
2003	1364.8	384.65
2004	1664.7	460.9
2005	2007.21	365.71

2006	2392.22	425.37
2007	3262.36	479.92
2008	3842.33	584.19
2009	4742.23	642.72
2010	6136.51	748.91

3.2 Co-integration analysis

According to the co-integration theory and method put forward by Granger, even though some economic variables themselves are non-stationary series, their linear combination may be stationary, which is called as co-integration equation and can be interpreted as the long-term stable equilibrium relationship among the variables. This paper adopts the Granger Causality Test to conduct co-integration analysis on the time series in the value added indicators of manufacturing and logistics industry in Hubei, aiming at finding out whether there is a co-integration relation between them. On the basis of co-integration test ideas, the paper conducts stationarity test on the variables applying ADF co-integration test method first. If the two variables pass the stationarity test or are integrated of the same order, which means that they meet the condition of co-integration test, the ordinary least squares method will be applied to establish the regression equation. And then the paper will take the stationarity test on residual series of the regression model to make sure the regression equation setting is reasonable when the residual series is stationary, which shows that there is a stable equilibrium relationship between manufacturing and logistics industry in Hubei.

3.2.1 Stationarity test

Since unit root test is the standard method of conducting stationarity test, the ADF test (Augmented Dickey-Fuller test) will be applied in the paper. With regard to the choice of test form, the series curve is adopted for the judgment on whether the test model contains constant term and time trend term, and correlation coefficient between variables is used here for the definition of lag phase.

(1) Stationarity test on the time series IND

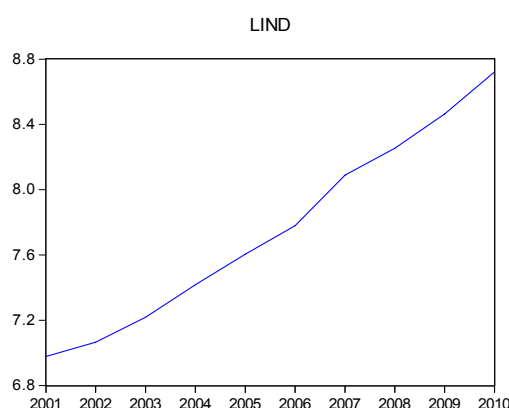


Figure 1 Sequence Diagram of LIND

It can be seen from the Table 2 that the value of t test statistic is -2.152380, which is greater than the critical value of -3.590496 at 10% significance level. Then we can conclude that the null hypothesis that the series has a unit root can be accepted at 90% confidence level, which means that the series LIND is non-stationary in an indication that the variable of value added in manufacturing of Hubei is a non-stationary time sequence.

Table 2 The Result of ADF Test on Series LIND

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.152380	0.4502
Test critical values: 1% level	-5.835186	
5% level	-4.246503	
10% level	-3.590496	

Next, it needs to be confirmed that whether the non-stationary time series is integrated series by conducting unit foot test on its difference sequence. Let the first-order difference sequence and the second-order one of LIND be marked as DLIND and DDLIND respectively, the curves of which are drawn as shown in Figure 2 and Figure 3.

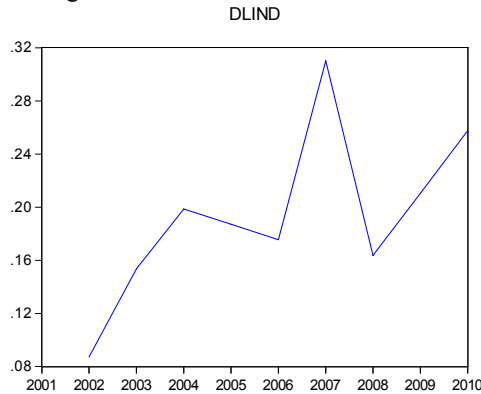


Figure 2 The First-Order Difference Sequence Diagram of LIND

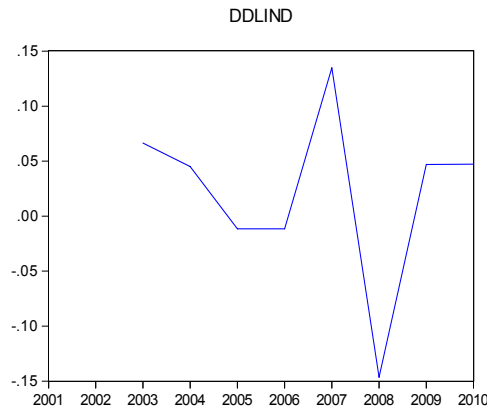


Figure 3 The Second-Order Difference Sequence Diagram of LIND

The results of unit foot test on the first-order difference sequence and the second-order one of LIND are shown in the following tables.

Table 3 The Result of ADF Test on Series DLIND

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.690384	0.2742
Test critical values:		
1% level	-6.292057	
5% level	-4.450425	
10% level	-3.701534	

Table 4 The Result of ADF Test on Series DDLIND

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.013111	0.0432
Test critical values:		
1% level	-7.006336	
5% level	-4.773194	
10% level	-3.877714	

It can be seen from the table 3 that the value of t test statistic is -2.690384, which is still greater

than the critical value of -3.701534 at 10% significance level. Then it can be concluded that the null hypothesis that the series has a unit root can be accepted, which means that the series DLIND is non-stationary either. According to the table 4, the non-stationary sequence LIND becomes stationary after the second-order difference, which shows that the value added series LIND in manufacturing of Hubei is integrated of order 2 with a label of I(2).

(2) Stationarity test on the time series LLOGI

The unit foot test is conducted on the value added series LLOGI in logistics of Hubei with the same method, the results of which are shown in Table 5, Table 6 and Table 7.

Table 5 The Result of ADF Test on Series LLOGI

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.133900	0.8496
Test critical values: 1% level	-5.835186	
5% level	-4.246503	
10% level	-3.590496	

Table 6 The Result of ADF Test on Series DLLOGI

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.839949	0.5912
Test critical values: 1% level	-6.292057	
5% level	-4.450425	
10% level	-3.701534	

Table 7 The Result of ADF Test on Series DDLLOGI

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.494367	0.0226
Test critical values: 1% level	-3.007406	
5% level	-2.021193	
10% level	-1.597291	

It can be seen from the test results that the non-stationary sequence LLOGI becomes stationary after the second-order difference, which shows that the sequence LLOGI is also integrated of order 2 with a label of I(2).

Considering that the original sequences LIND and LLOGI are non-stationary, and both of them become stationary after the second-order difference in an indication that they are integrated of order 2, we can conclude that the two value added time series in industry and logistics of Hubei meet the precondition of co-integration test. And then the co-integration test will be carried out on the two sequences to make sure whether there is a stable long-term co-integration relation between manufacturing and logistics industry in Hubei.

3.2.2 Co-integration test

(1) Establish the regression equation with the ordinary least squares method

Table 8 The Result of the OLS Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIND	0.439861	0.054171	8.119855	0.0000
C	2.714717	0.421487	6.440805	0.0002
R-squared	0.891793	Mean dependent var		6.127781
Adjusted R-squared	0.878267	S.D. dependent var		0.282195
S.E. of regression	0.098459	Akaike info criterion		-1.621503
Sum squared resid	0.077553	Schwarz criterion		-1.560986
Log likelihood	10.10752	Hannan-Quinn criter.		-1.687890
F-statistic	65.93204	Durbin-Watson stat		1.729607
Prob(F-statistic)	0.000039			

A regression model is built between the two variables LIND and LLOGI with the ordinary least squares method, taking LIND as the independent variable and LLOGI as the dependent variable. The estimated result of the regression model is shown in Table 8.

The regression equation is:

$$LLOGI = 2.71 + 0.44LIND \tag{1}$$

The test result of the regression model shows that both the coefficient of determination and adjusted coefficient of determination approach 1 as $R^2 = 0.891793$ and $R^2 = 0.878267$, which indicates that the model works well in the fitting. What's more, the concomitant probability of the F test is 0.000039, which means that the regression equation is highly significant in an indication that the independent variable has a highly significant linear relation with the dependent variable.

(2) Stationarity test on residual series of the regression model

The residual series of the regression model is defined as u , and the values of it are shown in the Figure 4.

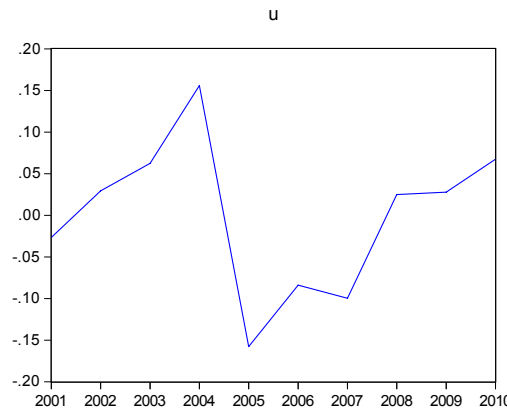


Figure 4 Line Chart of the Residual Series u

The unit root test is conducted on the series u according to the steps of the ADF test with the test result shown in Table 9.

Table 9 The Result of ADF Test on Series u

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.754049	0.0762
Test critical values:		
1% level	-2.886101	
5% level	-1.995865	
10% level	-1.599088	

Since the value of t test statistic is -1.754049, which is less than the critical value of -1.599088 at 10% significance level, it can be concluded that the null hypothesis that the series u has a unit root can be rejected at 10% significance level, which means that the residual series is stationary. According to the test procedure above, the series LIND and LLOGI are found to be co-integrated, which means that there is a stable long-term co-integration relationship between manufacturing and logistics industry in Hubei.

3.2.3 Granger Causality Test

The co-integration test can be used to decide whether the regression equation setting is reasonable, but it can't reflect the interaction relationship between variables. To make sure whether manufacturing and logistics can influence each other in Hubei, the Granger Causality Test will be conducted on LIND and LLOGI. The test result is shown in table 10 with the lag phase $p=1$, while the test result with the lag phase $p=2$ is shown in Table 11.

Table 10 The Result of Granger Causality Test with $p=1$

Null Hypothesis:	Obs	F-Statistic	Prob.
LLOGI does not Granger Cause LIND	9	0.07578	0.7923
LIND does not Granger Cause LLOGI		4.99715	0.0668

Table 11 The Result of Granger Causality Test with p=2

Null Hypothesis:	Obs	F-Statistic	Prob.
LLOGI does not Granger Cause LIND	8	0.21322	0.8193
LIND does not Granger Cause LLOGI		1.20535	0.4129

The results of F test in the two tables above show that the probability of making the type I mistake to reject the null hypothesis that the LLOGI is not the Granger cause of LIND is 0.7923 when $p=1$ and 0.8193 when $p=2$, which demonstrates that the probability that LLOGI isn't the Granger cause is quite large, and the null hypothesis can't be rejected. With regard to the null hypothesis that the LIND is not the Granger cause of LLOGI, the probability of making the type I mistake to reject it is 0.0668 when $p=1$ and 0.4192 when $p=2$, which demonstrates that the probability that LIND is the Granger cause is quite large, and then the LIND is considered as the Granger cause of LLOGI.

In conclusion, the logistics is not the Granger cause of the manufacturing development while the manufacturing is the Granger cause of the logistics development in Hubei according to the test result.

3.3 The conclusion of the empirical analysis

3.3.1 The result of co-integration analysis

According to the result of co-integration analysis on the value added in manufacturing and logistics in Hubei from 2001 to 2010, the manufacturing and logistics in Hubei are found to be co-integrated, which means that there is a stable long-term equilibrium development relationship between the two industries from a long-term development perspective.

3.3.2 The result of Granger Causality Test

According to the result of the Granger Causality Test, the manufacturing is an important factor for promoting the rapid development of logistics industry in Hubei, while the development of the logistics doesn't contribute to the development of manufacturing. Then it can be concluded that there isn't an interactive development relationship for promoting and influencing each other between manufacturing and logistics industry at the moment in Hubei.

4 Countermeasures of Promoting the Interactive development Between Manufacturing and Logistics Industry in Hubei

4.1 Creating a good management environment for the interactive development under the government guidance (Qin Renzhi, Zhang Hongxing, 2011)

1) Government should develop policies on encouraging the interactive development between manufacturing and logistics. For example, the qualified enterprises like WISCO and Wuhan tobacco group should be encouraged to separate off the logistical assets from their main business to establish sole proprietorship or joint venture, and they can also choose to overall transfer it. For the enterprises who transfer their entire property right, the government ought to give preferential treatment to them in terms of fiscal tax. In addition, the qualified enterprises and projects undertaking the program of interactive development between manufacturing and logistics deserve the capital support from government. What else the government can do is to plan and construct logistics land and give support in aspect of the land policy and so on.

2) Government should organize and carry out a number of demonstration projects and experimental units to promote the interactive development. Taking DPCA as the demonstration enterprise, its experience can be summarized and promoted across the large manufacturing enterprises within the province. Something else can be done is to choose a batch of key manufacturing enterprises and logistics enterprises from different industries and areas, such as tobacco company logistics center in Hubei, steel market in Central China, auto logistics center in Shiyan, chemical products logistics park in Jingmen and so on, as pilot enterprises of the interactive development and organize the relevant experts to provide guidance on the integration of the logistics business for manufacturers and the implementation of business process reengineering.

3) The "12th Five-Year Plan" about the development of the modern logistics industry in Hubei province should be fully implemented to promote the sustained, rapid and sound development of the modern logistics industry. According to the results of the empirical analysis, the development of logistics industry in Hubei is not the influencing factor for promoting the development of manufacturing. Therefore, the government ought to vigorously create a policy environment for supporting the development of logistics industry to promote the rational allocation of logistics resources and establish a

modern logistics service system in the province, which consequently can promote industrial upgrading and structural readjustment and increase the potential for economic development in our province.

4) Government should seed up the cultivation and introduction of logistics talents through various forms. For example, the way like the combination of short-term training and long-term training and the combination of formal education and on-site training can be adopted to cultivate the urgently-needed talents for logistics market. Given the advantages of scientific research of universities and colleges in the province, enterprises should be encouraged to cooperate with colleges and scientific research institutions on improving students' practical operation ability through adopting order training mold, jointly working out a talents training scheme and writing fine-designed teaching materials. What's more, it is necessary to strengthen the vocational skill education and carry out the work on job qualification training and certification in the logistics field.

4.2 Providing industry guidance and building an interactive development bridge between the two industries

1) Industry organizations like Hubei Logistics Association and Hubei Federation of logistics and purchasing ought to conduct in-depth research and fully play their important role in various aspects, including standardizing the market competition order, strengthening industry self-discipline, introducing logistics technology, cultivating talents and so on. What's more, they should give assistance to the relevant government departments in improving the industry regulation and services as well as provide references for the government to make and introduce policy of promoting cooperation between the two industries.

2) It is necessary to facilitate information sharing and standard docking between logistics and manufacturing industry. The establishment of logistics public information service platform facing the upstream and downstream customers in manufacturing enterprises and logistics enterprises should get key support, which can realize the real-time data acquisition and promote the establishment of logistics information docking and sharing mechanism. Besides, it is essential to construct and perfect the logistics standard system of manufacturing industry and accelerate the formulation of standards and industry regulations in many fields like logistics information, service process, data code, tools and Instruments, technical equipments and so on.

4.3 Increasing interaction between enterprises to promote the main theme of the interactive development

1) The demand for logistics services can be released through the process reengineering of manufacturing enterprises. Manufacturers can realize the logistics management model innovation by means of integrating and optimizing business processes and separating off logistics business. On the one hand, manufacturers can gradually outsource the integrated part or the whole logistics business to professional logistics enterprises. On the other hand, the logistics department within manufacturing enterprises can conduct independent accounting when conditions are ripe and carry out logistics service to the society.

2) Logistics enterprises need to have an insight into manufacturing supply chain model and improve the ability of logistics services to strongly promote manufacturing development, which is the critical factor to the interactive development between the two industries in Hubei. First of all, logistics enterprises ought to strengthen the service consciousness of the staff. Since logistics belongs to the productive service industry, only when all the links of logistics operation effectively interlock with each other can the quality and efficiency of the service be promised. Thus, every employee in logistics enterprises should have a good sense of service and get to concentrate on the work and serve whole-heartedly. Secondly, they should extend the contents of services according to customers' requirements. The existing traditional logistics enterprises, providing the services like transportation, warehousing and freight forwarding and so on, can speed up the transition to integrated logistics enterprises through making strategic alliances or merger and reorganization with other enterprises to integrate the resources, extend the service contents and spread the service boundary as well as keep promoting the level of integrated services. Thirdly, they can ensure the stability and consistence of logistics services via process and standardization construction. Finally, it is necessary to strengthen the construction of specialization, which is reflected in two aspects of hardware and software. The concrete expressions of the hardware aspect contain the application of professional logistics facilities and equipments, adoption of advanced logistics technology, uniform terminal area facilities with rational planning and so on, while the software aspect is expressed in the forms of corporate cultural construction, mental outlook and services of employees and so on.

3) The mutual trust and deepening of cooperation between manufacturing enterprises and logistics

enterprises is the key to the interactive development. Logistics enterprises can help manufacturers get separated from the complicated basic logistics business via participating fully in the supply chain management of manufacturers, including front-end raw materials purchasing logistics, inventory management, JIT delivery for the production line, product sales logistics, reverse logistics service and so on, which can make the capital and energy of manufacturers able to mostly fall on the core business like new product research and development and product manufacturing. Meanwhile, logistics enterprises themselves should have stable volume of business and never stop the step of self-development in the process of providing services. In a word, only when manufacturing enterprises and logistics enterprises deepen cooperation for mutual benefit, can the interactive development between the two industries be strongly promoted.

5 Conclusion

The interactive development between them has been the general consensus among the industry. As a major province in the centre of China, Hubei province is facing many obstacles in the process of promoting the interactive development between the two industries as follows. On the one hand, manufacturing enterprises have confined themselves merely to outsourcing the basic logistics services such as transportation, warehousing and so on, while they remain dominant in the integrated operation due to many factors like operation perception, enterprise management system, operation system and so on. On the other hand, owing to the insufficient social demand, the development of professional logistics enterprises is restricted, and the logistics service capability needs to be improved. What's more, the imperfect mechanism of the interaction has slowed down the pace of the interactive development between manufacturing and logistics industry, and some enterprises who have carried out the interaction are faced with many problems like the relatively low interaction level. According to the result of the empirical study, manufacturing is the important factor for promoting the rapid development of logistics industry in Hubei, while the development of the logistics doesn't contribute to the development of manufacturing. Therefore, there isn't an interactive development relationship for promoting and influencing each other between manufacturing and logistics industry in Hubei province at the moment.

To improve the level of interactive development between manufacturing and logistics industry in Hubei, all parts, including government, industry organizations and enterprises, should make joint efforts. First, government ought to strengthen the guidance and create a good management environment for the interactive development between the two industries by means of developing relevant encouraging policies, organizing and carrying out a number of demonstration projects and experimental units and speeding up the cultivation and introduction of logistics talents. Secondly, industry organizations should strengthen the guidance and build an interactive development bridge between the two industries by fully playing their important role in various aspects, including standardizing the market competition order, strengthening industry self-discipline, introducing logistics technology, cultivating talents and so on. Finally, manufacturers should separate off logistics business via integrating and optimizing business processes, and logistics enterprises need to have an insight into manufacturing supply chain model and improve the ability of logistics services to strongly promote the development of manufacturing, which is the critical factor to the interactive development between the two industries in Hubei. In a word, only when manufacturing enterprises and logistics enterprises trust each other and deepen cooperation for mutual benefit, can the interactive development between the two industries be strongly promoted.

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Research on Teaching Evaluation of Higher Education Programs Taught in English for International Students: Taking Teaching Practice in Wuhan University of Technology as an Example*

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Abstract: The international students' education programs in China are popular currently. Those students from different countries and backgrounds come there to study together, and they have to overcome the difficulties in languages, religions and cultures, while our teachers also face the difficulties in teaching higher courses in English and in international thoughts, the new international education market brings us both the challenge and the opportunity. But how to satisfy those international students in their education programs, this paper aims to explore a teaching evaluation system of international students' education program taught in English, and find out the typical problems and feasible solutions by taking an empirical analysis on the teaching practice for international students in Wuhan University of Technology.

Key words: International students; Higher programs in English; Teaching evaluation

1 Introduction

As China's comprehensive national strength and international status was improved, the process of the internationalization of higher education is accelerating and the quality of talents' cultivation is significantly enhanced. The international students' education in China is becoming more and more popular. According to statistic data, in 2012, there are some 328, 330 international students from about 200 countries and regions distributed in 31 provinces, autonomous regions and municipalities, directly under 690 universities, research institutes and other educational organizations^[1]. In 2010, the Ministry of Education launched "Study in China program", aiming at making up to 500,000 international students study in China, and making China one of Asia's largest destination for international student education in the year of 2020^[2].

However, international students not only come from continents and countries, but also have different backgrounds in races, languages, religions, educational systems, and cultures. Theirs coming to China presents new challenges to our traditional teaching modes and teaching organization forms, and has put forward higher requirements for the teachers in language, communication, higherism organizational skills, teaching methods, and teaching resources; Nevertheless, theirs coming has played a positive role in promoting the process of the internationalization of China's higher education as well.

This study aims to explore the evaluation system of international students' education program taught in English, to find out the typical problems and feasible solution, through an empirical analysis on the teaching practice for international students in Wuhan University of Technology.

2 Composition of Teaching Evaluation System for Higher Programs in English

In order to promote the development of international students' education, the Ministry of Education, Ministry of Foreign Affairs Ministry of Public Security issued "Institutions of Higher Education To Accept Foreign Students' Management Regulations", in 2000, and cleared the management system of international students teaching, for example, giving advice on using bilingual education to meet the requirements of internationalization. In order to greatly promote the development of international students' education, colleges and universities have carried out Taught in English mode, which is feasible and necessary^[3].

In order to continuously improve the quality of international students' education and enhance the educational value of international students, many institutions of higher education have established evaluation index and system of teaching effectiveness, by using evaluation methods systematically and regularly to give feedback on the educational quality and effectiveness.

Evaluation index system of teaching quality evaluation is the premise and basis, which decides the orientation towards which teachers and students make efforts. In order to improve its scientific nature

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rationality and authenticity, many experts and scholars devoted themselves to the research of evaluation index system. The evaluation index system of teaching effectiveness which exists in domestic colleges and universities is substantially the same basic elements mainly constituted by five aspects: the teaching attitude, teaching method, teaching content, teaching ability, teaching effectiveness, and the refinement of secondary indicators were set up on the basis of primary indexes (see Table 1). In recent years, some experts and scholars have been concerned about the personality characteristics of teachers, the higherism of curriculum, the academic of teaching and other indicators, especially some personalized indicators, such as: charisma, teaching style, higher practice, higher innovation, academic achievements etc. As Rice has put out it three forms of knowledge which runs through the process of teaching, namely: summary knowledge, pedagogical knowledge and pedagogical content knowledge^[3]. In addition, some experts believe that we need multi--dimensional trade-offs while evaluating the university teachers' teaching. As British scholar Trigwell and others consider that the evaluation consists of four dimensions, namely: knowledge, reflection, communication and concepts^[4]. Based on the relevant literature, this indicator is set up in accordance with foreign experience, on the basis of the general principles of national evaluation of teaching effectiveness, in combination with the common indicators, teaching evaluation effectiveness of international students and personality characteristics of teachers. Evaluation of the research is set as table 1 below.

Table 1 Teaching Effectiveness Index System

First grade assessment indicator	Second grade assessment indicator
Teaching level (X_1)	English (X_{11})
	Qualifications (X_{12})
	Teaching life(X_{13})
Teaching attitude (X_2)	teaching inputs(X_{21})
	Racial Discrimination(X_{22})
	The degree of attention (X_{23})
Teaching content (X_3)	textbook sources (X_{31})
	Curriculum (X_{32})
	Higher Practice (X_{33})
Teaching methods (X_4)	teaching methods (X_{41})
	Classroom interaction (X_{42})
	Evaluation (X_{43})
Teacher-student relationship (X_5)	AC frequency(X_{51})
	Communication(X_{52})
	Teacher-student relationship (X_{53})

The basic meanings of each indicator:

For the primary indicators, there are five aspects: teaching level, teaching attitude, teaching content, teaching methods and teacher-student relationships, specifically:

(1) Teaching level (X_1): the higher level of English (at least, be fluent in English and with accurate pronunciation to meet the communication needs between teachers and students in classroom); a certain level of expertise, enough knowledge reserves to qualify teacher, be well--matched in qualifications and teaching duties; having taught international students for a certain amount of time and with educational experience of teaching international students.

(2) Teaching attitude (X_2): rigorous scholarship, serious preparation, correcting homework carefully, earnest counseling; treating students equally, no racial discrimination; paying attention to all students' study and personal development, and being fully responsible for helping students to adapt to study and life so that every student learn something.

(3) Teaching content (X_3): choosing appropriate teaching materials in line with international standards, especially novel content; improving the knowledge system; making curriculum system more reasonable, highlighting the emphasis and difficulties; setting up practical courses appropriately, providing more practice opportunities, developing the ability to combine the theory with practice.

(4) Teaching methods (X_4): teaching in the right way, having Heuristic, focusing on developing abilities in various aspects; having classroom activities and teacher-student interactions, creating strong

atmosphere of students' participation in discussions; obtaining good teaching effect that students can master the basic teaching materials after lectures; grasping the emphasis and difficulties of courses, enhancing students' ability of analyzing and solving problems.

(5) Teacher-student relationship (X_5): frequently exchanges between teachers and students, assessing the international students' minds and living conditions in time, giving students guidance in their study and life in a timely manner; choosing the appropriate way to communicate with students; building up harmonious relationships between mentors and students so that students will have a favorable impression on their mentors and are willing to exchange words.

3 Empirical Study: Taking Teaching Practice of International Students in Wuhan University of Technology as an Example

3.1 Overview of International Students in Wuhan University of Technology

Wuhan University of Technology is not only one of China's first universities receiving international students which started in 1952, but also one of the colleges that have Chinese Government Scholarship for outstanding international students. As of November 2011, the school has trained more than 1,600 students from more than 100 countries, more than 1,000 students of whom have graduated successfully. Moreover an all-round, multi-level and wide-ranging education pattern has been initially built up.

Wuhan University of Technology has 20 faculties, 79 professions for undergraduates, 138 professions for graduates, and 68 professions for doctoral students.

3.2 Teaching Effectiveness Analysis

In this study, through a small range of expert interviews combining the actual situation of Wuhan University of Technology with research purposes, a survey for international students was conducted. All data were processed, with the help of SPSS 13.0 software package and EXCEL processing. Data analysis results are shown below.

3.2.1 Teaching Level(X_1)

The evaluation of teaching effectiveness mainly contains three aspects, the English level of international students' teachers, their qualifications and teaching life. From the survey data, 36% teachers' English is splendid; 28% teachers' English is very well, 29% teachers' English reaches fluency level. In the part of teachers' qualifications, 100% teachers have a master's degree or above, including 78.6% teachers with a doctorate degree or above. The teachers involved in research have taught international students for an average of six years, indicating that their teaching experience is rich. From three perspectives to make comprehensive comparisons and analysis on teachers' teaching, we can see that international students' teachers in Wuhan University of Technology are equipped with extensive experience and high teaching level.

3.2.2 Teaching Attitude(X_2)

The data from the survey of teachers' teaching attitude shows that more than two fifths international students think that our school teachers pay more attention to them compared with their former teachers, and more than a quarter believe they get the same degree of attention as their former teachers, while about 29% think that is even worse than their own. In the aspect of domestic workload for preparing lessons, 57% teachers made four times efforts, 22% teachers made three times compared to the undergraduate teaching, indicating that the teachers devote more to international students' education and make more adequate preparation. In addition, 99.7% respondents believe that they are treated equally; there is almost no racial discrimination. Based on the above data, it's clear that our school's teachers teach international students with positive attitude, and in a very responsible way.

3.2.3 Teaching Content(X_3)

Teaching content is an important indicator of the evaluation of teaching effectiveness which is made up of three secondary indicators, namely: material sources, curriculum organization, and higher practice. Thereinto, Curriculum consists of curriculum structure and course difficulty.

As can be seen from the Figure1, the way that international students get their teaching materials is various. However, 59% students purchase through school, indicating that students need unified teaching material, which encourage the school to unify customization or purchase materials. As we can see in Figure2, most students use materials written by other countries or schools, of which more than 50% students use foreign materials, rarely using textbooks written by our school. In order to enhance teaching effectiveness in students' education, attention should be paid to material unity.

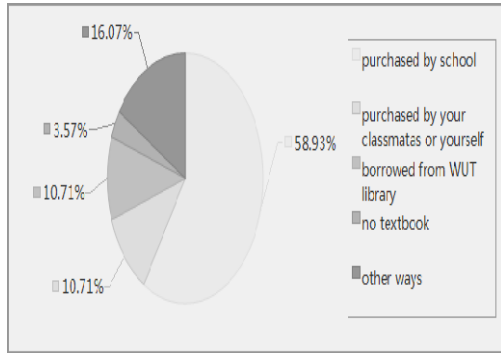


Figure 1 Channels to Get Materials

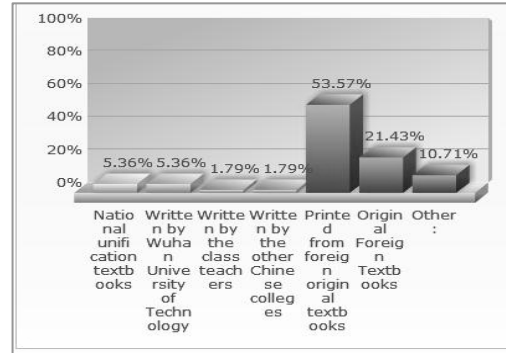


Figure 2 Materials' Written Agency

Table 2 Curriculum

	Very reasonable	reasonable	general	unreasonable	Very unreasonable
Course Structure	12.5%	60.71%	21.43%	3.57%	1.79%
Course difficulties	5.36%	26.79%	62.5%	3.79%	1.79%

As can be seen from the table 2, over 72% respondents believe that course structure is reasonable; 62.5% think that course has general difficulty, explaining that the structure is rational, while the difficulty of the course needs improving.

In addition, data from the survey shows that 76.79% students believe that practice is of great importance and more than 98% think that is very critical, implying that more attention needs to be paid to practical aspects in international students' education program. However, 75% international students think that they were provided with few opportunities to practice. So increasing the proportion of practice should be taken into consideration in international students' education.

3.2.4 Teaching Methods(X₄)

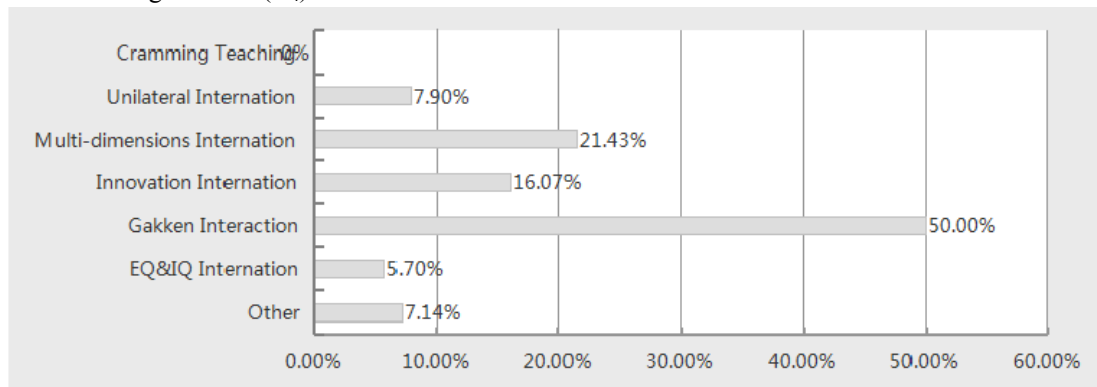


Figure 3 Teaching Methods

As can be seen from figure 3, the choice of this question is rather dispersed, half of which is Gakken interaction, while no people choose cramming teaching. Judging from the selection, all choices are relevant to interaction between the teachers and students, indicating that students prefer interactive teaching, hoping to melt into the classroom and making more exchanges with teachers.

3.2.5 The Teacher-student Relationship(X₅)

From Figure 4, it can be seen that 39.29% students regularly communicate with their teachers, 50% occasionally exchanges, only 10.71% seldom exchanges. This shows that communication between teacher and student is relatively frequently, but still needs to be strengthened.

Figure 5 shows that the process of international students' education, teachers and students communicate with each other mainly by face to face communication and e-mail exchanges, respectively 51.79% and 28.57%, so the teachers' English is demanding, including oral and written skills.

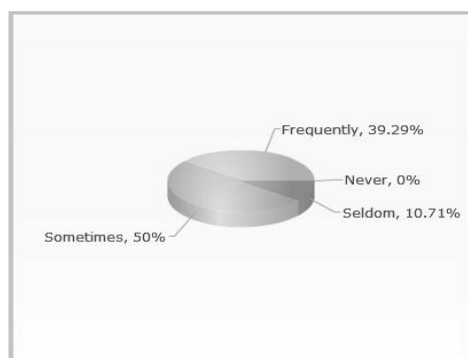


Figure 4 Communication frequency

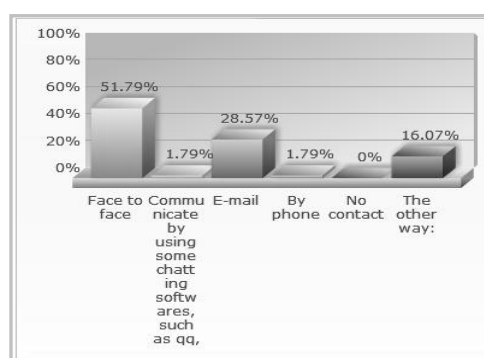


Figure 5 Communication Means

In addition, 78.6% teachers expressed their willingness to establish good relationships with students, expecting to help them in their study and guide them in their daily lives so that they would not feel alone in a foreign country.

3.3 Problem Analysis

As can be seen from the international students' survey, 60.71% students think barriers still exist in communicating with their teachers, while 37.5% students argue that pressure comes from learning communication. Language barriers occurred mainly due to different accents. The results of the survey show that cultural differences still exist, but the teachers' reaction is greater than the students; In teaching methods, students agree with heuristic teaching. However, some teachers still continued the traditional teaching way, which indicates that the teachers and students have some divergences on teaching methods, so there is a need to improve promptly. In the survey, only 10.71% students get a lot of practice, while 76.79% believe that practice is very important. Besides, from the international students' Taught in English curriculum assessment form in Wuhan University of Technology, we can see the practice is not attached enough importance to, indicating that the assessment method needs to be further optimized to make it more reasonable. In the selection of textbooks, in Wuhan University of Technology, 75% international students are using foreign materials, which is a big challenge to teachers, because teachers must improve the understanding of foreign knowledge so as to fully highlight the advantages of using foreign materials.

4 Conclusion

Through surveys and interviews on international students and teachers, our school's Taught in English mode is relatively good, reflected in the higher levels of teachers' English, having access to large numbers of teachers who have higher qualifications with the experience of studying abroad or being visiting scholars and rich teaching experience; Students think our school has good teaching effectiveness, there are many teacher-student interactions and students establish very harmonious relationships with their mentors. However, there are still some problems in our school's Taught in English mode, manifested in the curriculum beneath reasonable, less practical course; teaching content not rich enough to fully arouse students' interests. Our school still needs to further improve international students' education.

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Study on Simulation Model for University Mass Events*

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Abstract: University mass events drag more and more attention from society. The characteristics, influential factors and the warning system function are summarized and elaborated for University mass events. Based on the idea of parallel computing, introducing the concept of the immune system, the simulation model of the mass events warning is built, including simulation, the mapping, simulation steps, parameters and hypothesis. These make for the comprehensive scientific understanding of the evolution mechanism of University mass incidents and better realizing the early warning.

Key words: University Mass Events; Immunology; Early Warning; Simulation; Agent

1 Introduction

It is indicated in the blue book of 2012 from Chinese Academy of Social Sciences that the unsteady and uncertain factors of the social environment of the international economic have been standing out, and that China is still facing various problems and challenges concerning employment, labor relationship, division of income and social management. For the past few years, the number of mass events resulted from various social contradictions has reached ten thousand even a hundred thousand. The crisis of public opinions, security incidents and the like, all of which have shocked us. As statistics shows, the number of undergraduates, which shows a growth trend year by year, has reached more than 20 million. As an important part of the society, being situated in the multivariate society and faced with complicated and changeable environment, undergraduates are affected by many social problems in all kinds of ways. In recent years, university mass events, including personal safety, personal health, food security, mental injury, school violence, have been seen frequently in newspapers and other media. Every time these occur on campus, they will disturb regular education and life, bringing about heavy casualties and ill social affects.

University mass events refer to events that are influenced by both internal and external factors and dominated by numerous university students, who gather by means of certain contact and organization and adopt the ways of assembly, demonstration, sit-down strike to impose pressure upon the school or other authorities, aiming at expressing their feelings or protect their benefits. Among various factors, some may cause mass events when interacting with each other.

2 Influential Factors of University Mass Events

2.1 Characteristics of university mass events

University mass events being part of public mass events, the particularity of a university decides that these university mass events have not only the overall characters of public ones--suddenness and perniciousness, but also the characteristics of diffusibility, sensibility, subjects' activeness, etc.

2.1.1 Suddenness

Certain matters, which are incidental and result in mass events, are the fuses and sally ports. The time, the extent, the posture and the influence depth of mass events are hard to predict, which means suddenness.

2.1.2 Perniciousness

The property and extent of university mass events will lead to schools' damage and loss in different degrees, and some may even bring about political influences. Besides, easily spreading to other universities in this city or even all over the country, once utilized by people with ulterior motives, the extent and range of perniciousness can be objectively multiplied.

2.1.3 Diffusibility

Universities are places for higher education, the vital town for scientific research theory innovation, and the base for high-level personnel training. It is a place with large aggregation of the crowd.

2.1.4 Sensibility

Belonging to a special group, views of the college students upon the whole world, life and value

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are being established, during which time abilities of thinking rationally and their psychological qualities, especially mentality and capability against mass events, are too weak for them to endure these problems.

2.1.5 Subjects' activeness

As an open cultural organization, universities are in the very front of knowledge and our era. Large quantities of students with extensive knowledge, profound thoughts and sincere passions, are assembling here. They are sensitive in thoughts and active in participation.

2.1.6 Inducing factors' diversity

Inducing factors may range from great affairs related to national sovereignty and dignity, to trivial ones related to personal issues such as food, fees and dormitory management problems. All may develop into university mass events, and some may even result from collective tumult caused by a power cut of the school.

2.1.7 Organization behavior's concealment

With the rapid development of network technologies, college teachers and students can utilize convenient network communication, such as MicroBlog, WeChat, online communities and other channels for transmitting information quickly.

According to the characteristics above, it is necessary to set up a relevant early warning system by simulating and revealing the omens, occurrence, evolution mechanism of university mass events.

2.2 Early Warning System of University Mass Events

Usually, the early warning system of university mass events includes information monitoring, risk assessment, early prevention, early warning signal releasing, emergency preplan starting, early warning signal removing or emergency disposing, etc. Basic functions of the early warning system of university mass events are as follows.

2.2.1 Information monitoring

The early warning system can provide successive and automatic monitoring for mass events and record irregular monitoring results. It will institute an array of systemic statistical data by long-term monitoring and recording upon various data and information.

2.2.2 Risk assessment

The early warning system being a multivariate and omnibearing information collecting system, conclusions could be inferred and problems could be solved by analyzing and summarizing statistical data, accumulating experience in administration, eliminating false information, sieving out and analyzing the reality.

2.2.3 Early prevention

Portents of some mass events can be detected by monitoring and analyzing information. And then reduce identification events of emergencies and improve reaction velocity by keeping track of these portents. Even if some are inevitable, it would be better to make preparations for dealing with university mass events according to existing information. Conclusions should be transmitted to the emergency agency of the school through the rapid and efficient emergency mechanism so that the system's function of information providing will take effect.

Currently, it is hard to give a comprehensive response and a precise forecast; nevertheless, simulation models are relatively a fresh and scientific method. When conducting a simulation, indexes reflected in the actual situation should be transformed. Indexes can be refined on the basis of scientificity and pertinence as the Figure below.

Table 1 Parameter Indexes of University Mass Events Simulation

Event	Index	State	
University mass events simulation	Range of influence	Affecting the school order	Affecting the social order
	The number of people involved	Less than 100	More than 100
	Effectiveness of emergency	Invalid	Valid
	Inducing factors	Internal factors	External factors
	Location	Inside the campus	Outside the campus
	Time	Normal period	Sensitive period

3 The Simulation Model of University Mass Events

3.1 The simulation framework

Wang Feiyue et al.^[1] proposed "Artificial Societies--Computational Experiments--Parallel Execution" (ACP method), which was applied to emergency management. It can realize the parallel

evolution of artificial society and real society by using multiple data sensing and assimilation means, and achieve dynamic optimization management and control by conducting computational experiments to test possible future reality, analyzing and evaluating the action plan.

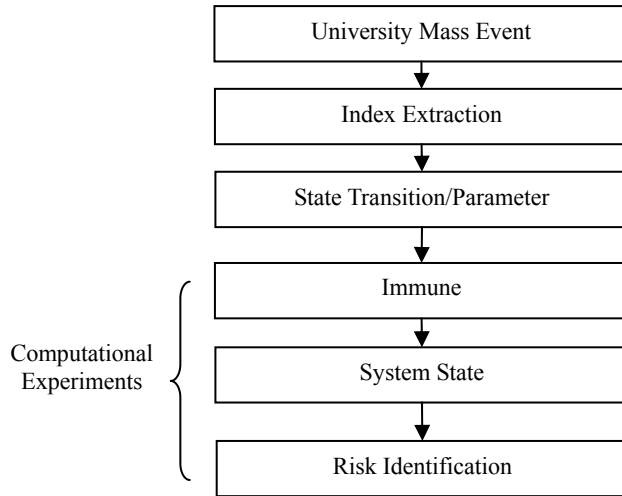


Figure 1 Stimulation Process of University Mass Events

The traditional social scene simulation studies often use complex differential dynamics-- difficult to demonstrate the complex giant system fully, while modeling method based on agent can combine organically the microscopic behavior of individual in complex systems with the overall properties of systems--macroscopic “emergency” by describing the interaction of individuals in complex systems in an agent way, and modeling interaction between individuals and between individual and the environment [2]. There are various forms of intrinsic mechanism in the correlation and causation between elements in the social economic system, presenting various types of complexity, such as time delay, information asymmetry, evolution mechanism, etc. And generally, it will present a complex phenomenon of “emergence” under the influence of nonlinearity and external world [3]. Some scholars have found that the problem faced by natural immune system is very similar with emergency management: the process of defending foreign invasion in the human body’s natural immune system is actually the process of identifying and treating risk constantly [4].

Constructed by de Castro [5], the immune network algorithm (aiNet) is used to simulate the reaction process of immune network defending primary stimulation, mainly including antigen recognition process, affinity maturation and network suppression. Learning from immune algorithm, this study will conduct computational experiments to bring university mass events as antigens into the immune system to react, exploring the characteristics of the response and digging the laws of evolution of university mass events. The computational experiment is a kind of research method to explore emergency management strategies, guided by integrated methodology, combined with computing technology, and then reveal the complexity and the law of evolution of the emergency.

3.2 Simulation Steps of University Mass Event

Dorm in $\delta = \{0,1\}^l$, affinity algorithm is Hamming algorithm [6], the formula is as follows:

$$opt(ab, ag) = \sum_{i=1}^l \delta_i \begin{cases} \delta = 1, ab_i \neq ag_i \\ \delta = 0, otherwise \end{cases} \tag{1}$$

ab refers to antibody, presents emergency measures; *ag* refers to antigen, presents emergency.

Antibody mutation probability formula of each cycle is as follows:

$$p_j = \frac{j}{n} \times \exp\left(\frac{\beta t}{T}\right) \times ab_j \tag{2}$$

P is the probability of No. *j* antibody’s variation, *n* is the total number of antibody, *j/n* links variation scale with the antibody’s ranking in the colony. Antibodies with higher affinity have smaller variation scale, which is good for comprehensive search of better antibodies. Exp (*βt/T*) links evolution algebra with variation scale, thus bigger variation scale is attached to evolution in the initial stage of immune reaction. Then, with the increase of the evolution algebra, variation scale gradually becomes

smaller, which is good for rapid convergence and fine search. β is the control parameter. ab_j is the numerical value of current antibody. The specific steps of simulation are as follows:

Step1: pretreatment of the input data, to transfer mass event information to statistical modeling data.

Step2: initialization of the immune system, the setting of antigen (mass event) scale, randomly generates antibodies and memory unit.

Step3: calculation of affinity, use Hamming distance algorithm.

Step4: colonial selection algorithm. Combination of high frequency variation and multi-point crossover, to clone the individual with higher affinity, and to treat ones with lower affinity in the way of mutation and crossover.

Step5: selection based on memory. To remove the individuals with low affinity, to retain the individuals with high affinity, and tolerance test, and conduct tolerance test.

Step6: to clean up antigen, and update antigen appropriately.

Step7: to reach the termination condition or simulation cycle.

4 The Simulation Test of University Mass Events

Genes are represented by binary string, including Self, antibody R and Non-self, three of them are binary string combination whose length is l . Assuming that all self centralized bit strings are independent with each other, that is each bit string is selected randomly from U . Based on agent modeling, artificial social system simulation is an effective method to solve the complex social system, which conducts parallel evolutionary computation on the Swarm platform. The major simulation parameters of university mass events are the speed of transmission (R), the effect of resistance (D) and the probability of mutation (p). Each individual is an agent in mass events, and each agent has the three parameters above. R represents the probability of the event's effect passing to the next person; D represents the probability of decreasing of people affected by the event; p represents the probability of unconventional process of the event evolution. Simply burst detection from multiple data streams on the network^[7], the interaction of two agents also depends on changes of the three parameters, as shown in Figure2:

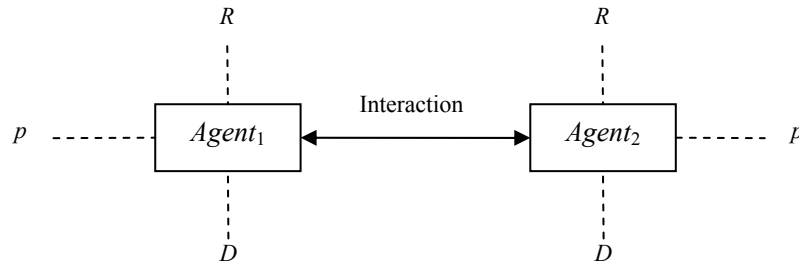


Figure 2 Agent Interaction in University Mass Events

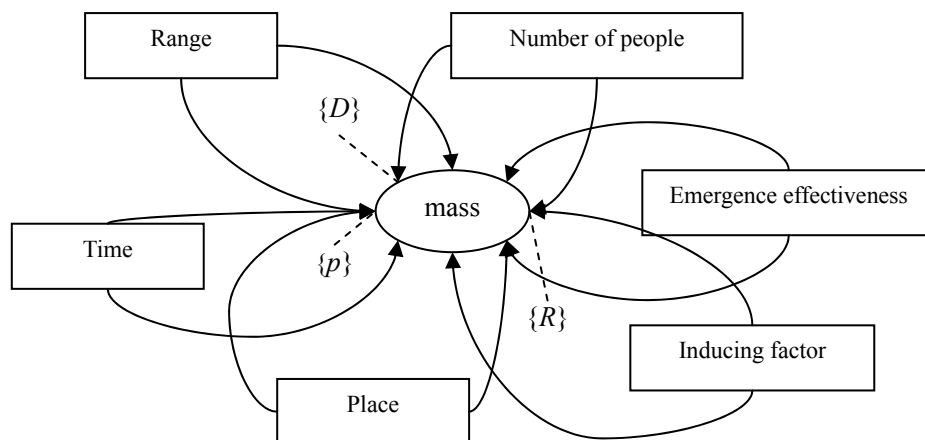


Figure 3 The Relationship of Simulation Parameters in University Mass Events

Based on the interactive mode, changes of parameter and indexes of mass event will be integrated. University mass events has the parameters collection of many Agent: $\{D\}$ 、 $\{R\}$ 、 $\{p\}$, As shown in Figure 3:

As shown in the Figure 3 above, every index has different effect on mass, and every index has a group of impact value (R, D, p). In fact, with the perfection of system, influential parameters will gradually increase, in order to reflect the complex system truly. Simulation parameter hypothesis of university mass events are as follows:

Through simulation parameter hypothesis of university mass events and Comparative analysis of the real event, the real Simulation data are generated, thus achieving further study of university mass event. It is a kind of new exploration for research methods in this field.

Table 2 Simulation Parameter Hypothesis of University Mass Events

Event	Index	State			
Simulation parameter hypothesis of university mass events	Range of influence	Affecting the school order	$R+0.1$, $D+0.1$	Affecting the social order	$R+0.2$, $D-0.1$
	The number of people involved	Less than 100	$R+0.1$	More than 100	$R+0.1$
	Effectiveness of emergency	Invalid	$D-0.1$	Valid	$D+0.1$
	Inducing factor	Internal factors	$p-0.1$	External factors	$P+0.1$
	Location	Inside the campus	$D+0.1$	Outside the campus	$D-0.1$
	Time	Normal period	$R-0.1$	Sensitive period	$R+0.2$, $p+0.2$, $D-0.2$

Note: “+ , -” means plus or minus on the basis of the original parameter values.

5 Conclusion

Study on the university mass events is a long-term work, because the former theoretical studies cannot get certain conclusions through the practical experiments and empirical research. Involving computational experiments and antigen antibody response in immune system, the early warning simulation model is an important subject to improve the function of early warning.

The information of the event is refined and transferred into index and binary string, and then input into a computer system. Through the simulation parameters and parameter hypothesis of university mass event, mass events are brought into the social immune system to react, which is a new research method, and is conducive to a comprehensive and scientific understanding of evolution mechanism of university mass events, achieving early warning more effectively.

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Empirical Analysis of China's Coal Consumption, Carbon Emissions and Economic Output*

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Abstract: China's economic growth depends on the consumption of coal, and the increase in coal consumption is the main cause of the increase in carbon emission. In this paper, we use the classic econometric method, such as cointegration analysis, impulse response function, and the variance decomposition technology to analyze the relationship from the point of view of the demand side. The empirical results for annual data show that there is an existence of the long-term cointegration relationship between the three variables of coal consumption, CO₂ emissions and economic output. Change in coal consumption is Granger reason that led to the changes on the carbon dioxide emissions in short-run. The change in economic output is not the same for the carbon dioxide emissions in short-run, but it has a potentially significant impact in the long-term. The impulse response function and variance decomposition show that the increase in coal consumption in the short-run lead to an increase in carbon dioxide emissions, and has a strong impact on the changes in the growth rate of carbon dioxide emissions. Based on the above empirical findings, this paper presents policy recommendations.

Key words: Coal consumption; Carbon dioxide emissions; Economic output; VEC model

1 Introduction

Coal is the most basic energy source in China and it is given an important strategic role in the economic growth of the country. In accordance with data from the National Bureau of Statistics, coal consumption accounted for 66.4% of the total disposable energy consumption in 2012. As it's abundant in reserves, relatively cheap price and stable supply, coal will continue to be an important component in our primary energy in recent decades. Being in the process of industrialization and urbanization, China's economic growth depends on consuming a large amount of different types of fossil fuels such as coal. Since the use of coal is an important cause of greenhouse gas emissions, in the global carbon emission reduction scenarios, it has great practical significance to study the relationship between the three variables of coal consumption, CO₂ emissions and economic output.

For the research of the relationship between coal consumption, carbon emissions and economic output, the current literature retrieved most focused on studying the relationship between two variables of energy consumption and economic output by using various measurement methods, and on this basis put forward relevant policy recommendations to save energy and reduce emission for different countries or regions. With global warming, the countries pay more attention to the increase in greenhouse gas, mainly carbon dioxide emissions. People gradually realized that it is necessary to put the growing carbon dioxide emissions into the energy consumption model for analysis. For example, James (2012) studied the relationship of energy consumption, pollutant emissions and economic growth in French from 1960 to 2000 by using cointegration and error correction model, and pointed out that economic growth has a significant effect on the increase in energy consumption; Hsiao-Tien Pao (2009) analyzed emission by taking advantage of the grey prediction model; Xing-Ping Zhang (2009) analyzed the causal relationship between these three variables in statistical data during 1960~2007, and argued that either carbon emissions or energy consumption is not the main reason for economic growth, therefore, in the long-run, the energy conservation policies will not harm economic growth; Based on environmental Kuznets curve model, Mohammad Jahangir Alam (2012) analyzed the relationship between the three variables in the Middle East and North Africa countries, he said that energy consumption had a positive effect on carbon dioxide emissions; Li. F. Dong (2011) researched panel data of China during 1985~2007, and argued that the energy consumption elasticity coefficient in eastern of China is two times higher than the western region. In addition, some documents also studied the situation of energy consumption and economic growth in different countries, such as Halicioglu. F

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(2009), Paresh Kumar Narayan (2012), etc.

Above all, the above brief literature review shows that it is useful for empirical study to establish the relationship between the total energy consumption, carbon emissions and economic output. The current characteristics of China's energy consumption are that coal consumption has been in a dominant position in China's total energy consumption and is the basis energy for economic development. Since the coal is one of the highest carbon emissions energy species, it is necessary to study the relationship between coal consumption, carbon dioxide emissions and economic output. Some literature analyzed the relationship between coal consumption, carbon emissions and economic output in China, such as Li (2011), Harry (2012). Because of the different angle of the research, the diversity of variable selection and sample data section, so the conclusions are not consistent. The aim of this paper is to investigate the relationship between China's coal consumption, carbon emissions and economic growth since the reform and opening up.

2 Model Construction and Data Sources

2.1 Construction of economic models

In order to analyze the dynamic relationship between China's coal consumption, carbon dioxide emissions and economic output, we based on the viewpoint of demand to establish the econometric model of relationship between the three variables, as shown in Eq. 1.

$$CO2_t = COAL_t^\alpha GDP_t^\beta \varepsilon_t \quad (1)$$

Where $CO2_t$ is carbon dioxide emissions in the t year, GDP_t represents China's actual economic output in the t year, $COAL_t$ is China's coal consumption, After taking the natural logarithm of Eq., α, β are parameters to be estimated.

2.2 Data sources

The data used in this paper are annual data, and the sample interval is from 1980 to 2011. Carbon dioxide emissions refer to China's total carbon emissions and data derive from the 2012 BP World Energy Statistics Yearbook, in units of one million tons. China's economic output data come from the World Bank, the real GDP in 1995 as the base period were deflated treatment. Coal consumption data stem from the 2012 British BP World Energy Statistics Yearbook, in units of one million tons oil equivalent value. In order to reduce heteroscedasticity and nonstationarity of the data, in the Eq. (1) all variables data are plotted on a logarithmic scale.

3 Empirical Analyses

3.1 Time series properties of variable data

To test for the unit root property of each variable time series, we use two test methods of ADF test and PP test to verify the stationary of time series. Test results of each variable data are shown in table 1. The results show that, the variables in levels are non-stationary series, and after the first order difference they are all stationary series.

Table 1 The Variable Data Time Series Unit Root Tests

Sequence	ADF test			PP test		
	Test value	5% critical value	Whether smooth	Test value	5% critical value	Whether smooth
$\ln(CO2)$	0.1612	-2.9364	no	1.1012	-2.9604	no
$\Delta \ln(CO2)$	-3.0093*	-2.9640	yes	-3.1603*	-2.9640	yes
$\ln(COAL)$	0.6604	-2.9763	no	0.1569	-3.6617	no
$\Delta \ln(COAL)$	-3.9815	-2.9763	yes	-3.3566*	-2.9640	yes
$\ln(GDP)$	0.3673	-2.9640	no	-1.8815	-2.9604	yes
$\Delta \ln(GDP)$	-3.2078	-2.9640	yes	-3.2914*	-2.9640	yes

Note: * indicates significant at the 5% significance level; Δ indicates the first order difference.

3.2 Cointegration and causality tests

After confirming the existence of unit root, the Johansen cointegration test will be performed. The optimum lag suggested by the AIC criterion for Eq. (1) is 2. Table 2 gives results of Johansen cointegration relationship. From table 2, there is at most one cointegrating relationship in Eq. (1). The result suggest that there is a long-run equilibrium relationship among the variables in Eq. (1).

Table 2 The Cointegration Test Results of Eq. (1)

Null hypothesis	haracteristic root	Trace test		Maximum eigenvalue test	
		Trace stat.	Critical Value	$\lambda - \max$ stat.	Critical Value
No cointegration	0.6127	31.7932*	29.7971	27.5068*	21.1316
At most one cointegration	0.1344	4.2864	15.4947	4.1878	14.2646

Eq. (1) corresponds to the cointegration relationship as shown in Eq. (2):

$$Ln(CO2_t) = 0.8372 Ln(COAL_t) + 0.1148 Ln(GDP_t) - 0.7071 + \hat{\epsilon}_t \quad (2)$$

(-47.8461) (-11.2082)

Under the parameter estimation results in Eq. (2), the values in brackets are t-statistical values. The cointegration relationship in Eq. (2) shows that carbon dioxide emissions increased 0.84 units along with coal consumption increased by 1 per unit. And carbon dioxide emissions increased 0.11 units in pace with GDP increased by 1 per unit. This shows that China’s carbon dioxide emissions increase is mainly caused by coal consumption.

Cointegration relationship between variables indicates that in the Eq. (1) at least exists Granger causality in a certain direction. Therefore, in order to further identify the direction of causality, we use vector error correction model, namely VEC model to judge of the causality direction. The causal effect is shown in Table 3.

Table 3 The Causality Test Results Based on VEC Model

Dependent variable	wald χ^2 statistic		
	$\Delta Ln(CO2)$	$\Delta Ln(COAL)$	$\Delta Ln(GDP)$
$\Delta Ln(CO2)$	—	5.6533*	0.5668
$\Delta Ln(COAL)$	3.5825	—	0.6548
$\Delta Ln(GDP)$	0.3175	0.3085	—

Causality relationship in table 3 show that for Eq. (1), the change of coal consumption is the granger cause of changes in carbon dioxide emissions, this shows that the coal consumption in China is a major cause of carbon dioxide emissions.

3.3 Impulse response functions and variance decomposition

3.3.1 Impulse response functions.

According to the modified likelihood ratio test of Sims (1996), we choose the VAR model of lag 3 order. In the impulse response function graph, the horizontal axis represents the time interval, selecting the lag period of 10 units. The vertical axis represents the percentage of change; the dotted line represents the confidence interval of plus or minus 1 times the standard deviation. Figure 1 and Figure 2 show the impact reaction results of carbon dioxide emissions, coal consumption and changes in economic output in the Eq. (1).

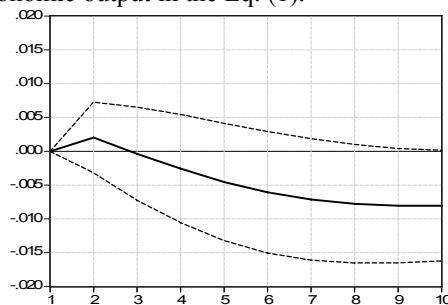


Figure 1 IRF from Ln(CO2) to Ln(COAL)

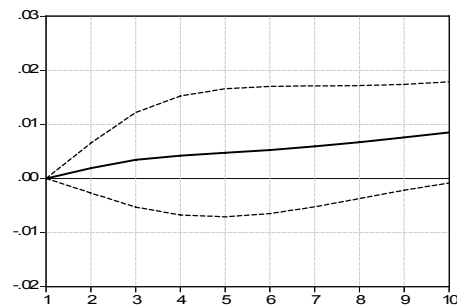


Figure 2 IRF from Ln(CO2) to Ln(GDP)

In figure 1, when 1 percentage shock of Ln(COAL) occurs, the reflection on impact of Ln(CO2) reaches 0.002 percentage points in second year, while a slow decline begins. It shows a slight shrinkage from the beginning of the third year and the shrinkage effect increased gradually with time. From the second year, the line trend smooth, resulting in a decline in Ln(CO2) and long-term negative effects. This suggests that the increase in coal consumption increased carbon dioxide emissions in short-term, because of the strict implementation of energy saving measures led to a reduction of carbon

dioxide emissions in the long term.

In Figure 2, when 1 percentage shock of $Ln(GDP)$ occurs, reflection on impact of $Ln(CO_2)$ shows a trend of gradual expansion, and as time goes by, its expansion is monotone increasing trends. This shows GDP growth has long-run continuous drive effect on China's carbon dioxide emissions. From another side, China's economic development must change the mode of economic growth, from energy consumption-driven development to intensive development pattern aimed to efficiency of production, to improve energy utilization efficiency.

3.3.2 Variance decomposition.

Variance decomposition can characterize the contribution of structure impact to the changes level of endogenous variable, and to evaluate the importance of different structural impact. Based on the idea, variance decomposition, we can identify in Eq.(1) the contribution degree of change rate of $Ln(COAL)$ and $Ln(GDP)$ to $Ln(CO_2)$. The resulting of variance decomposition estimation is given in table 4.

Table 4 The Variance Decomposition Results of $Ln(CO_2)$ Growth Rate

Period	Standard deviation	$Ln(CO_2)$	$Ln(COAL)$	$Ln(GDP)$
2	0.023254	98.56219	0.762408	0.675405
4	0.036813	96.74968	0.797266	2.453050
6	0.044160	92.22588	3.500605	4.273519
8	0.048154	85.23009	7.727472	7.042434
10	0.051076	76.91848	11.82779	11.25373

Results of Table 4 shows that, with the passage of time, both the change rate of coal consumption and economic output show a gradual increase of the contribution to carbon dioxide emissions, and with the extension lag, the contribution to change rate of $Ln(COAL)$ is greater than $Ln(GDP)$. This suggests that change in coal consumption has important influence on China's carbon dioxide emissions, and also shows that China's economic growth is energy driven growth.

4 Conclusions

Applying the VEC model, impulse response function, variance decomposition and other classical measurement technology, this paper investigates the relationship between China's carbon dioxide emissions, coal consumption and economic output by establishing econometric model from the perspective of demand side. Based on the above analysis, we draw the following basic conclusions:

(1) There is a long-run cointegration relationship between China's coal consumption and carbon dioxide emissions; the change of coal consumption is granger cause of the change in the carbon emissions. The result of Impulse response function shows that, the increase of the coal consumption in the short term leads to an increase in carbon dioxide emissions. Carbon dioxide growth rate variance analysis also shows that the coal consumption changes exert a strong influence on changes in carbon dioxide.

(2) Economic output change in the short run has not significant effect on carbon dioxide emissions, but in the long run, the growth in economic output potentiality impact on carbon dioxide emissions, and with the increase of economic output, carbon dioxide emissions continue to increase.

Based on the above conclusions, this paper can extend out the relevant policy recommendations and measures as follows:

(1) At present, China's economic development is characterized by industrialization and urbanization, this feature determines that China's consumption of coal is a large and rigid. In view of the characteristics of energy resource endowment in China, in the disposable energy consumption coal will occupy the dominant position in the long term. In order to ensure sustained economic growth, it is bound to consume large amounts of coal as expense. Due to the constraint of environmental protection, our country should be in line with the principle that coal cannot be without, but do not use indiscriminately, to efficiently use coal. Based on this, to improve the efficiency of coal use is currently the most pressing issue. Therefore, to set energy saving policy of strategic vision and to increase energy-saving technology research and effective promotion on coal consumption are effective way to improve the utilization efficiency of coal.

(2) Industrial sector, especially the power generation sector, is the main coal consumption sector,

how to reduce carbon emissions of power department is a top priority. From the point of current technology, it is the main way to a large margin to reduce carbon emissions by using carbon capture and sequestration technology for coal power industry. The high coal consumption industry sectors, such as chemical, steel and cement, reduce carbon dioxide emissions by using energy saving technology research and the necessary carbon capture and sequestration technologies.

(3) Adjusting the industrial structure is to speed up the formation of industry structure mode, service primarily. The development experience of developed countries proved that the service industrial structure can effectively realize conditions stable economic growth of low carbon scale. In order to speed up the adjustment of industrial structure, to reduce carbon dioxide emissions, the government can use economic and administrative means as industrial structure adjustment measures. In the economic tool choice, the economic means, such as a carbon tax and energy tax, adopted by Nordic countries can be used to reduce carbon emissions and enhance the level of China's industrial structure. In the administrative means, direct control way can be adopt to restrict the development of the high carbon high energy consumption enterprise, and also to encourage the development of low energy consumption, low emissions, high value-added business.

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Sino-Brazilian Relations and the Soft Power Cultural Exchange

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Abstract: China and Brazil have their own cultural backgrounds and standards of thinking, being and acting, and these differences strongly influence the Sino-Brazilian relations. Culture gains an increasing role in the connections between the two countries. This paper gives an overview about the cultural exchange between Brazil and China, highlighting the Confucius Institute initiative as a soft power strategy. It aims to provide an understanding on how cultural aspects have an impact as the cultural contacts take place and the exchanges advance, intertwined with the cultural systems. The authors state that although still in its starting phase, the initiative is on the right path. The potential of Brazil-China cooperation is unparalleled and now it is just a matter of enlarging the mutual cooperation. In this process, the Confucius Institute in São Paulo plays a key bridging role.

Key words: Cultural Exchange; Soft Power; Confucius Institute; Brazil and China

1 Introduction

Brazil and China have very different cultures and characteristics. While China has been a prohemint civilization in the world for millennia, Brazil is a young country and a true melting pot, combining original American, European, African and Asian traits. Although so different and distant, both countries have been in touch and developed cooperation relations.

Why study Brazil and China? Because these two emerging countries stand out in the world, increasingly enhancing cooperation and composing the group called BRICs (originally referring to Brazil, Russia, India and China). Created in 2001 by Jim O'Neill, of the Goldman Sachs Bank, the acronym comprises the countries at a similar stage in economic development, being predicted that in the near future (the year 2050) together they will surpass the richest economies of the present. China, East's (and world's) biggest emerging power, and Brazil, West's biggest emerging economy, have established better commercial and cultural relations that are also more and more intense – and this makes mutual cultural understanding between the two countries paramount. For Leite (1999), Brazil and China shared the presence of the Portuguese colonizers and the Jesuit missionaries, having more in common in terms of mutual cultural influence than they imagine. Besides, since 1812 Chinese immigration has played this connecting role as well. At first, as the coolie labor force, but contemporarily as an urban population with pronounced entrepreneurial trait. This can be especially seen in São Paulo state, which shelters half of the 200,000 *huaren* and *huayi*¹ existing in Brazil. São Paulo city is highlighted in the process, too, making evident the region's historical calling to bridge Brazil and China, corroborating the thesis that the countries are strongly interconnected.

Culture, in this process deserves to be stressed. Reeves and Baden (2000:4) define culture as the distinctive patterns of ideas, beliefs, and norms which characterize the way of life and relations of a society or group within a society. This set of beliefs shared by a group is frequently assumed to be natural and unchangeable. Culture also consists of the sum of the total learned behaviors transmitted from generation to generation, generally considered to be the tradition of that people: explicit and implicit patterns acquired and transmitted by symbols, constituting the distinctive achievement of human groups. The essential core of culture consists of traditional ideas and their attached values. Different cultural groups think, feel, and act differently, and there is no scientific standard for considering one group as intrinsically superior or inferior to another.

When it comes to international cooperations, contact between societies may affect cultures, and produce or inhibit social changes in cultural practices. Understanding cultural differences is essential in the modern world. How people from many cultural backgrounds communicate, in similar and different ways, internally and externally, is the object of study of cross-cultural communication. Understanding cultural differences will help ensure that communication across borders is effective and successful. This way, the concept of cultural competence is of importance. It refers to the capacity of efficiently interacting with people of different cultures, and comprises four components, namely: awareness of

¹ *Huaren* and *huaqiao* are the so-called Chinese overseas. *Huayi* are their descendants (Vêras, 2008).

one's own cultural world view; attitude towards cultural differences; the knowledge of different cultural practices and world views; and intercultural skills. According to Martin and Vaughn (2007), the capacity of efficiently understanding, communicating and interacting with people from different cultures is the result of the development of one's cultural competence.

In this context there will be an introduction of the Confucius Institute experience in São Paulo, Brazil and its developments along the last three years. An overview will be given about this academic exchange cooperation that involves the Chinese Government (represented by the Han Ban), the Hubei University (China) and the São Paulo State University - UNESP (Brazil). Besides introducing the initiative, the paper aims to comment the experience in terms of accomplishments, opportunities and overcoming challenges in bridging the two countries. As part of a comprehensive soft power political strategy of the Chinese Government, and aiming at the diffusion of Chinese language and culture, the Confucius Institutes were created in 2004 by the Han Ban, which is an organism of the Chinese Ministry of Education. The Institutes have mushroomed around the world since, and the São Paulo chapter officially started in 2009, being the first in Brazil. Now with capacity for more than a thousand students, the Confucius Institute in São Paulo has achieved the prize of best Confucius Institute twice (2010 and 2012) and countless partnerships. In a context of world economic crisis, a growing number of countries are willing to intensify their relationship with China, and in Brazil the topic of Sino-Brazilian relations became more relevant after 2009, when China became the country's main trade partner. As a result, in the last years many Brazilians have devoted themselves to learning Chinese. Although it is a new process, it is fast-paced and already successful, with high potential for further developments.

In terms of Sino-Brazilian relations, Paulino and Pires (2011), point out the need to strengthen cultural ties through the incentive of the already existing activities, such as the Confucius Institute at UNESP, and the support to spreading Brazilian culture in China and the implementation of centers for Brazilian studies and advertising Brazilian culture in Chinese universities. Some of the proposed aspects for an agenda of mutual cooperation have already been launched and start to yield fruitful results.

2 The Sino-Brazilian Relations: an Overview

The Brazil-China relationship is not a new one. As previously seen, according to Leite (1999), for a number of reasons, Brazil and China have been in touch since colonial times (which in Brazil were from 1500 to 1822). Both countries established diplomatic relations in 1974, and since the visit of then President Lula to China in 2004 these relations have been intensified. One of the main things the two lands shared was the Portuguese presence. Devoted to their double mission (mercantile and religious), the Portuguese circulated among Brazil, Portugal, Africa, India, Japan and China (especially Macau), promoting an intense exchange of people, goods and knowledge. Moreover, in spite of Portugal's prohibition of direct trade among colonies, it happened anyway. Therefore, Brazil received Chinese influences concerning foods, habits, and even architecture and arts. In the colonial period, the Jesuits were the ones to bridge Brazil and China, teaching and applying different kinds of knowledge from one place to the other. In the early 19th century, when the Portuguese court was transferred to Brazil, the Chinese emperor presented the royal family in Brazil with exquisite pieces of art and even soybean seeds (being responsible for the introduction of the crop in Brazil).

Immigration is another point of contact between Brazil and China. At first brought to Rio de Janeiro in 1812 as coolies by the King D. João VI to plant tea, they soon disappeared or committed suicide for being discontent about the working conditions. This characterized the failure of the coolie initiative in Brazil, resulting in the Qing Dynasty's interruption of the flux of Chinese workers to the South American country. Nevertheless, the Chinese immigration in Brazil went on, but now with a different characteristic: most immigrants are urban and come in unconnected waves, basically in an individual or family basis, self-financed. Nowadays the contributions of the Sino-Brazilian community are remarkable. Around the world the Chinese diaspora is calculated in 35 million people, and about 200,000 Chinese and descendants are estimated to live in Brazil, half of which just in São Paulo state. Therefore, as seen above, the region has an old calling to bridging the two countries. In the 20th century, famous Chinese painter Chang Dai-Chien produced works in Brazil for almost 20 years (Véras, 2008).

Both Brazil and China have continental dimensions, have been empires, and have an east coast near which most people live. In the two countries the development runs towards the west. There are many differences, though. Brazil is characterized by a diverse culture and geography, and historically it has been the source of important natural resources in its 513 years of official history. It is the largest country in South America in both population (approximately 190 million) and area (8.5 million square kilometers), and its

culture is a fusion of Portuguese, African and indigenous influences, resulting in a rich and distinct culture. One could say that the family is the foundation of the social structure and forms the basis of stability for most people. Although family size has been diminishing in recent years, families tend to be large and the extended family is quite close. China's rich cultural heritage must not be overlooked when discussing cultural interactions with this country. With a 5,000-year history and a mix of ethnic groups, it can be said that it is the only continuous ancient civilization. Founded on October 1, 1949, the People's Republic of China is situated in eastern Asia, with an area of 9.6 million square kilometers and a population exceeding 1.3 billion, which makes up 22% of the world total (the world's most populous country). China has followed a family planning policy since the 1970s in order to bring the population growth under control. Today, the country is implementing reform and opening-up policies, and has established what they call a socialist market economy, or socialism with Chinese characteristics. Throughout most of Imperial China's history, Confucianism was the official philosophy and the country's traditional social values were derived from various versions of this philosophy. Duty, sincerity, loyalty, honor, filial piety, respect for age and seniority are the most valued virtues in Confucianism. The society itself becomes stable through the maintaining of harmonious relations. The *guanxi* (relationship) is another relevant aspect. A need for group affiliation, whether to family, school, work group, or country characterizes the Chinese society as a collective one. They will act with decorum and will avoid anyone's public embarrassment for the sake of maintaining a sense of harmony. The concept of harmonious relationships is the essence of Confucianism, and the culture will revolve around it. The society as a whole will function smoothly if proper behavior through duty, respect and loyalty are shown in the relationships.

Both Brazil and China have historically been described from an Orientalist¹ angle, using the category by Said (2003). Moreover, François Jullien (1998) describes many cultural differences between Eastern and Western thoughts. As an heir of Europe's, Brazilian culture is highly influenced by the concepts of utopia, ideal reality, transcendence, and how to transform the reality is a main concern. The Oriental culture, especially the Chinese one, is rather pragmatic and resigned facing the reality. Authors such as Jullien (1998) emphasize China as a place where meaning is built in indirect and tacit ways.

From the trading point of view, China has been top priority of the Brazilian agenda. Over the last years the relations between the two countries have increased considerably. According to Paulino and Pires (2011), the Chinese market is Brazil's greatest source of commercial revenue (USD 30.8 billion in 2010 – representing 15.2% of the total). Chinese economy, in turn, was also the second greatest supplier for Brazilian market (USD 25.6 billion – 14.1% of all import expenses). China also led in direct foreign investment in Brazil in 2010 – making 32% of the total (in contrast to the 0.25% of the total in 2009). As pointed by Gama and Cajueiro (2012), among the Chinese companies in Brazil are JAC, Huawei, ZTE, Haier, Chery, Dong Feng, Sinopec, Bank of China, Sinotruck and Lenovo.

The Brazilian investments in China, on the other hand, show another picture. Data from China's Ministry of Commerce (MOFCOM) indicate that from 2000 to 2010, Brazilian companies invested US\$ 572.5 million in China, representing only 0.04% of the stock of foreign investments in the Asian nation. As for the Brazilian companies in China, we may highlight Vale (the first one, come in 1973), Marcopolo, Embraco, Petrobrás, Apex Brazil, Bank of Brazil, Itaú BBA, Comexport, BRF, Brazil Foods, Odebrecht, Suzano Papel e Celulose, Weg, Sertrading and the shoe manufacturers (Frischtak; Soares, 2012).

For beyond economic and political issues, the socio-cultural relations between Brazil and China deserve to be seen from an important angle, which should be systematically explored, such as cooperation in various areas of mutual interest. This is highlighted as a new and strong connection at an expanding stage. Paulino and Pires (2011) emphasize the need of a strategic agenda for this cooperation with China: the strengthening of social, cultural and educational relationships.

3 The Soft Power: Mutual Cooperation and Socio-Cultural Exchanges

This paper presents the Confucius Institute in São Paulo as an example of *soft power* cultural initiative of cooperation between Brazil and China. The Confucius Institute is named after the Chinese philosopher Confucius (551–479 BC, Qufu, Shandong Province), in an effort to associate the cultural initiative to the country's tradition and avoid political connotations, in spite of the philosopher's having been in the 20th century criticized and associated to feudal China. Now it has become a trademarked brand name. We may not forget that the proliferation of Confucius Institutes around the world not only has purposes of language and culture diffusion, but also the encouraging of trade ties and the extension of the Chinese campaign of soft power into the educational sphere in foreign countries. This way can China expand economic, cultural, and diplomatic reach through the promotion of Chinese language and culture.

¹ Defined according to the Western/European view.

In order to understand the initiative, the concept of soft power is essential. It was developed by Joseph Nye Jr. (1990; 2004) to describe the ability to attract and co-opt rather than coerce, use force or give money to persuade. Now the term is widely used by both analysts and statesmen regarding international affairs. In 2007, the then President of People's Republic of China, Hu Jintao, said that China needed to increase its soft power during the 17th Communist Party Congress. Countless other examples of world leaders referring to soft power can be seen, valuing it as an efficient instrument of security through diplomacy, communication, foreign assistance, civic action and conflict resolution, in ways that are different from the traditional military ones. Culture diffusion can be part of this strategy.

Hubei University has taken an active part in establishing two branches of the Confucius Institute abroad to follow the spirit of "promoting Chinese and upholding the fine culture of China", namely in the USA and Brazil. The first was established with the University of Memphis in USA (2007). The Confucius Institute established with the UNESP, Brazil, had its Inauguration on November 26, 2008. The creation of the Confucius Institute has an important role to play, following the mission to teach Chinese language, also divulging the Asian country's history and culture. This way, strengthening the Brazil-China cultural exchange. Besides language courses, the Institute also provides courses in Portuguese about China's art history and, for interested companies, classes on the Asian country's business environment (comprising cultural, legal, political, economic and taxation aspects).

The cooperation with Brazil has been so intense that in 2012 the University opened its Center for Brazilian Studies, and the scientific interest about the South American country has grown among the University researchers. The opening of the Center happened taking into account that:

(1) China and Brazil have a long history of friendship, and especially since the reform and opening up, China has had a closer relationship of exchange and cooperation with Brazil in all areas including politics, economy, culture, military, education, etc. The two countries have established the strategic partnership of mutual benefit. Hence, studies about Brazil grow important;

(2) Hubei University has carried out the research on Brazilian history since the 1960s. The staff translated and published the first General History of Brazil (Russian Version) in China. The studies on Latin America history advanced in China in the 1980s and the 1990s;

(3) Hubei University and UNESP co-established the first Confucius Institute in Brazil, which offers a platform of academic exchange and cooperation.

Therefore, Hubei University sets up the Center to improve the research level on Brazilian studies focusing on Brazilian history, economy, culture, international relations and tourism, and to contribute to the exchange and cooperation between two countries and two peoples. As for the Portuguese language studies, at present 130 students from different majors are taking Portuguese courses. These majors comprise Teaching Chinese as a Second Language (Undergraduates and Masters Degrees), International Intercultural Communication and English Majors (Masters Degree). Some of these students are selected to do an intensive training at the Han Ban in Beijing, and then sent to Brazil. Portuguese courses have existed in the University since 2009.

The presented above is in accordance with other aspects that Paulino and Pires (2011) believe to be fundamental to the Sino-Brazilian relations: the incentive to publishing works by Chinese authors in Portuguese, and to publish works by Brazilian and lusophone authors in Mandarin, both classic and contemporary. Valuing the common cultural heritage (especially the role of Macau) and encouraging the exchange between research institutions and universities from Brazil and China, with development of joint investigations in fields of common interest (such as new technologies, renewable energies, public health, among others, as presented by Paulino and Pires, 2011) are ways to increase and stimulate the exchange between the two countries.

4 The Hubei-São Paulo Cooperation and the Results

There has been an increasing demand for Chinese learning in Brazil due to China's growing importance for Brazilian economy. In terms of bilateral trade volume, China surpassed the USA in 2009 and became Brazil's largest trading partner. Brazil's exports to China reached 44 billion US dollars, and imports, 32.7 billion in 2011 (Gama; Cajueiro, 2012). Moreover, the Confucius Institute's mission in São Paulo is to spread Chinese language and culture, both in and outside the UNESP. This is true provided that UNESP has a tradition in community action. To meet these objectives, regular Chinese language courses in 15 cities in São Paulo state are provided, in addition to cultural activities – such as exhibits, Chinese film festivals, and workshops on art, cuisine, traditional medicine, among other topics. For the development of these activities many partnerships are established between public and private

entities. There are three basic motivations for the development of this project, equally perceived as important by the two countries involved:

(1) Apart from being a developing economy, China has over 5,000 years of history and culture, which triggers Brazilian people's interest;

(2) Since 2001 the well-known term BRICs has been part of the agenda of many organizations. Both Brazil and China are members of the BRICs, therefore intensifying the relationship, exchange and cooperation in all areas;

(3) Both universities (UNESP and Hubei University) value international exchange and cooperation, which could benefit teachers and students from both sides.

In addition, from China's part, one should not forget the strong soft power motivation for the cooperation, and a somewhat declared propaganda strategy. Since the beginning of its operations, the Confucius Institute in São Paulo has had a substantial increase in the number of participants. When it comes to sending Chinese teachers to Brazil, these are divided in two categories: the Volunteers (recruited among Hubei University's students) and the Professors (recruited among Hubei University's teachers). Here below are figures of personnel from Hubei University sent to Brazil:

Table 1 Chinese Personnel from Hubei University sent to Brazil (2009-2013)
Chinese Personnel from Hubei University sent to Brazil (2009-2013)

Year	Volunteers	Professors	Total
2009		2	2
2010	3		3
2011	8	1	9
2012	13		13
2013	4		4
Total	28	3	31

The volunteers would normally stay a year. Nevertheless, especially in the recent years, more of them have agreed to stay two years or more in Brazil. Their being called "volunteers" does not imply lack of remuneration for their work, but that their work has more of an "internship" characteristic, as they are students.

As for sending Brazilian students to China, they are basically of two categories: the students who come for the short summer course (June and July) and the ones who come for the one-year scholarship. More recently, there are six-month scholarships, too. Since 2010 the evolution can be seen:

Table 2 Brazilian Students from Confucius Institute at UNESP sent to China (2010-2013)

Year	Summer Course	Scholarship		Total
		Chinese Language	Masters in Teaching Chinese as a Second Language	
2010	35	8	1	44
2011	34	12		46
2012	23	29	1	53
2013	18	42	1	61
Total	110	91	3	204

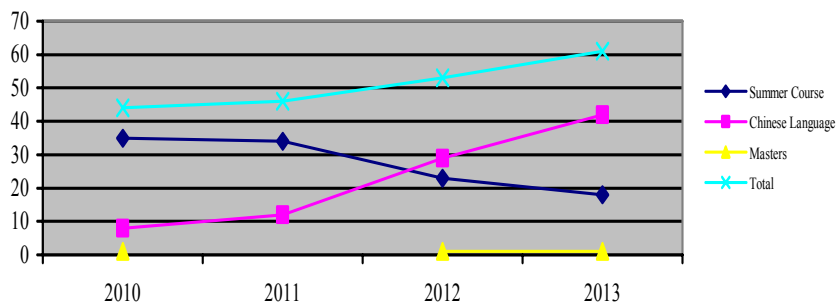


Figure 1 Brazilian Students from Confucius Institute at UNESP sent to China, 2010-2013

As for the Center for Brazilian Studies at Hubei University, future plans include: setting up database of Brazilian books, journals and other documents; inviting Brazilian officials and scholars to give lectures and present conferences; and implementing a “Week of Brazilian Culture” every semester or every year, through lectures and shows on Brazilian film, food, dance, etc. – in order to let more and more Chinese people know Brazil.

As previously said, a significant accomplishment of Confucius Institute in São Paulo was their winning of the Confucius Institute Prize on December 16, 2012 in Beijing. The prize aims to choose the best Confucius Institute in the world. The Institute in São Paulo had already won the same prize in 2010. To win this prize the Institute has to compete with over 400 institutions in more than 100 countries. In order to select the winner, the Han Ban distributes a lot of formularies for the branches to fill out, besides demanding them to write reports about number of students (sent to China and received in Brazil), cultural activities, professional management, training of teachers, etc. What the Han Ban pays attention to: they check what the branches have done, always checking their spreading and improvements, and assessing the Chinese teaching and the efforts. More classrooms (capacity) give more points to the Institute. More campuses too. What put UNESP in a good position was their hosting of the Latin American Conference of Confucius Institutes, the increase in the number of students enrolled and the cultural activities (shows and stage performances). The Chinese partner (Hubei University) was also evaluated: for example, in the summer course and scholarships. They also assess how much Hubei University supports the initiative in terms of sending teachers, receiving students; how much UNESP supports; the Government too. How much a personnel is supported is evaluated in both cases, and even if there are any local teachers (Brazilian teachers of Chinese). Also about staff, a characteristic that makes a difference is that the Confucius Institute in São Paulo can count on staff provided by UNESP, which is hard to find. Publications and press release matter, too. For example, the UNESP publishing house works on translations of important Chinese works into Portuguese, such as the Confucius’ *Analects* and Yu Xuanji’s poems (Yu, 2011). Performances are meaningful, and the Confucius Institute has even taken part in a samba school carnival parade. And very importantly, a good relationship with the Han Ban matters a lot, as well as a smooth cooperation UNESP-Hubei University.

The Confucius Institute in São Paulo has also developed partnership projects with public and private organizations: the Confucius Classroom Program. Besides being partners with private universities in São Paulo, in the end of 2012 they started an important cooperation with the São Paulo State Secretary for Education in order to offer Chinese language courses. More than 300 students from public schools have been reached by the initiative in four cities in São Paulo state, namely Araraquara, Franca, São José dos Campos and São Paulo. The agreement is expected to be expanded to more language centers throughout São Paulo state. The public schools’ students ages range between 12 and 17, and all they have to pay for is the textbook.

5 Conclusions

Since 2004 the Confucius Institutes have been spread around the world as a political soft power initiative by the Chinese Government, not only to advertise Chinese culture and language, but also to offer the Chinese vision on facts, and gain political space, in an effort to improve the image of China, as part of a persuasive strategy. As one of the most ancient cultures of the world, Chinese culture has great appeal among scholars and the general public. Pragmatism, on the other hand, is also what makes so many countries embrace the initiative, once the world is doing business with China. When it comes to the BRIC agenda, Brazil can have a special relationship with China. Unlike Russia and India, Brazil does not have historical problems with China concerning borders or political disputes. Brazil and China do not have to make up for past situations in their relationship building.

The Confucius Institute at UNESP results from the action involving the Han Ban, UNESP and Hubei University, and the support of each of the three partners is very significant. The Han Ban is the headquarters, the matrix from which everything stems, including the conception, methodology, training of professionals – and not less importantly, funding. Hubei University is the Chinese partner university, providing training, recruiting, and education in teaching Chinese as a second language. Also, the Chinese director of the Institute. In Brazil, UNESP provides the venues, resources, advertisement, community action and the Brazilian director. As in every branch of Confucius Institute around the world, a Chinese director and a local director work in cooperation, in a local host university.

Open in 2009, the Confucius Institute in São Paulo is still new in its operations, but has grown fast, soon reaching the capacity of one thousand students. As previously said, there are many factors that

arouse people's interest in Chinese language and culture, ranging from business opportunities to cultural heritage. Of course there are challenges, though. In Brazil Chinese language still has the reputation of being too difficult, what puts many people off. If English is seen as difficult to achieve, let alone Chinese. However, more and more people are breaking the initial barrier, and perhaps a strategy to make Chinese language/ culture more present in the Brazilians' daily life would make the latter more familiar with the language, hence more capable of learning it. São Paulo's having a Chinese community would help in the process.

The interaction between such different cultures is complex and such a theme obviously deserves a deep discussion. Here "comparing cultures" does not mean attributing positive or negative values to any of them. The same way having more similarities does not mean that the relations are better. A better relationship will rather come from the comprehension of the difference. Each country has its own cultural particularities: a mixture of attitudes, values, and social expectations. One important aspect of Sino-Brazilian relations is the complementarity issue. In her visit to China in 2011, the Brazilian President Dilma Rousseff stressed the importance of this aspect for the promotion of pacific development, highlighting a shared gain. For Stearns (2007), world history is more and more seen and understood in terms of shared processes and contacts. For this author, in general the contact between two or more different societies is seen as complex and potentially fruitful – making way to possibilities of both imitation and innovation – although not tension free. Few are the societies that rapidly or totally convert to another's standards, even when there are intense contacts and an actual conquest. Also for Stearns (2007), more often than not what happens is a set of compromises called syncretism, in which local beliefs and the ideas brought by the new contact mix, even when the fusion unites apparently incompatible elements. As the contacts happen and the exchanges advance, they are more and more intertwined with cultural systems. In the case of Sino-Brazilian relation, it is interesting to remark the Buddhist presence in the surroundings of São Paulo city, where the Zulai Temple is located. Also, it is important to observe the interaction of commemorative dates in the calendars. Chinese New Year, for example, is now celebrated in São Paulo according to the lunar calendar – and at present many of the celebrations are thanks to the Confucius Institute there. In Wuhan, in turn, in 2013 there was the I Week of Brazilian Culture, with presentations of films, live dance performances, typical foods, and academic lectures introducing the formation of Brazilian people and their habits. Although it was a still small initiative, it plants the seed of curiosity, and contributes for mutual understanding.

The contact can also operate small changes. For example, among Brazilians, hugging and backslapping (and even kissing in specific situations) are common greetings if people are close. Also, this would be an acceptable behavior if people are business partners for a long time. They would never be acceptable in the Chinese situation, though. Nevertheless, with the increasing exchange between Chinese and Brazilian students, it is noticeable that slowly the Chinese counterparts start adopting the Brazilian behavior, and after having this contact, every time they meet a different Brazilian person, they already know that this behavior is not disrespectful; therefore they sometimes incorporate the new approach. Although the results are still unknown, it is interesting to point out the affective interactions. For example, the new (Brazilian-Chinese) mixed couples that have been formed over the last years, both in Brazil and China, as a result of the Sino-Brazilian academic and cultural cooperation are remarkable.

Even with cultural globalization, Brazil and China still do not know about each other, and the two countries are overall restricted to football, samba and coffee when it comes to Brazil; and martial arts, acupuncture, Shanghai and Beijing when it comes to China – just to mention some examples of how exotic and strange they are to each other. Both countries are a lot more than this. Although the access to information is increasing, not all assimilate it the same way. With the expansion of migrations, exchanges, cultural movements, business and academic cooperations, distances that go beyond geography are shortened. At last, Stearns (2007) highlights that the contact of different societies are an unparalleled opportunity to understand their cultures, practices and developments. The complex impact of cultural contacts may result in a fertile context and mutual knowledge. What happens in the long run when two distinct cultures such as Brazilian and Chinese interconnect systematically?

Confucius Institute has taken action to minimize the problem of lack of mutual knowledge by offering scholarships to Brazilian students in China and by promoting cultural performances, art exhibits, translation of classics of Chinese literature, lectures, and Chinese film festivals, in addition to the regular language courses in Brazil. When it comes to translation of Chinese works into Portuguese, however, the pace is still slow for there are relatively few professionals up to the task (the same must happen the other way round, as few Brazilian titles are found in China). The Brazilian Ministry of Foreign Affairs (Itamaraty), through Brazilian diplomatic representations (Embassy and Consulates) around China have

made the translation of Brazilian classics available to Chinese audiences, such as in the case of works by Mário Quintana. With the support of the Consulate of Brazil in Hong Kong and Macau in 2012 the University of Macau published *The Man Who Knew How to Speak Javanese* by Lima Barreto (2012).

Anyway, there is still a lot to do. In China, the Center of Brazilian Studies at Hubei University not only will develop research, but will organize Brazilian film festivals and performances. But all in all, everything is still new and may take time to realize bigger events. Although still in its initial phase, the process is on the right path. The potential of Brazil-China cooperation is great, for many reasons herein listed. Now it is just a matter of enlarging initiatives and making them even faster. In this process, the Confucius Institute in São Paulo plays a key bridging role.

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Study on Influencing Factors on the Sense of Belonging to the City of the Migrant Workers' Children in Wuhan of China

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Abstract: Through field interviews and a questionnaire, this paper investigates the sense of belonging to the city of the children of migrant workers in Wuhan, via using the methods of the exploratory factor analysis and descriptive statistical analysis of the final results of the investigation. The finding shows that the influencing factors of the sense of belonging to the city are interpersonal skills and adaptability, role consciousness, self-awareness and self-expression, the degree of acceptance in Wuhan, and external awareness. This paper proposes solutions from these five aspects in order to improve the sense of belonging to Wuhan of the children of migrant workers and to help them grow up healthily.

Key words: Children of migrant workers; Sense of belonging to the city; Influencing factors; Factor analysis

1 Introduction

With the advancement of technology, China's comprehensive national strength has constantly increased, let alone, the progress of industrialization and urbanization has been carried forward. To solve the issues concerning agriculture, countryside and farmers, increase farmers' income to improve their living standards and narrow the gap between the rich and the poor, the labor industry has been developed rapidly across the country and the majority of farmers have flocked to the city to make ends meet, so the immigrant population is becoming increasingly large. Thousands of migrant workers rush around every corner of the city like the migratory birds. Since the late 1990s, the proportion of family migration has increased in population movements, gradually emerging out the trend to become a "family". A large number of school-age children came into the city with their parents and the number increased dramatically, which comes into being a large quantity of substantial problems directly related to their children, especially the increasingly prominent problem of their education. The twentieth chapter of the Twelfth Five-Year Plan for China's national economic and social development has mentioned that the full-time public schools should be the major channel to accept the children of migrant workers to ensure that they can have the equal access to compulsory education and do a good job on the convergence between senior and high school education, which signifies the country's attention on the issue about the education of the children of migrant workers.

Currently, there are as many as 14.46 million children of migrant workers studying at school in Wuhan. They have become a special group in the society. They come to a strange place, experience a lot of psychological problems in the process of integration in the city and bear the pressure of life, academic frustration and unfair treatment in their little hearts. Always staying among the state of self-abasement, stress, confusion and puzzle, their psychological behaviors have gone through various degrees of defects and deviations, so that they are also vulnerable groups in the schools and classes. In the just-concluded sample survey on the current situation of China's children of migrant workers, the result displays that nearly a quarter of migrant children show self-abasement because of being discriminated against, thinking that people in the city look down on them. Some of them have had the psychological problems such as self-abasement, timidity, sensitivity, solitary, depression and hostility. Because they lack of psychological preparation for integration into the urban environment and have no sense of belonging to the city, making it difficult to blend into the life in the city, however, the future development of them is directly related to the future development of the city.

Migrant workers and their children, who are surviving in the cracks under the social exclusion in the city, are the city's vulnerable groups. Under the recent mainstream slogan of building a harmonious society, full attention should be given to this problem. However, children of migrant workers are not only the object for us to simply impose sympathy on, but also the object that needs to be paid attention on by the whole society. How to solve this problem of migrant children's integration into the city depends on the innovation and improvement of the entire social system and the demolition of the urban barriers, and also relies on that people fundamentally attach importance to the right to education for migrant children, and on the care of the community. Furthermore, raising the people's cultural quality,

narrowing the cultural gap between the urban and the rural, the tolerance and understanding given by the urban community will help migrant children integrate into urban society, in order to achieve the goal of socialization as well as to promote social harmonious development.

2 Related Researches

2.1 Definitions of Migrant Workers

This research is targeted at the children of migrant workers. Migrant workers are those who are still the rural registered residence and come to the city to engage in various “freelance” as their main sources of income^[1]. There are narrow and general conceptions of migrant workers. Generalized migrant workers includes two parts: one part is the rural labor force that is employed in the local township enterprises but not leaves their hometown, the other part is the rural labor that goes out of the town working on the second or third industry. In the narrow sense, migrant workers mainly refer to the latter part of the people. The migrant workers referred to in this paper are those in the narrow sense. The research object --- children of migrant workers refer to the children who study in the city coming with their parents or other guardians.

2.2 The Concept of the Sense of Belonging

American psychologist Maslow believes that the sense of belonging is at the third level of psychological needs after the physiological needs and the security needs, which is a more stable psychological characteristic at a higher level. “Sense of belonging” pertains to the psychological aspect of social culture, which is an internal subjective sense generated by the effect of the external environment on humans. And the results of the effect have far more influence on people’s behaviors in the environment.

The sense of belonging generally divided into a sense of community belonging, regional belonging, and organizational commitment.

The subjects of this article are the children of migrant workers living in Wuhan, their sense of belonging to Wuhan is area belonging, thus borrowing a concept that “areas inhabited by members of the community and their respective cultural group identity, love and attachment”^[2].

2.3 The Research of Influencing Factors of the City Sense of Belonging

For the children of migrant workers in cities belonging factors issues, some literatures analyze the influencing factors of sense of belonging to urban children of migrant workers on a system perspective. Furthermore, the restrictions on the household registration system, the exclusion of the education system, lack of government public service systems, lagging behind in urban management systems and tools, and so on, are a major obstacle for the children of migrant workers in urban society. Therefore the government should reform the system and create a more equitable institutional and cultural environment^[3] for the migrant workers and their children. But the authors only described from the social level, their related policies services and the security aspects, a sense of belonging.

The author takes into account that the change in the system is not an overnight thing, but it is imperative to ensure the healthy growth of children of migrant workers. The senses of belonging, which are a subjective consciousness and feelings, are more closely related to their own small environment. Thus this article studies the sense of belonging from the perspective of individual cognitive children of migrant workers.

3 Research Instruments and Sampling Conditions

3.1 Questionnaire Design

The questionnaire refers to " Questionnaire of the Sense of belonging of Middle-school student ", which consists of two parts, the first part is the basic information, including migrant children’s gender, grade, age, parents’ occupation and Educational background, guardians, residence time and moving frequency in Wuhan; there are 20 questions in the second part and we use the Likers’ 5-point scale. This study ultimately gets fourteen entries and five factors, of which explained variance reaches 53.023%, the sum of five factors’ Cronbach alpha is 0.696, and the reliability is within an acceptable range.

The structure of the questionnaire was shown in Figure1, and the result is shown in Table 1.

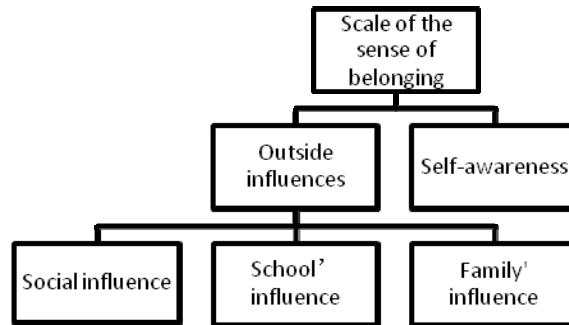


Figure 1 Questionnaire' Structure

Table 1 Factor Analysis

Project	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Happy extracurricular life	0.733				
Like the new environment quickly	0.657				
Often get recognition	0.504				
Felt social care	0.445				
Like to play with the children	0.430				
I relate to Wuhan development		0.788			
I'm a part of Wuhan City		0.735			
Like to be offered voluntary services		0.566			
be willing to raise my hands to speak			0.687		
Effort can make things better			0.561		
Like home now			0.558		
Like Wuhan City				0.783	
Comfortable living in Wuhan				0.761	
The people around me do not understand my own ideas					0.871
explained variance (53.023%)	12.984%	11.610%	10.638%	10.085%	7.706%

According to the structure of the scale shown in Table 3-1, we will name factor one as interpersonal skills and adaptability; factor two as role consciousness, factor 3 as self-awareness and self-expression, factor 4 as the degree of acceptance to Wuhan, factor 5 as external awareness.

3.2 Sample Profile

250 Questionnaires were sent to students, 217 copies of them were returned and 177 were valid. The survey was conducted in Wuhan Ling-Zhi Primary school and its Branch school, and the investigation object is the students in third grade to sixth grade. There are 94 boys, who make up 53.11% of the total number of students, and 83 girls, which accounts for 46.89% of the total number of students. There are 30 copies of the third grade, 63 copies of the fourth grade, 44 copies of the fifth grade and 40 copies of the sixth grade. The average age was 9.98 years old, and the mean residence time is 4.67 years.

4 Statistical Analysis of the Results

4.1 Impact of Demographic Variables

We will carry on the descriptive statistical analysis of the five factors and their possible influencing factors - gender, grade, age, parents' occupation and educational background, guardians, residence time and moving frequency in Wuhan. In order to show the scores of each factor clearly, we will converse factor scores into the value between 1 and 100, which means that the lower the value is, the weaker the sense of belonging to Wuhan is, on the contrary, the greater the value is, the stronger the sense of belonging to Wuhan is. The conversion formula: converted factor score = (factor score + N) * M, where: M = 99 / (maximum of factor score - minimum of factor scores), N = (1 / M) - minimum of factor score. The conversion does not change the nature of factor scores.

First, we use the statistical analysis of various factors as well as the gender, the study discovered that the female students' average score of factor one, factor two, factor five are higher than the male students' average score, which indicates that the female students' interpersonal skills and adaptability, role consciousness as well as external awareness are stronger than the male students. Meanwhile male students' average score at factor three and factor four are slightly higher (lower than 2 points) than the female students, explaining that the male students' self-awareness and self-expression, as well as an admission degree in Wuhan are slightly strong in the female students'.

Then we utilize the statistical analysis of various factors as well as the grade, the study found that the third year students get the highest average scores points in all factors except factor five, which may explain the low grade student' sense of belonging is stronger to a certain extent. The study also discovered the sixth year students get the lowest average scores points in all factors except factor two, which may explain the higher the grade is, the weaker the sense of belonging is, but its explaining degree is lower than the former. Then we carried on the statistics to analyze of students' age of each grade, the sixth grade students' average age is 11.410 years old and the 5th grade students' average age is 10.25 years old, the 4th grade students' average age is 9.404 years old, the third grade students' average age is 8.609 years old after rejecting 17 invalid values, which may draw a safely conclusion that the younger students are, the stronger the sense of belonging is.

At last, we are going to do a statistical analysis of the parents' vocational education, residence, moving, and dependents. At first, scores were divided into five levels through the processing of levels, which is less than or equal to 100 and more than 80 for the first level, less than or equal to 80 and greater than 60 for the second stage, less than or equal to 60 than 40 for the third grade, less than or equal to 40 and greater than 20 for the fourth grade, is less than or equal to 20 and greater than or equal to 1 for the fifth grade. The higher the level is, the corresponding the stronger is, also the sense of belonging the stronger is. According to the statistics, we found that parental education and occupation and dependents have no direct influence on the five factors' scores, as well as the significance of its regression analysis was not obvious. However, according to the statistics, we found that factor 1 and residence have a certain relationship, the longer the average residence of students, the higher score the factor I got, which means with the increase of years of children of migrant workers in Wuhan, their ability of communication, adaptation get stronger. There are no obvious relationship between factor 2 and other possible influence factors. Factor 3 has a more significant relationship with the time of moves, we found that the grade which is at the lowest level of the average number of moves (1.818) get the highest average score (86.386) in factor 3, while the grade which is at the highest level of the average number of moves (3.286) get the lowest score (9.263), which indicated that the times of moving has affected to the ability of self-expression and self-cognitive to the children of migrant workers. Factor 4 also has a certain relationship with the time of moving, we found that the grade which get the lowest of the average score (28.5215) moves most frequently (3.5), indicating the degree of acceptance in Wuhan has a certain relationship with the moving times. Factor 5 has low explained variance which is meaningless to make statistical analysis on it.

5 Conclusions

After an exploratory factor analysis we got five efficiency factors which affected the sense of belonging of migrant workers' children, and then we came to four conclusions through the descriptive statistics analysis of factors and put forward some suggestions according to the problems.

1) In this study, girls have stronger ability to adapt to the life of Wuhan, but the boys accept the city more easily. Although girls have stronger communicative ability, they have difficulty in accepting the new thing quickly in their inner heart, while boys are more willing to accept new things, who can quickly adapt to the urban life. So, we suggested that schools should carry out some psycho-educational activities, so that more girls can accept the city from the heart.

2) Low-grade students have a stronger sense of belonging. We hold the view that psychological gap is smaller to younger students, so the younger students can more easily generate a sense of belonging for Wuhan. On the other hand, younger students spending less time in their hometown, which make it easier for them to accept life of Wuhan quickly. In this regard, we propose that the school should combine the high grade students' future with the future of Wuhan well when they carry out educational activities, in order to arouse the awareness of the higher grade students that Wuhan City needs them just like their own growth is Inseparable with Wuhan City.

3) Self-awareness and self-expression are positively correlated with moving frequency. For one thing, the unstable life makes children feel negative and uneasy; for another, the changing of the learning environment lead to the poor learning foundations, causing the tired of study and the inferiority complex. We learned that the main reason why the migrant workers move frequently is that they don't have a steady work and a permanent house. At this point, we advise parents to try not to move frequently, giving our children a stable living and learning environment; the migrant workers are the main workforce in urban construction, in order to give migrant workers and their children a stable living environment, measures should be taken by government, for instance, to build a number of simple housing with safety standards and rent to them at a low price, then the housing pressure as well as the moving frequency will be reduced.

This study found five exploratory factors: interpersonal skills and adaptability, role consciousness, self-awareness and self-expression, the degree of acceptance in Wuhan, external awareness, which plays a substantial role on the sense of belonging of children of migrant workers. At the same time, we also found that students in low grades have the stronger sense of belonging, and the long residence time and less moving frequency will contribute to children building stronger adaptability and self-cognitive ability. The community and parents should give our children more care and help them improve the sense of belonging to Wuhan; children should also adapt themselves to the city to have a better learning experience. Enhancing the sense of belonging of children of migrant workers not only makes the children grow up healthily, so that they can be better educated; but also reduces the mental health problems of migrant workers about their children, stabilizing the mentality of migrant workers so as to build a more harmonious city life.

Limited to the conditions, this study investigated only two schools which just receive the children of migrant workers, so we cannot make the comparative study between the city children and the children of migrant workers, on which we can make further study.

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Empirical Research on E-Commerce Performance System Based on Chinese Enterprises Data *

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Abstract: In order to make the analysis of e-commerce performance system in Chinese enterprises, factor analysis is used in this paper. By pre-test and pilot test, data collection, single-dimension scale test, reliability test and validity Test, factor analysis can effectively conduct empirical research on e-commerce performance system in Chinese enterprises. For illustration, the collected copies are 300, and the effective rate of collection is 100%, which has satisfied the requirement that the questionnaire returns-ratio is not lower than 20% in the data investigation. The empirical results show that there is the stronger correlation between marketing management and marketing channels and marketing strategy can more effectively promote the growth of marketing performance. But in the expansion process of Chinese enterprises' e-commerce marketing channels, e-business models have still not significantly effectively enhance the market visibility of enterprise-related products, which shows that e-commerce strategy for Chinese enterprises have not entered a highly sophisticated stage.

Key words: Electronic commerce; Network technology; Chinese enterprises; Factor analysis

1 Introduction

Since the mid-1990s, e-commerce wave has caused the attention throughout the world, and e-commerce has increasingly apparent impact on all sectors of national economy. The shock waves of e-commerce involve in numerous fields from developed countries to developing countries, from OECD to governments and from enterprises to consumers.

E-commerce is the means to achieve business goals via electronic technology, including information exchange, electronic money transfer, online information access, network access server technology and design, information classification services, information directory access, online shopping and interactive technologies between TV and network ^[1]. E-commerce can improve the interaction between business and the external environment and internal process automation, which offers convenience for companies to quickly accept the new technology and provide the virtual environment of product exchange, knowledge exchange, and user communications for technical innovation.

2 Enterprise E-Business Performance System Design

The premise of developing e-commerce between enterprises is to greatly improve the level of corporate information, comprehensively update operation mode of enterprises, and conduct a gradual development of electronic commerce ^[2]. At present, the major constrained elements in relation to the development of enterprise e-business are followed. Firstly, the level of awareness of e-commerce is not enough. Many buyers are confused with e-commerce shopping, TV shopping, mail-order shopping so that e-commerce is only seen as tools of inquiring on Internet and tools of understanding market conditions rather than real shopping behavior ^[3]. Secondly, overall quality of logistics services is poor. Thirdly, the security concerning online transactions and online payment is poor. These measures cannot solve the security problems of online transactions ^[4]. Fourthly, Internet service system is not sound. Currently there is no a unified international standards and rules to ensure the smooth implementation of e-commerce ^[5].

Based on the above analysis, the design of Chinese e-commerce performance systems are shown in Table 1.

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Table 1 Chinese E-Commerce Performance System

Elements name	Indicator name	Indicator significance
Marketing management 1	Transaction risk control X1	There is a strong risk control to e-commerce activity risks.
	CRM management X2	Enterprises pay emphasis on the collection, screening and use of customer information and customer data.
	Marketing network management X3	Enterprises conduct the effective maintenance of e-commerce network marketing channels.
	Marketing account management X4	Enterprises conduct information management towards marketing accounts.
	Marketing regional expansion X5	E-commerce models enable enterprises to effectively expand sales area.
Marketing channels 2	Expansion of marketing products X6	E-business models make more and more products implement on-line business.
	Post-sale service quality promotion X7	E-commerce models improve the post-sale service quality in enterprises.
	Promotion quality of marketing X8	E-business models effectively enhance the market visibility of enterprise-related products.
Marketing performance 3	E-marketing ratio X9	Online product sales accounts for the ratio of sales volume of enterprise total products.
	Marketing growth X10	E-business models promote growth of overall sales in enterprises.
	Marketing cost savings X11	E-commerce models effectively reduce the cost of traditional marketing in enterprises.
	Customer satisfaction X12	E-commerce models effectively improve enterprises' customer satisfaction.
	Construction of dynamic alliance X13	Enterprises can form a dynamic and mutually beneficial business alliance online with the related enterprises.
Marketing strategy 4	Marketing skills to absorb X14	Enterprises can attract online business skills from the corresponding enterprises.
	Virtual strategy implementation X15	Enterprises can effectively utilize various market resources to form a virtual enterprise.
	Network technology development X16	Enterprises can continuously make the maintenance, development and upgrading of information technology.

3 Model Checking

3.1 Pre-test and pilot test

Based on the above analysis, authors found that the distribution of Cronbach's α value of the variables was between 0.7226 and 0.8395. According to Hau Kit-Tai's proposal, the questionnaire reliability can be accepted as long as Cronbach's α value was greater than 0.7. Therefore, authors believed that the questionnaire used in this study had the sufficient reliability^[6].

3.2 Data collection

The paper accepted seven-scale system to make the industry-related data collection. Samples were distributed in Beijing, Shanghai, Tianjin, Chongqing, Shaanxi, Sichuan, Yunnan, Jiangsu, Shandong, Zhejiang and other 10 provinces, which basically represented general characteristics in the area of Chinese enterprises. The total of 300 valid samples were obtained, the effective questionnaire returns-ratio was 100%, which had satisfied the requirement that the questionnaire returns-ratio was not lower than 20% in the data investigation.

3.3 Single-dimension scale test

The results showed that KMO value was between 0.718 and 0.820, and there were a large number of significant correlations in coefficient matrix. In this paper, 160 randomly selected sample data were selected from the total samples to conduct the exploratory factor analysis, and factor analysis results were shown in the following Table 2.

Table 2 Exploratory Factor Analysis

Second level index	Factor 1	Factor 2	Factor 3	Factor 4
Transaction risk control X1	.674	.119	.185	.431
CRM management X2	.709	7.60E-02	.243	.275
Marketing network management X3	.690	.187	.178	.354

Marketing account management X4	.540	.217	5.23E-3	5.08E-2
Marketing regional expansion X5	2.192E-02	.810	.329	.316
Expansion of marketing products X6	.222	.603	.169	.187
Post-sale service quality X7	.412	.588	.378	.196
Promotion quality of marketing X8	2.955E-03	.695	.192	2.12E-2
E-marketing ratio X9	.480	.115	.720	.421
Marketing growth X10	.289	.204	.717	.153
Marketing cost savings X11	.312	.198	.543	.289
Customer Satisfaction X12	.423	2.121E-3	.809	.327
Construction of Dynamic Alliance X13	3.454E-02	.436	7.19E-2	.596
Marketing skills to absorb X14	.313	.278	.405	.757
Virtual Strategy Implementation X15	.290	6.587E-3	.378	.58
Network Technology Development X16	.109	.356	.367	.612
Cronbach's α	.7318	.7255	.7376	.8169
Cumulative variance (%)	23.123	37.978	68.568	87.192

The results showed that the validity of the sample structure was strong, and each indicator in the corresponding factor loadings was greater than 0.5 on the critical value.

3.4 Reliability test

The reliability method was commonly used through α coefficient that was created by LJCronbach, and α coefficient ranged from 0 to 1. It can be seen from above table that the minimum value of Cronbach's α was 0.7255 and the sample reliability was higher.

3.5 Validity test

Validity referred to measure the effectiveness or accuracy of the questionnaire results. Validation method was commonly used confirmatory factor analysis. This paper used SPSS11.5 and LISREL8.7 confirmatory factor analysis (fixed variance), factor loading parameter list was shown in Table 3.

Table 3 Factor Loading Parameter List

Factor name	X1	X2	X3	X4	X5	X6	X7	X8
Factor loading	.29	.24	.23	.21	.27	.74	.37	.12
SE	.11	.08	.07	.08	.08	.09	.12	.07
t	2.6	3.0	3.3	2.6	3.4	8.2	3.1	1.5
Factor name	X9	X10	X11	X12	X13	X14	X15	X16
Factor loading	.33	.26	.79	.27	.24	.23	.23	.21
SE	.11	.11	.13	.09	.11	.09	.11	.08
t	3.1	2.3	6.0	3.0	2.3	2.5	2.1	2.7

The fit index list was shown in Table 4.

Table 4 Fit Index List

Fit index	df	CHI-Square	RMSEA	NNFI	CFI
Present Value Index (PVI)	159	233	0.049	0.921	0.945
Optimum value tendency	—	Smaller is better	<0.08	>0.9	>0.9

4 Conclusions

According to the fit index list, the model-related fit effect is well [7]. Therefore, business e-commerce system has strong practical performance and reliability in Chinese enterprises, which can provide a strong theoretical reference for e-commerce strategies for Chinese enterprises.

According to the factor covariance matrix, there is the stronger correlation between marketing management and marketing channels, which indicates that the basic management of e-commerce can effectively promote the development of marketing channels. Meanwhile, there is the stronger correlation between the marketing performance and marketing strategy. Therefore, compared to marketing

management and marketing channels, marketing strategy can more effectively promote the growth of marketing performance.

According to the factor loading parameter list, factor loadings of index X6 and X11 are high, and has certain significance. Therefore, in the process of building Chinese business e-commerce, the implementation of online marketing products can be continuously expanded, and more and more products can be sold online, in which the major measures to improve the efficiency of e-commerce is marketing channels currently. At the same time, e-commerce marketing performance reflects in savings on traditional marketing cost to a large extent, which is a routine phenomenon reflected in enterprises' marketing activities at the mature stage of the implementation of e-commerce.

According to the factor loading parameter list, factor loadings of index X8 lacks significance. Therefore, in the expansion process of Chinese enterprises' e-commerce marketing channels, e-business models have still not significantly effectively enhance the market visibility of enterprise-related products, which shows that e-commerce strategy for Chinese enterprises have not entered a highly sophisticated stage.

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The Global Company, Inequality and Employment

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Abstract: Extremes of socioeconomic inequality demand the need for work, jobs, employment and the resulting income all across the planet more than anything else. This article attempts to explore the contribution of what part of this task, companies and namely the large global companies do.

Key words: Companies; Employment; Inequality; Market; State; Sustainable development

1 Introduction

The debate on sustainable development in its economic, environmental and social dimensions, through the media, the *academia*, the organizations and social networks, have led companies and notably the great global company – including in Brazil, to regularly develop the so-called sustainable actions and almost always disclose and/or obtain media coverage of these initiatives, where they seek to present themselves to society - market and constituted powers, as responsible and committed institutions both to the environment and to the socioeconomic human progress.

This article aims to show what has been the contribution of these companies by evaluating the level and evolution of their direct jobs in the global market, taken from a doctoral research project in progress, whose theme is the capital and the social dimension of sustainable development and the focus is its role, responsibility and commitment to the reduction of socioeconomic inequality, poverty and misery on the planet, under orientation of Prof. Dr. Miguel Chaia, PhD ^[2].

2 Crisis and Society

The world socioeconomic crisis in the years 1970 ^[3] had as precedents high inflation, swollen States, stagnation, low productivity and high level of state interventionism. The reaction via liberal public policies – still interventionist, but to a lesser extent – announced by some nation States, causes the collapse of the system that was based on a set of job control practices, technologies, consumer habits and economic and political power settings; triggers a process of change, uncertainty and instability in capitalism, with production and flexible jobs, geographic mobility, changes in practices of consumption.

Taken to extremes in the years 1990 and 2000, such policies bring as result, a global financial crisis at start, which evolves into another extremely serious socioeconomic crisis, once financial markets have liberalized to a point of being unstable, generating low growth, recession and unemployment.

The ever finding of a persistent poverty, world widely scattered amid high and growing concentration of wealth, the growth of inequality and its reappearance in developed societies highlight the socioeconomic issue and has made arise ever since movements of humanitarian and assistance character by direct help from NGOs / CSOPs ^[4] to populations in precarious and difficult conditions both also by wars and natural disasters as well as the absence, indifference and very little successful integrated action between States and markets, governments and companies.

The change in the political model of the welfare State – its retreat from its presumed social function on one side, and the innovations brought by the information and communication technologies on the other, increase the problem and the visibility of backwardness and socioeconomic inequalities.

However, reducing inequality and poverty and even eradicate misery, requires substantial change in the lives of its protagonists. The imperative is that all should not be just passive agents of assistance and paternalism, but subjects who seek projects that require initiative, dedication, commitment and responsibility in the search for higher standards and quality of life. Necessary becomes that they directly participate in the development of income generating projects as remuneration for the work done and not just receive emergency resources, in order for them to make the entry by assistance programs already linked to a decent way out by a productive work generator of income.

This action is ethically and morally required. But to also be socioeconomically sustainable it needs to happen by the learning on how to use the resources of nature, transforming them, with capital and labor, in production and trade in a free market. As a result of this natural process instinctively created by human beings since very early and improved throughout history, come innovation, productivity and increase in the standard of living to all that of this process actively participate.

Due to the global scale of operations many companies already operate their own projects and a myriad of others along with humanitarian associations. With that they hope to be seen as institutions with social vision, acting beyond the economic dimension focused only on remuneration of investments.

The local and business elites are impacted in a particular form of consciousness and taken to act socially with moral and religious motivations as well as social legitimation.

However, in general they should not understand the exercise of good citizenship as a business imperative only and just only because it is assumed to be good for the company.

The liberal thought inherited from the Austrian School of Economics ^{[5] [6] [7]} rejects the welfare State as a paradigm of the process or the institutional system of social life, also because it is a generator of accommodation to benefits with no commitments nor responsibilities and, in addition, to discourage the innate motivations and capacity of human beings to learn, engage and take risks.

Actually what is proposed here is that this socioeconomic rescue could be much more successful if the participation of the capital, assumed here as imperative, happens integrated and complementary to both public authorities and independent social movements.

Although there are records of previous initiatives, it was only from the years 1960, with the advent of the administration by objectives and the rational management focused on efficiency in order to serve the economic and social progress ^[8] that companies began to define and develop policies, practices and objectives so-called social—both internal and external—and many of them accountable and disseminating at least part of those called social investments.

This growing interest of the company for a more relevant social role should and needs to be much more than the capitalist accumulation, its perpetuation and security to continue to generate value and obtain profits. Beyond the human being's behavior with regard to power and money, the crisis of the State, either hypertrophied, minimum or absent, and constituted public officials taking care over their own personal and family power projects, one should discuss the role of business in reducing inequality, in overcoming poverty and in meeting essential needs of human beings and society.

This 2008 and still ongoing socioeconomic and political crisis already made disappear millions of jobs in the formal market of developed economies. The resulting instability, we have seen, in addition to having already toppled Governments, has jeopardized even some democracies.

Even where there is unemployment insurance, discloses the international media, people have taken informal jobs with low pay, no social protection and with risks even for survival. More than 200 million people may fall into absolute poverty – in addition to the hundreds of millions already there.

A crisis of these proportions cannot be solved by the ideological dogma of the austerity cutbacks of expenses and investments. On the contrary, the elite world leaders should make the generation of jobs an absolute political priority, to at least sustain some more consumption by income growth and not just by people's indebtedness.

In addition, allow and/or facilitate debt restructuring – needs, interest and time limits – where applicable, and to improve the functionality of the credit system, make credit flow more for medium-sized, small and micro enterprises. Even more important would be the reduction of taxes and charges paid by entrepreneurs and employers on investments and wages, as a stimulus for companies to invest and to hire people.

Stimulate and preserve its internal market, Governments spending better and within limits of a tax burden that focuses and not only punish the productive investment generator of jobs, should be the basis of the plans of any nation organized as a market economy, open to research and knowledge transfer, with a necessary State, more agile, less bureaucratic and provider of quality public services.

In Brazil, although there are occasional adverse effects that may even expand, one has to highlight the performance of the Brazilian economy in the current crisis, at least so far, as a result of governmental action of developmental and social focus, generator of jobs, broad support to social programs and, in particular, the existing greater control and regulatory action of the local financial banking system market. Still not perfect, has served as an example and model to Governments and global institutions for monitoring, control and promotion of economies and markets.

But the lack of large-scale infrastructure investments, the complexity of legislation and high level tax rates on production, consumption, income, labor and payroll, Government spending, deficits and excessive waste, added to the inefficiency of the administrative engine at all levels, are the focus and essence of the vulnerabilities of the Brazilian economy. The industry, commerce and services sectors of the economy suffer severe competitive limitations imposed by the endless series of legal, bureaucratic, logistical, tax and fiscal barriers. Without structural changes, Brazil will continue to follow on the margins of the global economy, always fighting symptoms, not the causes of inefficiencies.

4 Inequality

*In my commonwealth... For no kind of traffic would I admit
Letters should not be known... No name of magistrate
Riches, poverty and use of service, none... No occupation... No sovereignty
All things in common... Nature should bring forth of its own kind... All foison, all abundance
Line of Gonzalo, honest councillor of Alonso, King of Naples
The tempest. William Shakespeare. 1611.*

Conceptually, inequality is expressed as social due to the many existing objective differences, particularly in the economic and legal fields, between members of a community or between groups of reference with which one is able to draw comparisons regarding cause of actions and reactions in order to eliminate these differences ^[9]. Actually and more specifically, the concept being used here is of socioeconomic inequality expressed from the differences in abilities, commitments and responsibilities of individuals, families, regional populations and also between markets and nation-States with generation, accumulation and distribution of wealth and income.

It is known that the above-mentioned councillor Gonzalo's paradisiac commonwealth - that in fact, none of the characters in the play takes seriously, even centuries before the time it was written nor today, can be considered as an example of a society with social organization, quality of life, well-being, innovation and development, since what could be the idealization of paradise is actually the description of a precarious way of life of populations and cultures of very primitive hunters – gatherers nomads.

In his research, Jared Diamond ^[10] shows that even today, there are people living out of nature by collecting plants and hunting. Nomads just like more than 10,000 years ago, they do not experience quality of life and social organization capacity even minimal under the so-called civilized standards, at least in Western terms, once they do not even dominate food production technology, with domestication of animals and primitive agriculture. As they all have to devote most of their time looking for food, they tend to develop more egalitarian societies, in a collectivist production model, in a tribal society and still no social classes, no bureaucrats, no hereditary chiefs and a minimum of political organization.

However, priests already act among them with the worship of deities, the help to reduce fears and grievances and also, to bring relief to suffering and evil ^[11].

In our contemporary times ^[12] there are successes and signs of hope for better well-being and quality of life, with infant mortality dropping, increased human life expectancy, the proportion of adults in the world who can read and write, as well as increases the proportion of children starting school. In addition, the world food production increases more rapidly than population growth.

However, the same processes that produced these gains also gave rise to trends as, in absolute numbers, there are more hungry people, who cannot read or write, who do not have safe drinking water, safe and comfortable houses nor energy for cooking and heating. The gap between rich and poor countries increases – does not diminish – and there are few prospects, taking into account the trends and present institutional arrangements, that this process reverts. Socioeconomic inequality varies between societies, historical periods, economic structures and systems (capitalism or socialism), wars and abilities of individuals to create value and wealth. But mankind has never managed to end the horror of war and famine, these being the biggest systemic failure of human society ^[13].

Dramatically true ever since and when written (1987) as it is today. Since always human beings have talent, innovation, technology, resources, power, politics, Government, bureaucracy and personal interests sometimes nothing but transparent. But also lack desire, commitment and responsibility.

By analyzing and trying to answer why some societies flourished more than others, Jared Diamond ^[14] identifies in food production – the beginnings of the agricultural revolution, with irrigation technologies, plant cultivation and domestication of animals – the formation of the first human groups and the origin of socioeconomic inequality.

Stocks of food release humans from the daily effort to ensure food. However, the complexity resulted from the need for planning, resource use and mainly with the stockpiling of food, raises the need for the organization of human groups in towns and cities later and also its protection and security.

From the existence of herds and the stockpiling of food and around that wealth, arise both craftsmen and scribes as well as a political elite to control, taxation, full-time political, administrative and safety activities. All of them free from the obligation to produce and ensure their own food. So then begins the development of settled societies, established, politically centered, socially stratified, economically complex and technically innovative ^[15], bringing to join religion, the need for governance, social management, regulation, control, bureaucracy, and the already cited protection and security.

From here also changes virtually every relationship of humans with the environment because it begins the reversal of the relationship of prevalence of nature onto the human being, with his process of intervention, search and use of natural resources, fed by the slow, continuous, long, inexorable, unending and irreplaceable evolution of innovation, productivity, science and technology.

Metals expert craftsmen produce swords and other weapons, and along with the production and supply of food, humans acquire a base from which to mount police and armed forces, make wars and create civilizations, empires and dynasties. Thus, by the accumulation of wealth and power by the fittest and most productive and technologically advanced and, along with the environmental effects arising, the political power, the economic power and the socioeconomic inequality broadens and consolidates.

So, politics, the military, the public administration and production join mysticism and religion, which with its natural vocation for power, feeds on humans a life haunted by spirits and demons, subduing them with guilt and fear, intimidation and duress and precepts of good and evil, with appeals not only to accept a superior metaphysical entity protection, essential to their salvation and redemption, but also ^[19] one moral of compassion and of exaggeration of piety. Princes, kings, emperors, nobles and military, dictators and tyrants, rulers and bureaucrats, join priests and religious not only to the deification of the State but also to the exercise of moral and social regulation in the world. All this permeated not only by beliefs generators of ideologies, disciples and followers, as well as by fears of the unknown, structured from economic power, environmental imbalance and socioeconomic inequality.

In contemporary times there are alerts that the damage of economic activity has gone beyond the limits of sustainable survival of the planet and the human species, which in turn has never experienced existence without extremes of wealth and poverty, misery and famine.

Inevitable is the controversy over the morality and usefulness of inequality and its effects on human society once no system of social division of labor should dispense a method that makes individuals responsible for their contribution of free choice to the joint effort of production, responsibility established by the framework of prices, with the consequent inequality of income and wealth, essential characteristics of a market economy, whose alleged distributive inefficiency was also never worked out by State interventionism, lavish model in the transformation of free individual choice to generate well-being, in bureaucratic human beings abiding by orders and obligations without any relation to the real needs of the consumer market ^[18]. The fully awareness of the innate inequality between humans is that it is this inequality that leads to social cooperation and to civilization. And what makes possible the evolution of society is precisely the fact that peaceful cooperation under the sign of division of labour in the long run, pick up and meets better to the selfish interests of all. The superiority of market society consists in the fact that its operation confirms this principle ^[16].

However, even if it is accepted that the selfish human initiative and its innate inequality – and not the provoked – can be a promoter of investment, extremes of socioeconomic inequality need to be seen as a social problem that widens and becomes great, if not the greatest generator of harm to society.

It is well established that ^[17] also in the richest societies the poor live less and suffer more of almost all social problems. However, one common factor binds societies healthier and happier: the greatest degree of equality among its members. In addition, more unequal societies with extreme boundaries of wealth and poverty generate negative effects to the wellbeing of the upper limit of the band, not by any form of deprivation of essential needs, but, for example, ^[20] more crime, more fear and insecurity that are reflected by increasingly aggressive use of fences and walls for homes and condominiums, internal and external surveillance cameras, armored cars and private security.

Being a wide socioeconomic inequality a deplorable social phenomenon and indeed destructive to society and its individual constituents everywhere, what should and can be done and how best to reduce it? In general has prevailed the State action with assistance via redistribution and transfer of income and philanthropy of individuals and businesses. However, from what can be seen, at best this only mitigates extreme situations. More than often it does not overcome it, once preserves the inequality by maintaining the populations served on poverty.

Seems to be the challenge of our time ^[22], to match the minimum essential needs of the world's population consumption with physical and environmental limits of the planet and with less extravagant consumption patterns, without compromising the dynamism of market economies and individual freedoms, once egalitarian experiences, always associated with both left and right-wing totalitarianism, have failed and demoralized throughout the 20th century, no longer being viable and sustainable options.

Among the many reasons for socioeconomic inequality, the remuneration for work has been singled out as its biggest cause ^[21] and examples of extremes between Nations and companies, individuals and jobs are plentiful, in this ^[23] contemporary organizations and knowledge era.

4.1 Metrics and extremes

The evolution of the GDP ^[24] of the 153 emerging countries, where more than 5 billion human beings live (4/5 of world population) ^[25] with the lowest HDIs ^[26] of the planet and the revenues of the 500 largest global companies with their direct employment looks like this:

	YEARS	2012	2011	2010	2004	2000	1994
GDP 153	US\$ trillions	27.3	25.7	21.9	9.1	6.5	4.8
REVENUES 500	US\$ trillions	30.3	29.5	26.0	16.8	14.1	10.2
EMPLOYEES 500	Millions	64.9	63.7	60.7	47.9	47.2	34.2

Sources: GDP ^[27]; Revenues and Employees ^[28]

The OECD ^[29] estimates the formal jobs on the planet in 1.2 billion, for a population between 15 and 64 years estimated at 4.5 billion ^[30]. Thus, the participation of the 500 global companies in direct formal employment around respectively of 5% and 1.2% is unimpressive. However, their revenues have always been greater than the GDP of the 153 Nations.

Among the several indices to measure income inequality, the Gini coefficient ^[32] grew by over 10% (1985 to 2010) and has never been so high among the OECD member countries, in most developed economies and societies and with the highest HDIs of the planet, where data are available.

Gini Coefficient Income Inequality – OECD Average

YEARS	1985	1990	1995	2000	2005	2007	2010
GINI	0.286	0.293	0.297	0.307	0.314	0.315	0.316
BASE	100.0	102.3	103.6	107.1	109.6	109.9	110.2

Source: OECD May 13, 2013 Report ^[31]

The average income in the entire OECD of 10% richest population increased from 7 to 9 times that of the poorest 10% in 25 years from 1985 to 2010. Even countries traditionally more egalitarian, as Germany, Denmark and Sweden, had the gap between rich and poor increased from 5 to 6 times since the 1980. Some countries have managed to reverse this trend more recently-Chile and Mexico, even though the incomes of the richest are still more than 25 times those of the poorest. In Brazil, which is not part of this index, although it has made progress, this relationship is still 50 times ^[33].

About 2/3 of the world's population – four billion people – lives on less than US\$2 a day ^[34]. Four million children died from no access to water (2005) and 10 million die of absurd causes each year ^[35]. No less absurd, 20% of the richest people held 70% of the income in 1960 and in 2000 already reached 85%. In the same period, the fraction of income of the poorest 20% fell from 2.3% to 1.1%. A total of 94% of the world income goes to 40% of the population, causing 60% of the population live with only 6% of this income and more than a billion human beings live on less than \$ 1 dollar a day ^[37].

About 21% of the world's population of the advanced capitalist countries control 78% of world production of goods and services, and consume 75% of the energy produced. In the last 50 years the planet lost 1/3 of the forest cover and 1/5 of humanity has no access to drinking water. Industrialization didn't bring development to 2/3 of humanity-just watch the growth and level of wealth from developed countries and the remaining ^[36].

In Brazil, local research *PNAD/IBGE* ^[38] ^[43] also published by *IPEA* ^[39], shows that from year 2002 on, income of the richest 1% reversed to slightly below the income of the poorest 50%.

For families receiving *Bolsa Família* ^[40], the *IDF* ^[41] in 2012 shows significant progress in access to improvements regarding: child development (0.85), income (0.63), vulnerability of the family (0.74) and housing conditions (0.78). However, lower knowledge (0.38) and lower work (0.29) indicate that the dependence on the monthly income transfers program follows high, since these dimensions, sustainable natural way out of paternalism, have not yet had their specific vulnerabilities exceeded.

5 Work and Market

From divine curse to divine condition; from forced to spontaneous; from punishment to reward; from active life to contemplative life; from natural law to moral duty; from option to needing; from frustration to supreme achievement; from doing to learning; from manual to intellectual; from material to immaterial; from control to power; from search to receiving; from right to responsibility – all these are some of the multiple social categories of human work incorporated throughout history.

Work can be defined as an activity whose purpose is to use natural things or even modify the environment to meet human needs – generating dependency of human beings in relation to nature, preparation or use of natural elements and, more or less effort, pain and fatigue as consequent human cost^[42]. Work can also be time spent in tasks increasingly abstract, partial and immaterial, in exchange for a remuneration system and not only just for a salary^[70].

From subsistence to accumulation and hence for the exchange and for sale of its fruit which can both be essential, necessary, complementary and even quite often superfluous, none of that matters more than the fact of the work as an agent of transformation of humans into social beings, whether he's an artisan or part of a production gear. The duty to work to survive needs to be lived and performed as a manifestation of freedom, of overcoming the limits of nature and never as alienation and subjugation. Necessary is that humans work in what they like most, that like much of what they do and also seek the sound balance in their professional, personal, family and community lives.

This close connection between work and human existence ennobles it and the distressing aspect in many activities is much more associated with social conditions in which is performed than the work itself, once be natural that the activity would should be nice or to seek out pleasant ways of doing it, process that becomes rewarding with success even if partial in finding a way out^[44].

However, we cannot lose sight that, as throughout history, even today persist monotonous jobs, under pressure, unhealthy, dangerous and even stupid, brutal and terrible environmental conditions, and under orders from mediocre, stupid, despotic bosses, giving the working human being not even minimal conditions to overrun^[45].

In this overcoming, work in general can benefit from technology, social organization, market, trade unions, political system^[51], as transformation and quality factors in society in general and in company of any size in particular, although its operating and economic-financial gains continue to overlap on a large scale the common welfare in our society.

Despite the criticism of the excessive financial and economic power and the successive scandals over time, Galbraith^[46] recognizes that the global company has become a central factor in the modern economy, where exercise extremely useful role in contemporary economic life. Boldly, Roddick^[47] proposes that, in terms of power and influence, we can forget the Church and politics, by advocating that there is no institution more powerful than the company in contemporary society.

A society that aspires growth, innovation, stability and social equity – real benefits for society as a whole – needs to rely on a strong ethical market, innovative and competitive, as well as also needs to rely on a State with constitutionally defined and limited powers, and an ethical, active, efficient and inductor Government. But it is also imperative, the separation, balance and alternation of power and the regulation of both State and market, by local and multilateral organizations, legitimate, articulated, institutionally strong and active.

In thus, the best starting point for growth generator of work, employment and income, still assumes the free choice of individuals, the possibility of quick reaction in the economy, a free consumer, entrepreneurs free, aware of all the risks and responsible for their actions^[48], in a free and competitive market, and a political power which regulates and guarantees the freedom, law and order.

But, Drucker teaches^[49] – social and political theory since Plato and Aristotle always focused power. Responsibility, however, should be the principle to inform and organize post-capitalist society, once the organizations and knowledge society demand organization and governance based on it. A company to be considered fully responsible, needs to assume an economic responsibility – profit being the first and the base from which enables it for an environmental responsibility, a prerequisite for its own sustainable growth, and a social responsibility as a good employer, good corporate citizen, good neighbor, integrated in the communities where it operates.

In an entrepreneurial society, unanimity is not necessary nor possible, not even conceivable. It does not assume that all are entrepreneurs nor that all are to believe in companies. But, of course, is a society of trust, where whoever has the power to decide, influence, create, train, teach, judge, serves as a model, mostly adheres to behaviors that constitute a development society^[50], the best generator of work, employment and income for society.

6 Nations, Companies and the Rise of China

The revenues of the 500 largest companies have always been greater than the GDP of all 153 emerging and developing countries. However, the GDP 472.5% growth exceeded by large both the 195.8% growth of revenue of the 500 companies and the 101.4% of GDP of the developed Nations.

The gap has decreased though. In this 18 year period, the revenue that surpassed GDP in 114.9% (1994) falls to only 11.0% (2012) mainly due to the insertion of China in the global economy – most important geopolitical fact of the end of 20th century, being confirmed at this early 21st century.

US\$ Billions	COMPANIES GLOBAL 500	EMERGING 153 NATIONS	DEVELOPED 35 NATIONS	WORLD 188 NATIONS
YEARS	REVENUE	GDP	GDP	GDP
2012	30,304.9	27,290.2	44,417.1	71,707.3
2010	26,043.0	21,944.3	41,533.4	63,467.7
2004	16,798.1	9,135.0	33,093.6	42,228.6
2000	14,065.0	6,558.9	25,772.5	32,331.3
1994	10,245.3	4,767.1	22,058.4	26,825.5
% GROWTH				
2000 / 1994	37.3	37.6	16.8	20.5
2004 / 2000	19.4	39.3	28.4	30.6
2010 / 2004	55.0	140.2	25.5	50.3
2012 / 2010	16.4	24.4	6.9	13.0
2012 / 1994	195.8	472.5	101.4	167.3

Sources: IMF – same ^[28]; Fortune Global 500 – same ^[29]

China's GDP, \$ 559.2 billion (1994), reached \$ 8.2 trillion (2012), increasing share among the 153 emerging countries from 11.7% to 30.1% and from 2.1% to 11.5% among the 188 Nations.

Brazil's 11.5% share (1994) drops to 8.8% (2012) among the 153 emerging countries, whereas China went from 11.7% to 30.1%. However, Brazil won positions among the 188 world nations – from 2.0% (1994) to 3.3% (2012), once influenced by 101.4% growth and greater economic weight of the 35 developed countries, the 188 countries grew only 167.3%.

Share Among 153 Emerging and 188 World Nations

US\$ Billions	GDP BRAZIL			GDP CHINA		
	US\$	% / 153	% / 188	US\$	% / 153	% / 188
2012	2,396.0	8.8	3.3	8,227.0	30.1	11.5
2010	2,142.9	9.8	3.4	5,930.4	27.0	9.3
2004	663.5	7.3	1.6	1,931.6	21.1	4.6
2000	644.3	9.8	2.0	1,198.5	18.3	3.7
1994	546.5	11.5	2.0	559.2	11.7	2.1
GDP % GROWTH						
2012 / 1994			338.4	1,371.2		

Source: IMF – same ^[28]

Due to the rise of China to the global capitalist market, stands the big evolution of the company's global presence among the 500 biggest Chinese in revenue, from 3 (1994) to 89 (2012). Among the 10 largest in 2012 are already 3-in the 4th, 5th and 7th positions.

NUMBER OF COMPANIES		1994	2000	2005	2008	2010	2012
FORTUNE 500 GLOBAL	CHINA	3	12	20	37	61	89
	BRAZIL	2	3	4	6	7	8
FORTUNE 10 GLOBAL	CHINA	-	-	-	1	3	3
Ranking of Brazil largest - Petrobras		169	160	86	34	34	25

Name and ranking of the other seven Brazilian companies in 500 Global 2012

Banco do Brazil 116, Bradesco 168, Vale 210, JBS 275, Itaúsa 366, Ultrapar 420 GPA 449

Source: Fortune Global 500 – same ^[29]

7 Companies and Direct Employment

The values of the main economic and financial valuation metrics — revenue, net income, assets and shareholders' equity – for the 500 Global largest companies are impressive not only for its size, but also for its sustained growth over the most recent period considered, and there's no reason to imagine that has been different over time in prior periods.

These growth rates illustrate very well its strength and economic power. Between 1994 and 2012 revenues increased 195.8%, profits 447.0%, assets – investments – 293.9% and equity 350.7%.

However, although the number of jobs has increased by 30.3 million (34.5 to 64.9 million), this represents an increase in the period of just 88.0%.

The gain, of course, is fully reflected in productivity, 57.3% in revenues, 190.9% in profits, 109.5% in assets and 139.7% in equity, and entirely appropriated by the invested capital, ensuring its remuneration, feasibility, economic and financial sustainability and investment capacity.

YEAR	RESULTS US\$ Billions				EMPLOYEES		
	REVENUE	PROFIT	ASSETS	EQUITY	TOTAL	AVG	MEDIAN
2012	30,305	1,541	121,514	14,547	64,877,969	129,7	87,0
2010	26,043	1,523	112,482	13,165	60,710,587	121,4	80,0
2004	16,798	929	67,746	7,694	47,956,133	95,4	58,2
2000	14,065	667	45,808	5,527	47,225,289	94,4	60,5
1994	10,245	282	30,848	3,228	34,515,427	69,0	46,1
% GROWTH							
2000/1994	37.3	136.8	48.5	71.3	36.8		31.1
2004/2000	19.4	39.3	47.9	39.2	1.55		(3.75)
2010/2004	55.0	63.8	66.0	71.1	26.6		37.4
2012/2010	16.4	1.2	8.0	10.5	6.9		8.8
2012/1994	195.8	447.0	293.9	350.7	88.0		88.7
% PRODUCTIVITY ON TOTAL EMPLOYEES							
2012/1994	57.3	190.9	109.5	139.7	-		-

Source: Fortune Global 500 - same ^[29]

The Global Top 50 employers – 10% of businesses, generate around 38% / 40% of the jobs generated by the Global 500. It is worth noting that in recent years of the first decade of the 21st century, both economic and financial indicators such, and the number of jobs generated, show strong growth due to the presence of the Chinese economy in the global market and the entry of their companies not only in the 500 and 10 global in revenues but also among the 50 top global employers.

In the total direct jobs generated by the 500 largest, the jobs of Chinese enterprises accounted for 1.1% in 1994, 12.2% in 2000, 14.1% in 2010 and 13.3% in 2012. Among the 50 largest employers, China had 2 companies and 3% of jobs (1994), 8 companies and 30.2% (2000), 15 companies with 37.3% (2010) and 15 with 36.8% (2012).

It is also worth pointing out that this significant presence of the Chinese economy and enterprises in the global market generates a statistical distortion of growth, since the large Chinese company is notably State owned and, therefore, generates more direct jobs and lower productivity as consequence.

DIRECT JOBS	1994	2000	2010	2012
FORTUNE GLOBAL TOP 50	13,040,594	19,176,264	22,988,822	23,910,232
FORTUNE GLOBAL 500	34,515,427	47,225,289	60,710,587	64,877,969
TOP 50 / GLOBAL 500	37.8	40.6	37.9	
CHINESE COMPANIES IN TOP 50	2	8	15	15
CHINESE TOP 50 DIRECT JOBS	396,125	5,786,559	8,568,594	8,648,371
% IN GLOBAL 500	1.1	12.2	14.1	13.3
% IN GLOBAL TOP 50	3.0	30.2	37.3	36.8

Source: Fortune Global 500 – same ^[29]

8 Employment and Population

The first and the most important among the contributions the company and, for sure, the big global corporation can offer to society is the generation of not only direct employment but also work and income for the economically active population of society. However, even considering a period of sustained economic growth since the mid-1990, comes as a surprise the comparison of the evolution of the offer of direct jobs of the 500 largest companies with the evolution of the population from 15 to 64 years, taken as the age of the target population for paid work. Between 1995 and 2010 (these UN statistics for years 0 and 5 only), the number of direct jobs the 500 largest companies grew 25.6 million (72.9%), while the 15 / 64 years world population increased by about a billion human beings (28.1%).

These Global 500 corporations, employed 0.89% - less than 1% (1995) and 1.24% (2010) of the EAP, a very small direct employment when compared with the income-generating needs of society. One can certainly point out also that, not to mention socioeconomic crisis, technology, productivity, outsourcing and informality, do not contribute to overcome this problem.

YEARS	GLOBAL 500	WORLD EAP (1) ^[71]	% (2)
	DIRECT JOBS	POPULATION 15 TO 64 YEARS	
2010	60,710,587	4,524,850	1.24
2005	50,538,508	4,197,009	1.10
2000	47,225,289	3,851,820	1.13
1995	35,119,851	3,531,208	0.89
% GROWTH			
2010 / 1995	72.9	28.1	35.0

Sources: Fortune Global 500 – same as ^[29]; UN – same as ^[31] and ^[56]

9 Population and Work

In 2009, the world economically active population around 4.5 billion people ^[52], participates ^[53] of a world labour market of 4.2 billion people, where the formal employment is estimated at 1.2 billion and the informal jobs – production and trade of legal and regular products and services, with no registration and without social security – arrive at 1.8 billion. So between 1.2 and 1.4 billion people in active age do not exist in economic terms and are part of the \$1 or \$2 a day of the statistics ^[54] ^[55].

The participation of direct jobs of 500 largest companies in 2009 in the world labour market of 1.3% and in the formal market of 4.7% and work on economically active population around 1.2%, is very small, even with China, whose insertion into the global market with its state capitalism and large amount of State-owned enterprises, greatly increased the number and growth rate of direct jobs.

Even with the growth of economies and companies from the years 1990, in many developing countries, the informal labour market grows, is broad and pervasive with outsourcing and services, does not generate tax revenue and social protection for workers and their dependents and not rarely is the most dynamic segment of the economy, and also the only generator of jobs and income on large scale. Until 2020, this market should increase by one-third, retained the current projections of population growth and economies. But this increase may be even greater, if more formal jobs are lost amid the ongoing crisis and, more migrants return to their countries of origin and, mostly, for informal jobs ^[58].

EAP	4.5
TOTAL MARKET	4.2
FORMAL MARKET	1.2
INFORMAL MARKET	1.8
OUT OF MARKET	1.2
GLOBAL 500 DIRECT JOBS (2009) in Millions	57.8
% in EAP	1.2
% in TOTAL MARKET	1.3
% IN FORMAL MARKET	4.7

Sources: Fortune Global 500 – same as ^[29]; UN – same as ^[56]; OECD – same as ^[57]

10 The role of the Company

Beyond the man's behavior with regard to power and wealth, the crisis of the contemporary State increasingly hypertrophied caring more of itself and a wealth accumulator selfish capitalism, make sense to discuss the role of free enterprise – essence and foundation of capitalism, in the generation of work, employment and income and in meeting the needs of human society.

But even with technology, managerial capacity and investment, companies have not been able to make a relevant contribution to cope with the deep problem of global poverty ^[56], once they do not involve not only the hundreds of millions of people on the sidelines even of the informal market of work but also of those who, in the formal market, are at the base of the social pyramid, where instability and insecurity of employment relationships are larger.

Even though accepting that the companies are part of the most innovative and financially most efficient sectors of all, in his reflections on what should be the role of enterprises in aid to the world's poor, ^[57] companies still have no direct mechanism to implement its practices in elimination of poverty.

Still, the contribution of large enterprise in generating more jobs, work, income, investment and consumption in the economy, can and should come from private investment, made not with charity and philanthropy, but as business and through their value chains ^{[59] [60] [61] [62]}, heavily focused on supporting the local development of communities where they operate ^{[63] [64] [65] [66]} and where else it can generate business, notably in the vast market of the socioeconomic pyramid base on the planet ^[67].

Some people do not agree. To devise a threading model in structural spaces for study of the problems and needs of society, Santos ^[68] suggests that political parties, trade unions, social and popular movements, NGOs and a welfare-State join to counter the so-called dominant forces of society.

Quite the opposite, ^[69] in an entrepreneurial society model, Peyrefitte argues that non-inclusion, co-option or even cooperation notably of the large enterprise of the private sector of the economy, as another one of organizational forms in the development of actions and solutions, actually generates a huge waste of energy by competition and not an appreciable gain in value as a result of the involvement and collaboration of all these essential social actors.

11 Final Considerations

The participation in the direct jobs market of the 500 Global companies around 1% of the target population and less than 5% of formal employment is disproportionate with its capacity for investment, business, wealth and value generation, and too small for the needs of work, employment and income of the human society. Even its spread in their production chains, brings only a few tens of millions out of these 1.2 billion formal jobs in an estimated 4.2 billion target human beings of the total market.

There is no way out through the generation of direct employment. A large-scale wave of entrepreneurship and the conscious consumption of goods and products that meet specific needs of populations, are at the heart of the eradication of poverty, through the generation of work, employment, income, savings and investment, and credit as financial leverage and not pure and simple indebtedness.

Entrepreneurship – with the consequent generation of work, employment and income, and hence consumption and investment, as a creation of human beings by their natural need and ability to create linkages and value, evolved and has consolidated its position in enterprises, the more complex and sophisticated institution of society in generating goods, material values and quality of life.

Inappropriate economic policies have generated trade and currency exchanges wars, disordered caps, inflation, deflation, more income and wealth inequality, poverty, economic and social instability and produced authoritarian regimes, riots, conflicts, guerrillas and military wars.

To prevent repetition of this tragic sequence, no other action of the business and Government leaders on the planet could have more priority than one focused on the creation and preservation of jobs, mainly in trade and services in general, whose generator and multiplier effect on income and consumption in the economy is much faster.

Society needs active, efficient and inductor Governments, less inclined to create and raise taxes and promote confiscations, and more prone to exemption and modernization of the supply and distribution chains, as well as it needs strong, innovative and competitive markets. Both ethical, limited and regulated by laws and autonomous institutions.

What is not sustainable and cannot continue is this concentration of political power and wealth of Governments and corporations propagating to billionaires and millionaires family fortunes for a few

thousand people in a society that has not been capable to generate livelihoods with a minimum of dignity for some billions of human beings.

At no time in the history of human beings, not with religion, philosophy or science, neither Governments nor companies, mankind managed to overcome inequality, hunger, poverty and extreme misery. Quite the contrary, seems to have them extended. The frustration is not just of our time or of any particular society, but neither should nor can it serve as a mitigating circumstance, consolation or hopelessness, in an attempt to improve today and the future of the human society and the planet.

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Analysis of User Experience in Brand Marketing

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Abstract: This paper discusses the significance and strategy of user experience in brand marketing. Brand marketing is a process in which various marketing strategies are used to enable customers to form understanding, acknowledgment and acceptance of enterprise brand, products and services. It has shifted from traditional model which emphasizes production, product and market to experience-based one that stresses the satisfaction of consumer need. In the face of increasing diversification, large-scale operations and similarity of products and services, customers become more critical and rational. Simply providing experience platform and service for the customer is no longer an effective means to attract customers and enhance brand value. In conclusion, experience-based marketing strategy should be built on the basis of analysis of dimensions, characteristics and factors of user experience to provide perfect experience, and finally enhance brand value and bring profits for company.

Key words: Brand marketing; Dimensions of user experience; Factor of user experience; experience marketing

1 Introduction

With the rapid development of goods and service economy, brand marketing has become more and more mature. The consumption behavior, demand and the life style of customers have changed very much. Under this background, Gilmore (1999)^[7] suggests that “the era of user experience economy has come.” Together with Pine (Pine and Gilmore, 1999), he puts forward the concept of user experience. Besides, he also raises the idea that “the experience economy has gradually been a new stage of development after the service economy.” From a interactive perspective of enterprise and customer, Schmitt (1999)^[6] suggests that user experience is a collection in which enterprise can communicate with customer the sensory stimulation, information and the points of emotions.

Tao Wang and Guohua Cui in domestic suggests that user experience is a wonderful and deep feeling owned by the consumer in the consumption process, which is provided by the enterprise, since he is immersed in the design and product-promotion. However, Hongli Guo(2010) thinks that “in order to improve customer value, enterprise should start with the user experience, consider factors of user experience and organize these factors.”

Research at home and abroad only discuss the concept and contents of user experience. However, what is the process of the construction and characteristics of user experience, as well as the factors, still need systematic theory to support. This paper argues, company should develop different experience marketing strategies for customers on the basis of analysis of dimensions, characteristics and factors of user experience in difference marketing environments.

2 Dimensions of User Experience in Brand Marketing

2.1 Brand marketing and user experience

Briefly speaking, brand marketing is a way to give the product some kind of images to impress the customers. Philip Kotler, a famous marketer, thinks that marketing targets contain ten types, including the product, invisible service, event, experience, person, place, property right, organization, information, and concept. American scholars John C Mowen and Michael S Minor consider that the experience each side got from exchanging process, apart from the product, service, and money during exchanging activities was also one of the exchanging resources. As a marketing resource, experience is recognized publically.

In the age of experiencing economy, the purpose of a customer's purchasing products is to realize self-value through satisfying his need but not to help the enterprise make a profit. He would take into account product, service, and purchase and usage experience to judge a brand. Therefore, to reach the goal of brand marketing, the user experience analysis becomes so crucial.

Analyzing user experience could start with analyzing dimensions of user experience, and according to the features and influencing factors of analyzing experience to draw up experience marketing strategy, to design favorable experience environment, superior experience service, and impressive experience

interaction and so on to decrease user’s payment and increase user’s value.

2.2 Dimensions of user experience in brand marketing

Schmitt (1999) divided experience dimensions into five types, “feeling, experience, thought, action and relation”. He thought we should choose proper “experience media” to control the whole process. This paper is based on Schmitt’s division to experience dimension and borrow the concept of elementary geometry to further subdivide user experience into experience point, acknowledgment line, and emotion surface and acceptance body. Through analyzing dimensions of user experience, enterprise could adjust and integrate better of each stage to user experience to design different user experiences purposefully.

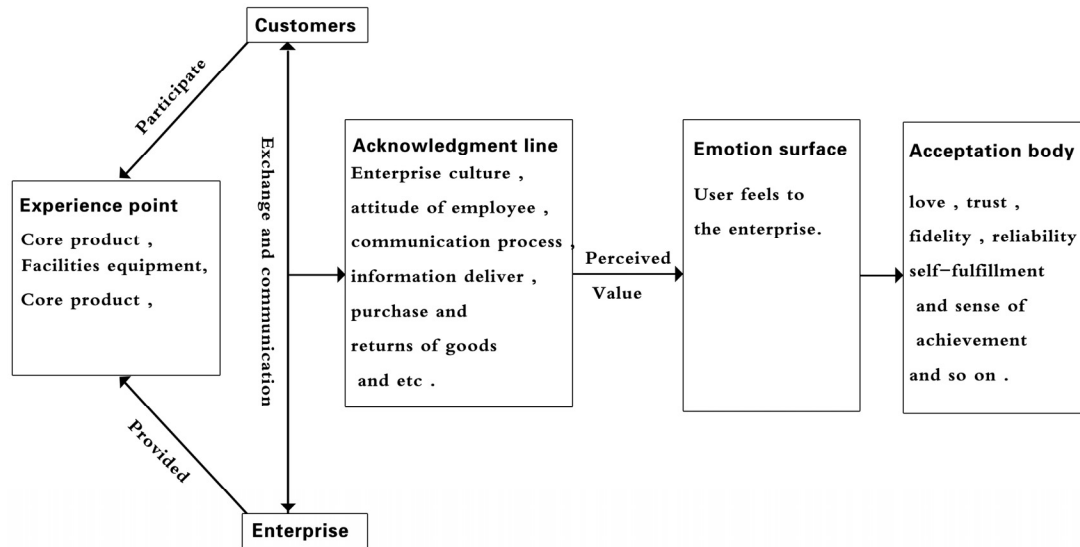


Figure 1 Dimensions of User Experience

2.2.1 Experience point

Experience point is any point that user and enterprise may touch. It mainly includes three aspects, core product; facilities equipment; employee and manager. For example, when we go to a computer experience store, we will get a series of experience points, such as the store sign, its name, the interior design, the computers, the posters, and the employees, the computers’ texture, function and price, etc.

2.2.2 Acknowledgment line

Acknowledgment line is a collection of experience points and information exchange, including enterprise culture, attitude of employee, communication process, information delivery, purchase and returns of goods and etc. For example, when experiencing a computer or exchanging information or conducting the product interaction with the employees, the user would have a process of thinking, thus form a whole acknowledgment of the experience store, which is so called acknowledgment line

2.2.3 Emotion surface

Emotion surface is an accumulation of all of acknowledgment lines, some kind of induced emotion, and the holistic experience that user feels to the enterprise.

2.2.4 Acceptation body

Acceptation body is a collection of emotion surfaces. Once the users accept the enterprise, they would produce some feelings, such as love, trust, fidelity, reliability, self-fulfillment, sense of achievement and so on.

3 Characteristics of User Experience and Influential Factors

3.1 The three characteristics of user experience

Since Gilmore (1998) proposed the famous judgment—experience economy era, the commercial potential brought by user experience has been recognized gradually. As a result, many enterprises hope to focus on experience to enhance customer value and their own interests. But user experience has strong personalized features, so it is necessary to practically analyze its characteristics and influential factors.

According to the above analysis of dimensions of user experience, we find the experience characteristics mainly include: environmental experience, emotional experience and comprehensive

experience. Environmental experience is the content which is covered by experience point—that is the experience of perception and five senses. Emotional experience contains information communication, emotional communication, enterprise culture and so on, which is corresponding to cognitive line. And comprehensive experience is the overall feelings of customers’ emotional factors which is created to emotion surface and acceptance body.

In order to better strengthen customers’ perceived value, It is necessary to create a good atmosphere and highlight the core products of enterprise to let customers directly come into experience role with a clear priority and target by improving environmental experience design ; At the same time, we should attach importance to emotional experience design to improve the efficiency of service, care and guide customer to make sure of effective transmission of experience information, finally let customers have a good comprehensive experience.

3.2 Influential factors of user experience

Experience is the feelings of customers in the process of their interaction with the enterprises. As a result, the factors of customer experience could be analyzed from the two perspectives—customer’s and enterprise’s perspectives. From the enterprise’s point of view, the focus is the experience conditions, which include to enterprise’s products, services, environment, brand, employees, etc. (Schmitt, 1999). from the perspective of customer, it mainly includes customer’s demand motivation, personality and education background (Bearden, 1998). This paper, based on the theory supported by Bearden, further analyze the factors that will affect experience and lay importance to customer’s psychological experience, which can be divided into three parts. The first part is psychological demand, which determines the purchase desire; the second part is age psychology, which determines the purchase motivation; and the last one is property class, which decides to the purchase results.

In order to improve the customer experience as much as possible, the enterprise should determine the targeted effects based on the enterprise’s operating conditions, industrial characteristics, earning performance and competition performance. Besides, it is necessary for the enterprise to interview and conduct investigation to gain feedback from customers so that the customers’ psychology and motivation and even their current situation can be better understood. Based on the information gathered, companies can manipulate all kinds of favorable elements to perfect the customers’ experience.

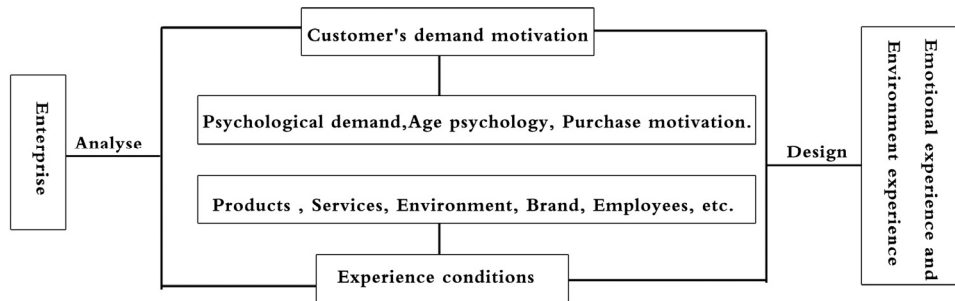


Figure 2 Factors of User Experience

4 Marketing Strategy Based on Customer Experience

4.1 Management framework of user experience

From the process and characteristics of user experience to the analysis of influencing factors, experience-based marketing strategy contains the idea of improving user experience in the practice of experience. Company should formulate the experience marketing strategy on the basis of relevant management of user experience. For this purpose, it is necessary to build the management framework of user experience.

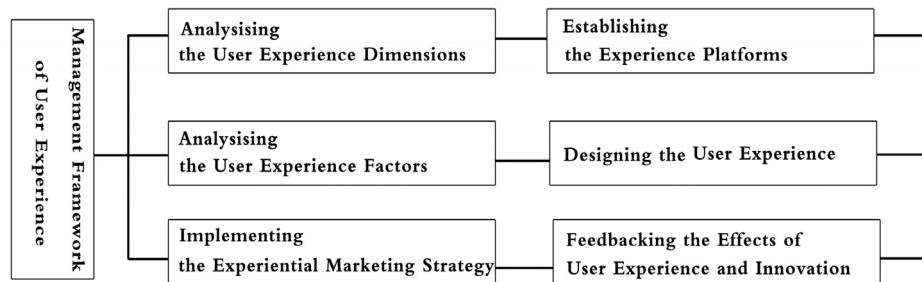


Figure 3 Management Framework of User Experience

4.2 Experiential Marketing Strategy

Experiential Marketing is mainly classified into five catalogues, sense, feeling, thinking, action, and relation (Schmitt, 2004)^[4]. To realize experiential marketing aim, proper experience types must be pinpointed. In this paper, integrated with Mr. Schmitt's five catalogues, it is further classified into three types. First, making the customer purchase unconsciously; second, attracting the customer to buy in the process of interaction; third, attracting the customers to buy under the knock-on effect.

4.2.1 Sensory marketing and emotional marketing—making the customers purchase unconsciously

Sensory marketing means making the customers purchase through stimulations through satisfying the customers' sensory pleasure, excitement and desire etc, while emotional marketing attaches specific emotions to a brand. These two types of marketing tactics take advantage of the customers' sense to bring enjoyment and excitement, and then stimulate their imaginations through the story and culture of the brand and trigger their purchase desire.

In the market of daily use chemicals, sensory marketing is the most traditional tactic. Unilever's "Dove" brand reinterpreted "beauty" through the "Campaign for Real Beauty". All women were instructed to adopt a positive attitude to change their living conditions. By doing so this brand successfully and deeply impressed consumers. This type of marketing will build deep emotional connection with customers, so that it will beat the competitors easily.

4.2.2 Action marketing and thinking marketing—attracting customers during interaction

Action marketing and thinking marketing allow customers to generate reflection and feeling through participation in the experiences. Its most important principle is to surprise and impress people unexpectedly, and to stimulate customers' interest.

Dove is quite outstanding with regard to this aspect. It first puts forth the question "What is real beauty?", followed by the establishment of "True Beauty" website through which women can think and interact so as to build a real customers' community.

4.2.3 Related marketing—relevant experiences under knock-on effect

Relevant experience means stimulating the customers' desire to change themselves so as to experience the strong relationship between the enterprises and their customers. Through such an experience, the enterprise's can increase the customers' acceptance and loyalty to the brand.

Generally people like the brands which can help them shape their personality. Coca-Cola expresses an optimistic attitude which arouses a sense of belonging and attracts people all over the world.

5 For the Brand of the Domestic Mobile Phone—How to Catch up With Samsung and Apple

There is a big gap existing between the Chinese domestic brand and Samsung or Apple in the mobile phone market of China. The key for domestic mobile phones to catching up with Apple and Samsung lies in improving the hardware and technology, and moreover in taking practical measures to improve customers' experience.

5.1 Grasping the dimensions of experience and understanding clients' psychology

Many measures should be taken if domestic mobiles aim to be as good as Samsung and Apple. First of all, good experience platform should be established on the basis of a profound understanding of the dimensions of customer experience, such as the establishment of experience store and experience center as well as designing better experience environment and humanistic service. Second, profound understanding of customer psychology should go before the design of the customer experience. For

example, to provide a quick experiencing and purchasing and easy returning for the customers who are suffering from a busy work so as to make them feel convenient.

5.2 Using marketing strategy timely in the process of experiencing

Samsung and Apple, the former as a leader in the field of smart phones and the later as a bellwether in humanized service, undoubtedly did a marvelous work by taking the experience marketing model perfectly. As for domestic mobile phones, which are still trapped by the traditional marketing model, innovations should be made insistently through studying marketing strategies made by Apple and Samsung.

Zhuopu could be regarded as a good example by keeping pace with experiencing marketing as Apple and Samsung did. Apart from that, it has its own unique features now and its store-marketing can be found in more than 100 experience stores and adopt a strategy to sell its products both on line and in traditional market at the same time, aiming to provide its customers with the excellent sense, action and thinking experience, as well as other experiences related with consumption and after-sale service.

Of course, brand power should not be neglected in brand marketing. Only when domestic mobile phones integrate user experience into the current brand marketing system and continuously improve the quality of the hardware can they satisfy the consumers' need and beat the competitors.

6 Conclusions

If company wants to achieve the best effect of brand marketing, it must realize the value of user experience. In order to create the perfect user experience, company should study the experience management framework and use the strategy of brand marketing for experience marketing on the basis of analysis and anatomy of dimensions, characteristics and factors of user experience. In the increasingly competitive environment of experience economy, companies that attract the customer will become the final winner. In order to keep a long-term competitive capability, company should realize the importance of influential factors of user experience in brand marketing, and finally help the enterprise's customer value and financial profits.

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Analysis of Residents' Leisure Behavior in Medium-Sized City: A Case Study of Xianning City of China *

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Abstract: With the rapid development of economy and the increase of national holidays, leisure tourism has gradually become an important part of city residents' life, which provides a reference for developing and managing recreational land to analyze leisure behavior characteristic. In order to provide a reference for leisure tourism, the study focuses on the leisure tourism of medium-sized cities which is less concerned at present and taking Xianning city of China as an example, probes into residents' leisure way, tourism preference, travel motivation, travel frequency, travel time and other behavior characteristics. Lastly, a conclusion of how to conduct the leisure behavior is drawn.

Key words: Medium-sized city; Leisure tourism; Travel behavior; Xianning city

1 Introduction

With the sustained development of national economy and steady increase in national income, China has entered the "era of leisure", leisure is the welfare that the public should enjoy when economy has developed to a certain level, and also is the important method to increase national happiness. There are totally more than 115 days of vocation time for Chinese throughout the year at present, so the leisure demand is greatly inspired. In recent years, some scholars have researched on residents' leisure behavior in some big city. For example, Zheng Yiqing summarized the residents' leisure impediments and revealed the current situation of Shanghai public leisure activities (Zheng Yiqing, 2006); Liu Ningning predicted the development trend of leisure activity in the future (Liu Ningning, 2004); Xu Xiaoxia and Chai Yanwei analyzed on the gender difference of Beijing residents' daily leisure behavior (Xu Xiaoxia, 2012); Liu Changxue and Wang Degen analyzed Hefei urban residents' weekend leisure travel behavior by using "need-motive-behavior" mode (Liu Changxue, 2005); Wang Bin and Wang Zhaoli analyzed on the difference between Dalian residents' leisure motivation and behavior (Wang Bin, 2008).

The scholars' research object is mainly concentrated on big city, and the research on residents' leisure behavior in medium-sized cities is still weak and lack of attention (Lu Xiaoli, 2006). In order to understand Chinese residents' leisure behavior characteristic comprehensively and provide a reference for developing leisure tourism in medium-sized city, the article focuses on medium-sized cities, and takes Xianning city in central China's Hubei Province as an example.

2 Research Method

Using the questionnaire investigation method, the author went to Xianning Qianshan Forest Park and Hot Spring Square for random sampling to leisure visitors in March 2012. 250 questionnaires were released totally and 203 available questionnaires were recalled, with an effective rate 86%.

The population characteristics of the sample are as follow: Males account for 45.32%, females account for 54.68%; Tourists' ages mainly are between 18~24 (48.2%), 25~34 (21.18%) and 35~44 years old (16.26%); Occupation compositions are student (29.56%), freelancer (28.08%), company staff (16.75%), business owner (8.37%), civil servant (6.90%), teacher (5.42%), farmer (2.96%) and military (1.97%); Education background compositions are college (40.39%), high school or technical secondary school (27.59%), bachelor (15.76%), junior high school (10.34%), primary school (4.43%) and master (1.48%); Monthly income level compositions are 1000~1999 (37.44%) and 2000~2999 (29.56%). The sample composition is thought to be in accord with Xianning's basic population characteristics as well as the social economic development. Therefore, the following analysis is representative.

3 Analysis of Leisure Behavior Characteristic

3.1 Choice of leisure activity way

The result of the survey sample "choice of leisure activity way in weekend and vocation" shows that

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residents' main entertaining ways are watching movie or TV, sleeping and shopping, which respectively account for 37.44%, 34.98% and 33.99%; The choice of "tourism leisure" accounts for 30.05%. Other options such as "doing housework", "reading books or newspapers", "visiting relatives", etc, also occupy a certain proportion. It indicates that residents' leisure activity ways in weekend and vacation are still mainly home-based activities at present, which has a great potential for development. (Figure 1)

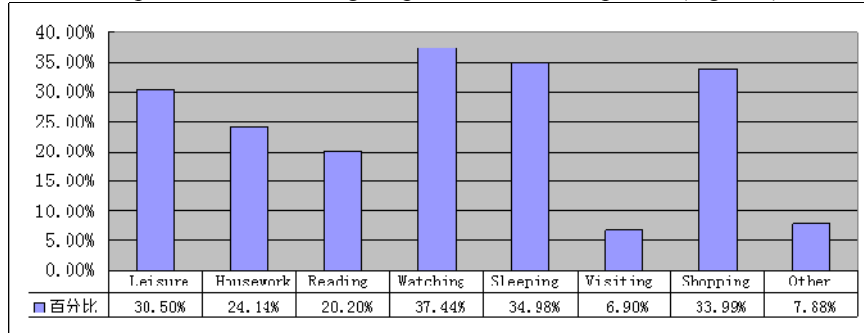


Figure 1 Choice of Leisure Activity Way

3.2 Travel motivation

Statistical on "residents' travel motivation" survey shows that the proportions of two options "life-enriching" and "friend-gathering" are the highest both in urban and suburban, respectively accounting for 44.34% and 41.14%, which are followed by "exercise" and "leisure", occupying respectively 36.45% and 43.84%. Others such as "relatives/friends-visiting"(22.17%), "business activities"(11.33%), "religious belief"(2.96%), "native product-buying"(1.97%) and "other" (5.17%), etc occupy a small proportion. The tourism projects have high attractiveness only when tourism designers design them in accord with the demand of residents.

3.3 Frequency of tourism leisure

The statistics of residents' leisure frequency within a year shows that, residents' leisure frequency is mainly concentrated on "1~2 times", accounting for 47.78%, which is followed by "3~5 times", accounting for 24.63%, "more than 6 times" accounting for 19.21%. It is in accord with the regular that the more times of traveling, the smaller proportion is. Besides, the data also shows that 3.94% respondents' leisure frequency is 0. The reasons include limited income and then limited tourism purchase capacity, a heavier burden or no leisure time. The reason also includes that some people have no ideas on tourism for their poor educational background. However, the proportion of this part is small, which indicates that the travel demand of residents is strong.

3.4 Tourism products preference

The survey on "residents' tourism products preference" shows that, "forest park" is residents' most favorite leisure project, and the proportion of it is the highest, 46.80%. The proportions of "playground", "lakeside resort", "farmhouse", "temple", "industrial parks" and "other attractions" are distributed, and account for the indifferences. Overall preference shows residents' psychological preference that they like to be close to the nature and want to return to the nature as well as their diverse needs of tourism products. Therefore, leisure tourism development should focus on the investment and innovation of forest park, and take forest recreation tourism products which is based on eco-tourism as the main leisure tourism development, and other tourism products as subsidiary ones. (Figure 2)

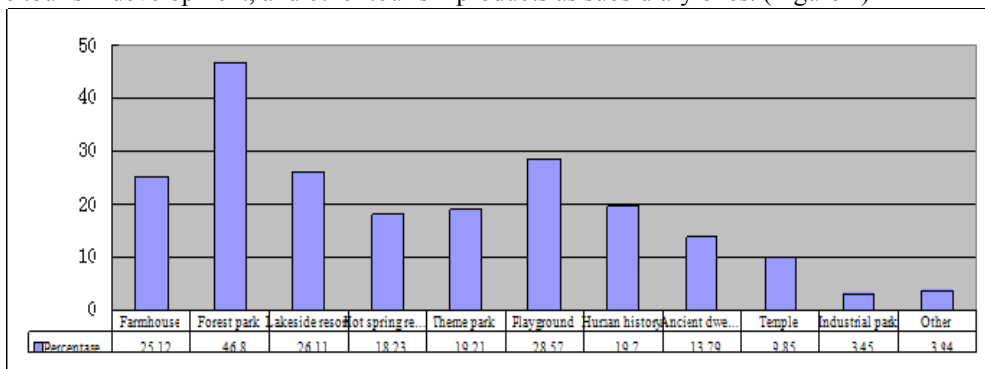


Figure 2 Tourism Product Preference

3.5 Travel time

The survey on “Resident’s travel time” shows that the proportion of “weekend” is the highest, accounting for 36.45%. This is followed by holidays and small holidays, respectively accounting for 35.96% and 29.06%. The proportion of “golden week” is relatively small, only 18.72%. It indicates that weekend leisure tourism has become one of the main forms for current residents to travel, and resident’s choice of travel time is more rational. And on the seasons’ choice of the year, since the climate in spring and autumn is pleasant, there is a high proportion of people traveling in these two seasons. And because it is hot in summer and cold in winter, there is a relative low proportion of people traveling in these two seasons. Therefore, the seasonal fluctuations of Xianning city of China on traveling is big. For this reason, tourism enterprises can increase publicity appropriately, influence people’s tourism decision-making, guide people to take part in tourism activities harmoniously, and avoid the emergence of the phenomenon that there is a more excessive number of travelers in some seasons and too limited number of travelers in off-season. (Figure 3)

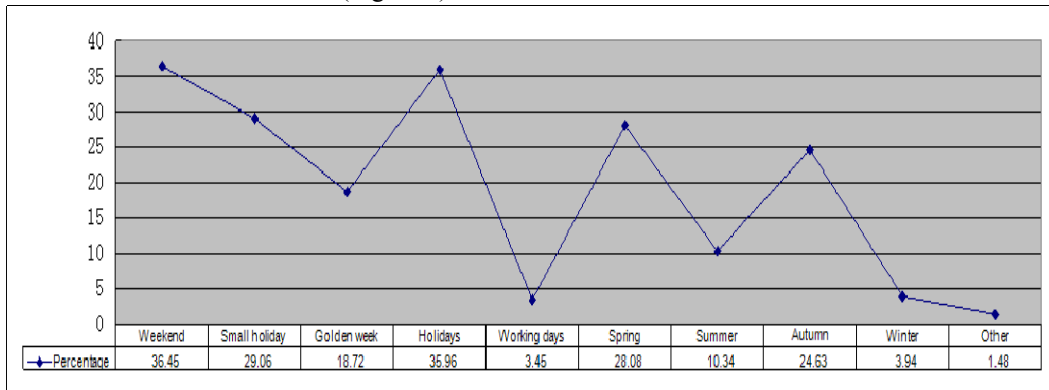


Figure 3 Travel Time

3.6 Travel partner and transportation

In the aspect of travel partner, the survey shows that among the four options “family”, “friend”, “colleague” and “other”, “friend” accounts for the highest proportion, 60.10%, which is followed by “family” with a proportion 35.96%. “Colleague” accounts for 25.12% and “other” accounts for 4.43%, which is in accord with fundamental realities of Chinese focusing on family and friendship. Besides, travel with family or friend is a good way to relax and improve the relationship.

The survey on “transportation” shows that, the proportion of “Travel by public transport” is the highest, 41.38%. This is because most of the tourists are middle working class or students, whose discretionary income is limited while the surrounding spots’ distance is fairly big so that the bus and public transport has become the first choice. Self-driving accounts for 37.93%, which means domestic cars have been available to the public at present. Self-driving travel is very convenient and is favored by people. (Figure 4)

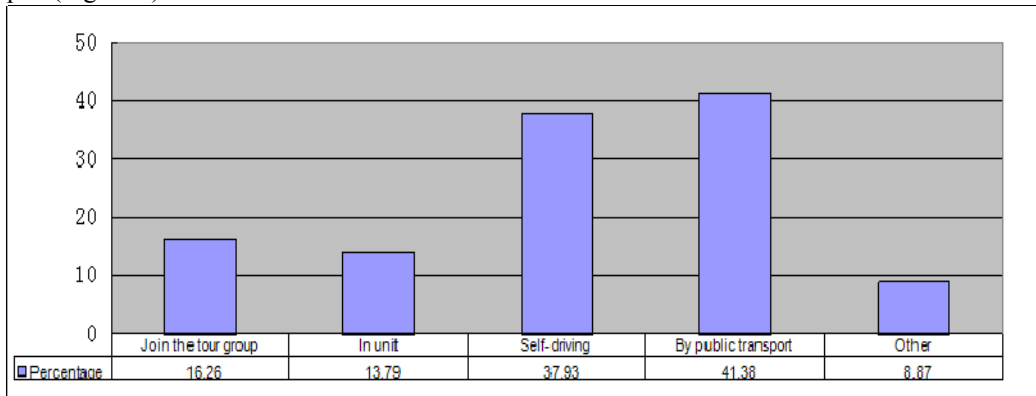


Figure 4 Travel Partner and Travel Methods

3.7 Ways to get travel information

The result of the survey show that the highest proportion of “ways to get travel information” is

recommendation by friends or relatives, accounting for 42.36%. It is followed by “Internet”, and “TV”, which account respectively for 41.87% and 38.42%. Therefore, scenic areas should focus more on “word-of-mouth” publicity although TV and website publicity also play an important role at the same time. Scenic areas should establish a website to publicize actively and make use of television skillfully to advertise tourism area. Besides, to get information through newspapers and books also occupies a certain percentage, which can not be ignored. Travel managers can make hierarchy publicity contrary to source markets after cleared these publicity utility. (Figure 5)

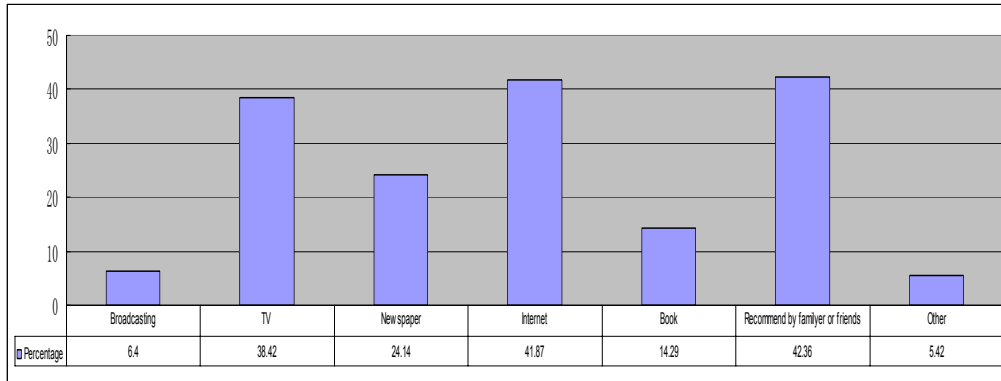


Figure 5 Way to Get Travel Information

3.8 Days may stay

The number of “Overnight visitors” always is an important indicator among tourism statistics. The results show that in the survey of days may residents stay in peri-urban travel, there are 41.87% of respondents may stay for two days, which accounts for the highest proportion, followed by “stay for three days”(24.63%), the share of “stay for four days” is 5.91%, “more than four days” is 7.39%, above are all “possible overnight visitors”. The share of “return in that day” is 18.72%, which is relatively less than “possible overnight tourists”. All results indicate that the source market scale of Xianning residents is huge and has a large development space.

3.9 Requirements of accommodation and expenditure

Tourist’s impression of tourism destination is easily affected by accommodation in tourism activities. The survey shows that, on meals during traveling, people eager to be able to taste the local specialties in the peri-urban leisure travel, this proportion reaching 77.34%. The next is “farmhouse meal”, accounting for 27.59%, and only 8.37% of residents selects “fast food”. 0.99% of residents hope to participate in the upscale banquet. Thus, it is optimal that the repast in or around scenic area should reflect the local characteristics.

In terms of expenditure on traveling, the survey shows that most people can withstand a total personal consumption between 100 to 500 Yuan whether in city or pier-urban leisure tourism, the proportions of in city and pier-urban are as high as 79.80% and 74.39% leisure tourism, while the share of personal consumption which is greater than 100 but less than 500 is relatively small. The data indicates that people’s price requirement is relatively modest, for which limited requirement when the price is too high and low-grade travel route when the price is too low that easily leave bad impression . (Figure 6)

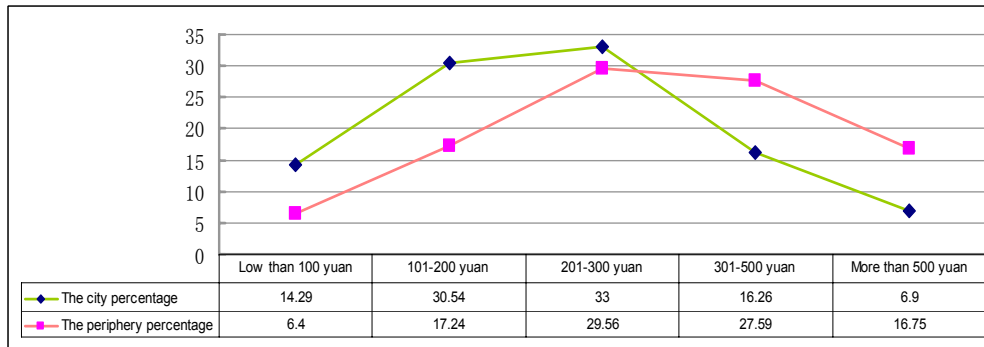


Figure 6 Consumers’ Willingness

3.10 Travel satisfaction and travel recommended willingness

In surveying the satisfaction level, we found that the proportion of “general” is the highest, accounting for 57.14%. “Very satisfied” only accounts for 3.94%, and “very dissatisfied” is 0. On the one hand, this result illustrates that information tourist obtained usually exaggerates the travel effect which makes residents have high expectations each time before traveling, and on the other hand, it explains that there are deficiencies in peri-urban scenic construction and it needs to improve. (Figure 7)

Travel satisfaction not only is an important factor of willingness on travel recommendation to others, but also a free publicity of travel products. According to the survey, 60.59% of residents will recommend the places they have ever visited to their friends and relatives, and this proportion is much higher than other options. Only 2.96% of residents won’t recommend it definitely. It reveals that residents have a high travel recommendation willingness which has a tremendous impact on “word-of-mouth” publicity.

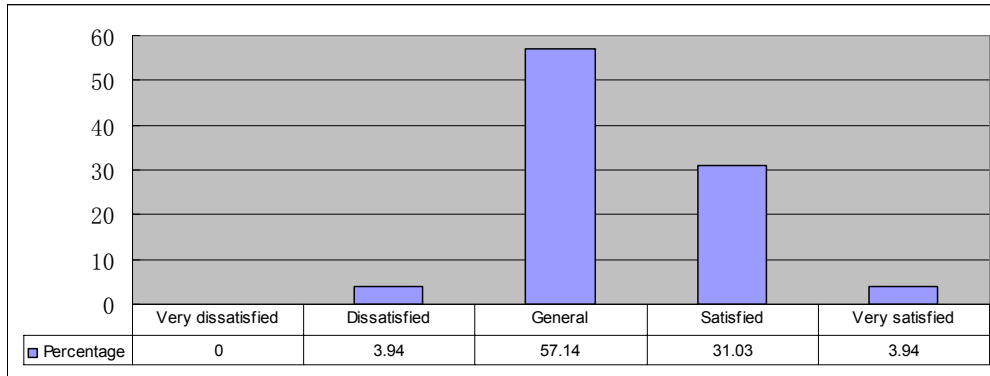


Figure 7 Travel Satisfaction

3.11 Travel complaint

Surveying on “travel complaint” shows that the proportion of “complaint” is the highest when residents are dissatisfied with the travel service, accounting for 36.95%. It is followed by “complain to anyone”, accounts for 27.09%. The proportion of “submit to humiliation” is 18.23%, and only 16.26% of residents do not mind. For complaint departments, the highest proportion is “complain to the unit”, the second is “complain to superior”, and accounting for 27.59%, the last is “complain to industrial and commercial sector or media”. The result shows that residents deal with problems rationally when they are dissatisfied with the travel services. Tourist complaints always affect surrounding crowd’s impression of scenic area and have a greater impact on scenic development. Therefore, scenic area needs to pay attention to tourists’ complaints and satisfaction and maintains a good image of the tourist places.

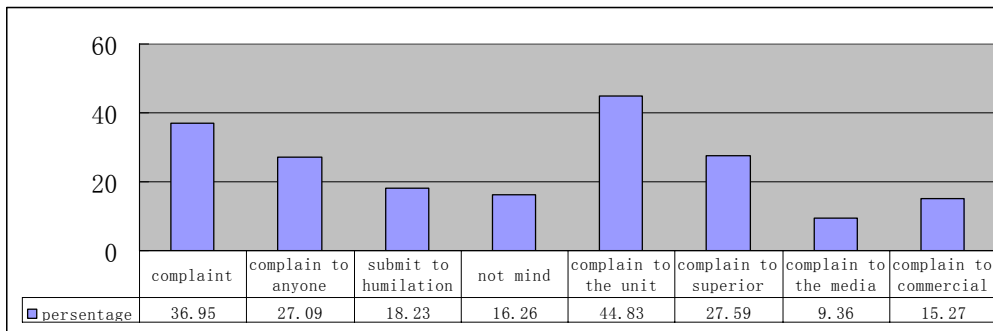


Figure 8 Travel Complaint

4 Conclusions

4.1 Develop leisure tourism vigorously and create a good leisure tourism environment

Leisure tourism has become the main leisure activity of residents in medium-size city to enjoy life and relax and has a huge development potential. A good leisure tourism environment not only can stimulate residents’ consumption and promote the development of many industries, but also can increase people’s well-being sense and meet the growing demand of leisure travel. To create a good leisure tourism environment, firstly, it requires the government to play its leading role, to scientifically manage and rationally plan leisure tourism products, to strengthen the construction and improvement of leisure

tourism infrastructure and related facilities. Secondly, it requires tourism providers to develop high quality and healthy leisure tourism products, to improve the quality of travel services, to concern about travel complaints and satisfaction issues. Lastly, it requires promoting leisure education vigorously, advocating the civilized and scientific leisure lifestyle to improve residents' quality of leisure life.

4.2 Develop diversified leisure travel products which is ecological tourism-oriented and suitable for residents to gain knowledge and share feelings

Residents travel motivations are to enrich life and gather with friends. Tourists expect to relax and share feelings with friends and relatives while broadening their horizon and enriching their life when appreciating the natural beauty, customs and culture in different places. Residents overall travel preference is diversified leisure tourism product--forest recreation--ecological tourism-oriented. Thus, only when tourism providers develop tourism products which meet residents' leisure demand in view of residents' travel motivation and travel preference, can tourism products be able to attract the attention of residents and stimulate residents' travel consumption.

4.3 Tourism area must pay attention to "word of mouth" publicity in their management

The ways residents obtained travel information illustrates that most residents will choose a tourism area according to the satisfaction degree of their friends and relatives of the area. While tourists' recommendation willingness indicates that most tourists would like to recommend the places that they have ever visited to surrounding people. Therefore, if tourism areas want to do great job in marketing, "word-of-mouth" publicity is essential. Because "word-of-mouth" publicity is unique and other marketing means can not replace, it is the best way to enhance tourism area's various aspects of service quality, improve tourists' satisfaction, and maintain a fine expression to tourists, for gaining a good "word-of-mouth" effect. A fine impression in tourists' mind is the basic of "word-of-mouth" publicity.

4.4 Develop self-help tourism market vigorously, and pay attention to promotion of individual market

At present, the most popular travel decision-making way for residents in medium-sized city is self-arranged travel with their relatives and friends, so self-help tourism market develops fast in recent years and has very large development potential. In addition, taking bus and self-driving are still the main methods to travel. Therefore, tourism planners should fully consider the self-help tourism market and develop good self-help tourism products vigorously. Considering the larger difference between self-help tourism and package tours in marketing, tourism providers should treat product publicity differently and pay attention to the promotion of individual market.

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Risk Management of REITs in China

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Abstract: The macro-regulation of the Chinese Central government has accelerated the development of real estate investment trusts (REITs). This paper analyzes the risks facing REITs in China. It suggests that a risk management system be set up to prevent the risks. It is concluded that the government and REITs companies should both play their part to promote its sound development. REITs market can actually help reducing the overall systemic risk of China's financial market, it will help to accelerate China's development on financial tool to serve the rapid development of the real estate economy.

Key words: REITs; Risk; Management; China

1 Introduction

With the tightening of the Central Government's macro control, China's real estate investment and financing patterns are changing. The main channel of financing – "credit" gradually is now shrinking with the emerging of all sorts of direct financing channels, such as property funds, trust, overseas listing of the securities, securitization of assets and etc. More and more real estate enterprises rely on the real estate trust for fund raising. However, in the development of China's real estate investment trusts, there exist many risk factors due to the market immature and the imperfection of the relevant laws and regulations. The purpose of the paper is to outline the risk management system of REITs. In order to achieve this, the following contents will be covered: the status quo of the REITs; the risk analyses of China's REITs; the risk management framework of REITs.

2 REITs in the Western Countries and in China

A REIT is basically an organization with the sole purpose of owning and managing investment properties-including apartments, shopping malls, office buildings, industrial parks, hotels and warehouses and etc. Typically there are Equity REITs, mortgage REITs and hybrid REITs. A equity REIT owns, or has an "equity interest" in, rental real estate rather than making loans secured by real estate collateral. Mortgage REITs makes or owns loans and other obligations that are secured by real estate collateral. Hybrid REITs combines the investment strategies of both equity REITs and mortgage REITs. Typical benefits of REITs include: (1) Access to real estate investment, REITs provide the opportunity for small investors to invest in expensive real estate assets that would otherwise be accessible only to institutional and wealthy individual investors; (2) Diversification, REITs allow investment in a portfolio of assets and provide an alternative to investing in listed property company shares. For institutions such as insurance companies, which require steady returns to match their long-term liabilities, the stable income stream of a REIT is an alternative to holding bonds; (3) Regulated status, REITs are typically a highly transparent and regulated means of investing in real estate, which boosts investor confidence; (4) Tax transparency, Most countries treat a REIT as a tax transparent vehicle, so the income earned by a REIT is only taxed on distribution to the investors and not at the REIT level, thus avoiding double taxation.

2.1 Reits in the U.S

Internationally, the United States was the first country to introduce the REITs. One of the main reasons the U.S. Congress created real estate investment trusts (REITs) was to provide economies of scale to individual investors participating in the risk-return tradeoff of large-scale real estate properties^[1] In 2006, the US had 197 REITs worth about 330.7 billion U.S. dollars compared with 34 REITs worth a total of 1.5 billion U.S. dollars in 1971 to U.S dollars in 2006. According to the NAREIT, the total market capitalization of equity REITs increased from \$0.33 billion in 1971 to \$151.27 billion in 2002. In addition, increasing participation by institutional investors resulted in a structural change in the early 1990s.^[2] Wang et al. document that institutional ownership in REITs between 1979 and 1990 ranged from 6.66 to 15.60%.^[3] Institutional participation had increased to 30%, according to Chan et al.^[4] The U.S. REITs is now in a period of relative stability.

2.2 Reits in Canada

REITs are relatively new phenomena in Canada, As of November 1994, there were only three REIT

strading in Canada, and just five by March 1997. At the time of the Initial Public Offering (IPO) pilot study reported, there were 13 REITs trading on the Toronto Stock Exchange (TSE), seven of which were launched in 1997. Total assets in Canadian REITs grew from Cdn\$80 million in 1993 to \$4 billion in 1998. Since 1998 the Canadian REIT market has been relatively quiet. Riocan acquired REALFUND and Summit acquired Avista, both on unsolicited offerings. Three new funds have issued IPOs: Cominar in September of 1998, O&Y REIT and Retirement Residences REIT (RETREIT) in 2001. RETREIT and CPL REIT announced in 2002 that they would merge.

2.3 Reits in China

According to the State Statistical Bureau of China in 2005, the domestic REITs market continued to show rapid development(as shown in Figure 1). Not only the types and scale were expanding, the product structure also showed a sign of diversification. Up to Dec. 31, 2005, a total of 121 REITs were issued with a value of 15.727 billion yuan, an increase of 28.73% over the same period in 2004. The issuing number and scale hit a historical height since 2002. At the end of 2006, China lifted the policy restrictions on foreign banks' operation in RMB deposit and lending. This means the Chinese real estate companies will compete in a fiercer environment and a new round of innovations in financial products and services will be spurred.

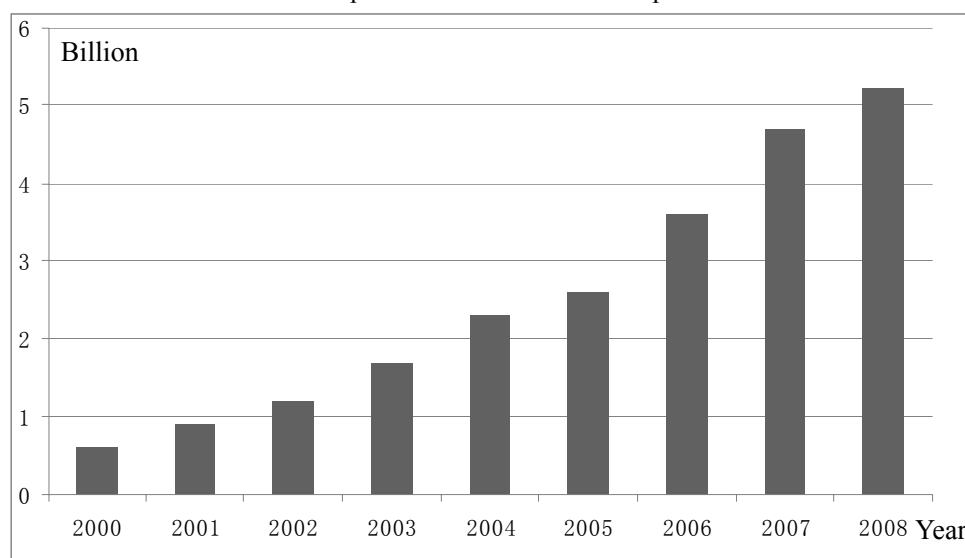


Figure 1 Loan Amount of Real Estate Industry Between 2000-2008 in China

3 Risk Analyses of Reits in China

As the natural selection of real estate development, REITs can widen the direct financing channel, raise the proportion equity financing of the developers, establish a mechanism for sharing risks and benefits. The introduction of REITs is widely welcomed by investors in China. But there do exist some risks due to imperfection of legal systems and lack of professional management in REITs

3.1 Legal risks

In the United States, there are some relevant laws to regulate REITs, such as Securities Act of 1933; Securities Exchange Act of 1934; Internal Revenue Code of 1986 (Sections 896-960); Tax Reform Act of 1986. For example, the Internal Revenue Code of 1986 stipulated that: REITs entity must be managed by one or more directors or trustees; Shares or beneficial interest in the entity, if the entity is operated as a trust, are transferable; The entity must have a minimum of 100 shareholders; The entity is not closely-held (no more than 50% of the entity's shares may be held by five or fewer individuals; The entity invests at least 75% of its total assets in real estate assets ;The entity derives at least 75% of its gross income from real property rents or interest on mortgage on real property; The entity pays dividends of at least 90% of its taxable income. All these laws are necessary for the sound development of REITs in the United States. But in China there exist some legal risks.

3.1.1 Risks brought by the imperfection of corresponding laws

In addition to one law and two regulations, China issued the Provisional Regulations on the Management of REITs Businesses of Trust Investment Corporations in 2004. These laws and regulations have specified some problems existing in REITs and made some breakthroughs. However, some of the important rules for the establishment of REITs are not proper, for example, the rule that stimulates that

the total copies of contract to a trustee should not exceed 200; the rule that all the REITs products are not allowed to promise profit to the buyers.

At the same time, the Fund Act, the Securities Act and other regulations all avoid such checking mechanism as corporate governance. The existing laws and regulations have not clearly stipulated such important questions as conflict interest, frauds, inside trading, agents and etc. Imperfection of laws would hinder the sustainable development of REITs.

3.1.2 Risks brought by the insufficient attraction of the preferential tax policies

REITs enjoys tax reduction worldwide, that is, the profits just transferred from the trusts to the investors, it should not be taxed twice. It is the preferential tax policies that attract the investors most. Up to March, 2006, the Chinese tax laws have not recognized this, nor have the qualification of REITs bodies. Currently for investors who invest in listed REITs or ordinary listed companies, they will face a 33% of the corporate profit tax and a 5% of the commercial tax. Such high tax has reduce the attraction to the investors.

3.1.3 Risks brought by frauds in the property ownership

A perfect system of property ownership and its transparent trading constitute the foundation of the REITs market. Fraud risks may occur if (1) the definition of property right is not clear. The existing laws and regulations basically deal with the property right in the state-owned real estate, and have not covered a variety of forms of property right; (2) the registration process is too complicated. REITs demands high flow, if the complication of the registration process will certainly increase operation costs; (3) the segmentation and transfer of property rights are not clearly specified. REITs raise funds by gathering the individual investors together. Thus the investors share the property rights. When the property rights are transferred, it comes to the question of how to divide the rights. But the existing laws only allow the whole transfer of property right.

3.2 Risks brought by the real estate market

Risk factors in the real estate market may affect the REITs value, such as the real estate price, the interest rate the rental return, the stock return. At present, the risks and REITs are closely tied to the capital market. With the interest rates going down worldwide, most of the investors buy REITs with the expectation that REITs will go up and they would rather accept a lower stock return. If the interest rate rebounds, the financing cost will increase and negative effects will occur.

3.3 Risks brought by the absence of fiduciary responsibility

REITs would suffer from poor management and investment failure if fiduciary responsibility is absent. As fund managers, the fund management companies, they are independent legal entities established in accordance with the Company Law, and should be supervised under the corporate governance. But the reality is that the shareholders of the fund management companies of China are mostly security companies, banks, listed companies, insurance companies. This kinds of shareholder structure would inevitably result in connection transactions and conflicts of interests.

4 Risk Management of Reits

The governments, trusts and investors all have their share and demands in the development of REITs. At the same time, they bear different risks. A risk management system can be established to prevent the risks with the concerted efforts by the governments and REITs.

4.1 Legislation by the government

4.1.1 Establishment of a sound legal system

In addition to the special laws concerning the investment fund, REITs should be regulated by the Securities Act, the Company Law, the Fund Law and the Contract Law jointly in order to achieve consistency in the legal environment. Preferential tax laws should also be made to attract the REIT investors.

4.1.2 Recognition of valid property ownership and the establishment of information disclosure

In order to establish a perfect REITs market, the government should bear in mind that: Recognition of valid property ownership is the prerequisite for the approval of REITs. The investment banks should reduce the risks via verification report and check before IPO. The capital management companies should check to insure that property ownerships they are purchasing are valid.

The supervising agents of the government should regulate information disclosure, ensuring that (1) *information* disclosure should be done in the media assigned by the supervising agencies; (2) strict and detailed rules should be made concerning such information disclosure as interest conflict, fraud, inside transaction and etc; (3) information disclosure should be done according to the specifications and texts

laid down by the supervising agencies.

4.2 Risk-reducing efforts by the trust companies

The trust companies should realize their full potential by releasing products of various risks and benefits through the creative design of the structure so as to meet the diversified and customized demands of the REITs market. In this way, the risks brought by the real estate market will be reduced. At the same time management by professional managers should be adopted to protect the interests of the investors.

4.2.1 A new mode to develop commercial property REITS

A new mode to develop commercial property has been introduced in China. It is similar to financing lease. The investment companies with strong managerial capability invest in retail and commercial properties and then lease them to the foreign retailers who do not want to invest and possess their own. Thus a strategic cooperation partnership is formed. The investment companies rely on the rentals for returns and the foreign retailers can save a large amount of money. The former can take advantage of the latter's brand name. The latter can depend on the former's managerial capability and the attraction to the international lessees and gather more customers. The investment companies can collect fixed rentals or can share portion of the sales profit plus the fixed rentals. In this way the value of the commercial property will be added.

4.2.2 Professional management of REITS

Professional asset management companies and managers should be hired to manage the daily affairs and the operations of REITs. They use their professional knowledge to devise the investment portfolios to reduce the risks so as to ensure higher returns.

The asset management companies should be highly skilled in a series of functions. For example, they know how manage the portfolios of real estate assets, know how to establish and explore future asset acquisition channels, know how to deal with the affairs related to investors. At the same time, professional manager system should also be set up to improve corporate governance, to establish a comprehensive internal control framework, to formulate the organizational constitutions and rules and etc.

5 Conclusion

Though REITs has developed rapidly in China, there do exist some risks due to imperfection of legal systems and lack of professional management in REITs. A risk management system should be set up to ensure the sound development of REITs. The government should try to improve the legal system, set up a system of information disclosure, and supervise and severely punish the law-violating practices. As for the REITs companies, they should realize their full potential by releasing products of various risks and benefits through the creative design of the structure so as to meet the diversified and customized demands of the REITs market. To sum up, the joint efforts by the government and the REITs field can reduce the risks and ensure its healthy development.

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An Analysis of the Chinese Firms Investments Political Risks in West Africa

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Abstract: This paper analyzes the political risks of Chinese investments in The West African Economic and Monetary Union (WAEMU) using the International Country Risk Guide (ICRG) methodology and data. The ICRG data are used to calculate Chinese investments risk index in WAEMU counties. The results show that the risk associated with the Chinese investments in WAEMU countries is lower than the risk associated with investments in general.

Key Words: Political risk; Chinese investments; WAEMU

1 Introduction

Political risk refers, for multinational companies, to the risk that a host country will make political decisions which prove to have adverse effects on the multinational's profits and/or goals, provoking strategic, financial or personnel losses. Currently, Chinese companies are becoming the biggest investors in Africa; where the political risks are very high hence a debate on the relationship between Chinese investments and their host countries political risks.

The aim of this paper is to analyze the Chinese investments political risks in The West African Economic and Monetary Union (WAEMU). It first presents the political risk variables according to the international country risk guide (ICRG), and then it uses the ICRG data to calculate the political risk for Chinese companies. The rest of the paper presents a review of the literature (2), a brief presentation of WAEMU (3), the methodology used (4) the results (5) and the conclusion (6).

According to C. Kennedy, political risk is related to changes in macroeconomic and social policies such as fiscal, monetary, trade, investment, industrial, income, labor and developmental policies or to political instability such as terrorist attacks, riots, coups, civil wars and insurrections.

In developed countries political risks is usually due to regulatory excesses while in developing countries is often linked to structural risks. These include regime instability, sync economic policies and ethno-religious-cultural imbalances in development, due to the monopoly of political power and economic wealth by a single dominant ethnic or religious group.

From the regulative institutional perspective, a decision on location choice for multinationals is to determine favorable locations where regulative institutional constraints are less repressive to FDI activity so that multinationals can more readily conform to the regulative constituents of the host countries (KANG & JIANG, 2011). The political and legal regime is one of the main dimensions of these regulative institutions. In this regard, host country political risk can be considered alongside any other kind of external influence that affects the company's operations, whether that means the possibility of expropriation or nationalization of the investments, or other government actions or changes in the political and social situation that could have a negative effect on economic activity (Kobrin, 1979; Robock, 1971; Simon, 1984).

The differences in political risk between countries affect the stability of their markets, which affects foreign companies aiming to do business there. The high degree of uncertainty associated with foreign ownership or increased asset exposure in the event of eventual expropriation are some of the factors that can hinder FDI decisions (Brouthers, 2002; Pak & Park, 2004). As a result, the conventional wisdom suggests that higher political risk will be negatively related to FDI, given that multinational companies will be more reluctant to invest in countries that are a high risk or have an unstable environment.

Although some papers focusing on Chinese multinationals support the view that Chinese investments are negatively related to higher political risk (Duanmu & Guney, 2009), there is empirical evidence suggesting that the risks of the host country do not affect Chinese multinationals in a conventional way. Cui and Jiang (2009a) found that country risk does not affect how Chinese multinational commit FDI resources. Buckley et al. (2007) did not confirm that Chinese outward FDI is negatively associated with high levels of political risk in the host country. Some papers even report that Chinese multinationals tend to invest in countries with higher levels of risks (Malhotra & Zhu, 2009; Ramsey, Yeung & Laforet, 2011).

2 An Overview of the WAEMU Countries

The West African Economic and Monetary Union (Union Economique et Monétaire Ouest Africaine, UEMOA) is a regional organization of eight West African countries (Benin, Burkina Faso, Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo). They share the same money, West African francs (CFA francs), monetary policies, and French as an official language. The objective of the union is to promote regional economic integration and create a common market. Benin, Cote d'Ivoire, Guinea Bissau, Senegal and Togo are on the coast of West Africa whereas Burkina Faso, Mali and Niger are landlocked countries. The climate ranges from warm and humid on the southern coast and dry and hot in the semiarid countries. The economy is predominantly agricultural. Cocoa, coffee, timber, cotton, onions, sesame seeds, and Arabic gum are among the cash crops produced and exported by the union and also mining industry: oil, uranium, gold. Cote d'Ivoire, which represents the largest economy of the union, has some manufacturing activities.

Political stability has improved in some member countries. Niger after one year of military transitional regimes elected a new president in 2011. Cote d'Ivoire, after social conflict and a political crisis, organized a democratic election and a new president was elected in 2011. Senegal elected a new president in 2012 in accordance with the constitution after an attempt by the outgoing president to modify the constitution and remain in power. However, in 2012 there was political instability in Mali with a rebellion in the northern area and a coup d'état.

3 Methodology

The methodology is based on the international country risk guide (ICRG) methodology. The ICRG political risk index is a general index. In this paper, the political risk index is calculated for Chinese investments

3.1 The ICRG political risk rating

The ICRG political risk rating includes 12 weighted variables covering both political and social attributes. The aim of the political risk rating is to provide a means of assessing the political stability of the countries covered by ICRG on a comparable basis. This is done by assigning risk points to a preset group of factors, named political risk components. The minimum number of points that can be assigned to each component is zero, while the maximum number of points depends on the fixed weight that component is given in the overall political risk assessment. In every case the lower the risk point total, the higher the risk, and vice versa. A political risk rating of:

- 0.0% to 49.9% indicates a Very High Risk;
- 50.0% to 59.9% High Risk;
- 60.0% to 69.9% Moderate Risk;
- 70.0% to 79.9% Low Risk; and
- 80.0% to more very Low Risk.

3.2 Variables

Table 1 The Twelve Variables with Their Corresponding Maximum Score

	Variable	Score
A	Government Stability	12
B	Socioeconomic Conditions	12
C	Investment Profile	12
D	Internal Conflict	12
E	External Conflict	12
F	Corruption	6
G	Military in Politics	6
H	Religious Tensions	6
I	Law and Order	6
J	Ethnic Tensions	6
K	Democratic Accountability	6
L	Bureaucracy Quality	4

Table 2 The Subcomponents of the 5 Variables (A,B,C,D,E) in Table 1

A Government Stability	B Socioeconomic Conditions	C Investment Profile	D Internal Conflict	E External Conflict
1-Government Cohesion	1-Unemployment	1-Contract Viability	1-Civil War	1-War
2-Legislative Strength	2-Consumer Confidence	2-Repatriation	2-Terrorism	2-Cross-border Conflict
3-Popular support	3-Poverty	3-Payment Delays	3-Civil Disorder	3-Foreign Pressures

3.3 Data

Data was collected from international country risk guide (ICRG) for the West African economic and monetary Union Countries. From the 8 countries, data for Benin was not available and China does not have any relationship with Burkina Faso hence, the study was conducted with only six countries namely: Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo and data is calculated mostly for western countries investment. According to interviews and data collected for terrorism attacked, (computed in variable D Internal conflict). The political risk index is calculated for Chinese investments in West Africa.

4 Results

Table 3 The Scores and Political Risk in 2012

COUNTRY	A	B	C	D	E	F	G	H	I	J	K	L	Political Risk 2012
Cote d'Ivoire	8.5	2.5	8.0	8.0	9.5	1.5	2.0	2.0	2.5	2.0	3.0	0.0	49.5
Guinea-Bissau	5.0	3.0	5.5	8.0	8.5	1.5	0.5	5.0	2.5	3.0	4.5	1.5	48.5
Mali	6.5	3.5	7.0	6.5	9.0	1.5	3.0	4.0	3.0	4.0	3.0	0.0	51.0
Niger	7.5	2.5	6.0	8.5	10.5	1.5	2.0	2.0	2.0	3.0	3.0	1.5	50.0
Senegal	8.0	4.0	7.5	8.5	9.5	2.0	2.5	3.0	3.0	3.0	4.0	1.0	56.0
Togo	8.5	2.5	7.5	9.0	9.5	1.5	0.0	5.0	3.0	2.0	2.0	0.0	50.5

Table 4 The Scores by Subcomponents of the 5 Variables (A,B,C,D,E) in Table 3

Country	Government Stability			Socioeconomic Conditions				Investment Profile				Internal Conflict				External Conflict				
	1	2	3	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E
Cote d'Ivoire	3.5	2.5	2.5	8.5	0.0	1.5	1.0	2.5	3.0	2.5	2.5	8.0	3.0	2.0	3.0	8.0	4.0	2.5	3.0	9.5
Guinea-Bissau	2.0	1.5	1.5	5.0	1.5	1.5	0.0	3.0	2.0	2.0	1.5	5.5	3.5	2.5	2.0	8.0	4.0	3.0	1.5	8.5
Mali	2.5	2.0	2.0	6.5	2.0	1.5	0.0	3.5	2.0	2.5	2.5	7.0	2.0	2.0	2.5	6.5	4.0	2.5	2.5	9.0
Niger	3.0	2.5	2.0	7.5	1.0	1.5	0.0	2.5	2.0	2.0	2.0	6.0	3.0	2.5	3.0	8.5	4.0	3.5	3.0	10.5
Senegal	2.5	2.5	3.0	8.0	2.0	2.0	0.0	4.0	2.5	2.5	2.5	7.5	2.5	3.0	3.0	8.5	4.0	2.5	3.0	9.5
Togo	3.5	3.0	2.0	8.5	0.5	2.0	0.0	2.5	2.5	3.0	2.0	7.5	3.5	3.0	2.5	9.0	4.0	3.0	2.5	9.5

To calculate the Chinese investment political risk in West Africa, The highest score of 4 is given to the second column of variable D internal conflict which corresponds to Terrorism. Then the Political risk index is calculated for Chinese investments in West Africa. The result is given in table 5.

Table 5 The General Political Risk and Chinese Investments Political Risks in 2012

COUNTRY	Political Risk 2012	Chinese invest political Risk 2012
Cote d'Ivoire	49.5	51.50
Guinea-Bissau	48.5	50.00
Mali	51.0	53.00
Niger	50.0	51.50
Senegal	56.0	57.00
Togo	50.5	51.50

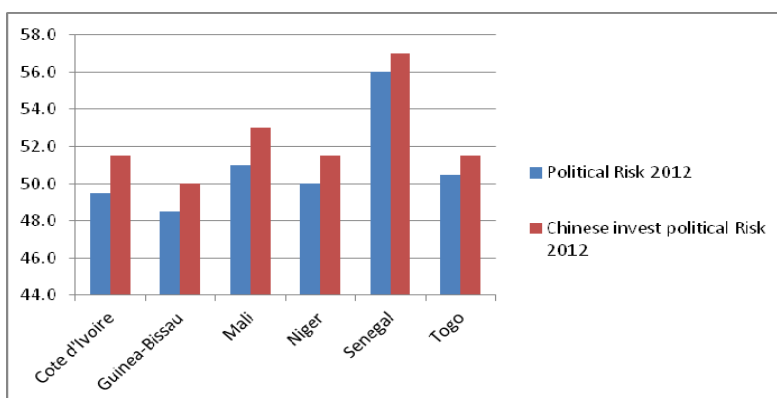


Figure 1 The General Political Risk and Chinese Investments Political Risks in 2012

The results show that the risk rating score for Chinese investments is higher than the general risk rating. The risk went from very high (less than 50%) for Cote d'Ivoire and Guinea-Bissau to high risk (between 50% and 60%) for all the 6 countries for the Chinese investments.

5 Conclusion

Although there is a debate about the Chinese investments and the political risks in their host countries, it can be concluded that the political risk for Chinese investments is quite different from the one for western investments. This study has shown that the political risk in WAEMU for Chinese investments is lower than the one for western countries. It therefore can be recommended to Chinese investors to assess their own political risk indexes in Africa because it may be different from the one for western investments.

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A Theoretical Study on Health Quotient Promotion-based Physical Education Reform at the University Level

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Abstract: University-level physical education does not currently include or implement health education. As a consequence, college and university students have a very weak theoretical understanding of health. This study maintains that university-level physical education should focus on the state of students' health, using the principles of the health quotient. Of particular importance are problems related to mental health, social adaptive ability, and lifestyle. Physical education should incorporate instruction based on health quotient-related theories and techniques; doing so will lay a strong foundation for students' lifelong physical education. In addition to opening up new paths and methods in research related to the all-around health education of college students, this can also enrich and perfect the theoretical system of modern sports science, as well as provide a new line of thinking and perspective to university-level physical education reform.

Key words: Health quotient; University-level physical education

1 Introduction

In the National Mid-to-Long Term Educational Reform and Development Program Outline (2010-2020), it is stated that maintaining comprehensive individual-based all-around education is the strategic theme of educational reform and development. At its core is finding a solution to the question of what kind of people education should aim to cultivate and the methods that should be used to do so. Key points include gearing education towards the entire student body and promoting the comprehensive development of students. It also emphasizes the importance of striving to increase students' sense of responsibility towards serving their country and society, their daring and creativity, and their problem-solving abilities. University-level physical education must firmly establish the idea of "health first," increase the quality of physical education, strengthen mental health education, and promote students' mental and physical health. The *National General College and University Physical Education Course Instruction Outline*, issued by the Department of Education in August of 2002, names "strengthening one's physical constitution, improving health, an overall increase in students' physical strength and ability to adapt to their environment, and promoting the comprehensive development of mind and body" as the most important responsibilities for university-level physical education in China. This publication gives prominence to health objectives that include allowing students to achieve comprehensive development in "the five areas of exercise participation, exercise skill and technique, physical health, mental health and social adaptation". If students are to achieve comprehensive development, health quotient education is a key indicator that can test schools' administrative principles, direction, and strength. College and university students are a special group; they have specific life experiences and growth environments. Institutions of higher education require measures and strategies that focus on individuals at varying stages of development; they should regard students' individual health quotient growth from the viewpoints of development and change. The purpose of health education is to foster good hygiene and exercise habits among students and to allow them to achieve comprehensive development in regards to health, so as to strengthen their social adaptive abilities.

The key points of higher education in China, as well as all-inclusive education, include the education and cultivation of a proper lifestyle and the establishment of scientific views towards health. The concept of the "health quotient" offers us a new line of thought that can be applied to these tasks. An urgent problem exists in university-level physical education theory and practice. While carrying out health-based instruction, schools must demonstrate how to apply physical education to increase students' use of the health quotient, such as through the effective use of classroom-based and extracurricular physical education activities; additionally, schools must be able to evaluate and predict the health conditions of their students. In addition to opening up new paths and methods in research related to the all-around health education of college students, this can also enrich and perfect the theoretical system of modern sports science, as well as provide a new line of thinking and perspective to university-level physical education reform.

2 Analyzing and Understanding Health and the Health Quotient, and Methods of Their Promotion

2.1 Health and the Health Quotient

In 1949, the United Nations World Health Organization (WHO) defined health as not only the lack of disease or physical weakness, but rather the satisfactory state of one's body (in terms of physiology), mental health, and social adaptive abilities. Fifteen percent of health and longevity is determined by heredity, ten percent is related to social conditions, eight percent is related to healthcare conditions, seven percent is determined by environmental factors, and sixty percent depends upon an individual's behavior. The health quotient (HQ) reflects an individual's knowledge and understanding of health and is an effective evaluation index of one's state of health. It uses a statistical index to measure an individual's knowledge understanding of health as well as the ability to maintain one's health. The health quotient gives particular prominence to personal healthcare. It emphasizes that through personal healthcare an individual can achieve optimal physiological, psychological and social health. Additionally, it focuses on the individual's healthy lifestyle and habits, as well as the whole and systematic study of methods of health care.

2.2 Promoting Health and the Health Quotient

In 1988 the WHO defined the promotion of health as the promotion of the methods of maintaining and improving individuals' health. Their definition also states that health promotion is a strategy of harmonizing people with their environment, and should decide every individual's responsibility in regards to their health. They emphasize the importance of active participation in the promotion of health on the individual, group, and even the societal level. People must correct unhealthy habits and behavior, optimize their lifestyles, and promote the improvement of the environment. The promotion of health can be applied to a wide range of settings and can aid the analysis, prediction and explanation of many behavioral habits and trends. Like the concepts of the intelligence quotient and emotional quotient, the health quotient is one characteristic of an individual. It can be improved through education, by applying willpower or emotional intelligence, and through diligent physical effort. The health quotient is an accumulation of health-related skills and knowledge. Through education, environmental development, as well as the additional accumulation of skill and knowledge, it can continue to grow. On these grounds, the author attempts to define the promotion of the health quotient as the individual's proper use of health care-related knowledge, the direction-based analysis and improvement of one's health score, as well as the maintenance and promotion of healthy habits and behavior. The promotion of the health quotient ensures that people can successfully synthesize healthy behaviors and activities with stable mental health. Its purpose is to give people full control over their own health.

3 Viewing Existing Deficiencies in University-Level Physical Education from the Perspective Of University Students' Personal Health

3.1 The troubling current state of university students' personal health

3.1.1 University students' quality of health continues to slide

On September 2, 2011, the Department of Education, the National Office of Physical Education and the six national ministries and commissions jointly published the *2010 Study and Research Results of the Nationwide Physical Condition and Health of Students*. This publication points out that as the physical health of elementary and middle school students improves, the collective physical health of university students continues a downward trend. The amount of physical exercise among university students is clearly below that of elementary school students; university students spend an excessive amount of time online, watching movies, and playing video games.

3.1.2 Although college students pay attention to their personal mental health, they lack timely and effective solutions when facing psychological problems

This eventually results in a poor capacity for handling psychological problems and the lacking of abilities for interpersonal communication and dealing with disappointment.

Between November 30, 2010 and February 28, 2011, the University Student Press and the Chinese University Student Network focused on ten aspects of psychological problems among university students, such as the causes of these problems, students' current conditions, and countermeasures against these problems. In an online evaluation carried out to assess the state of mental health among university students, the most prominent problems were pressure in interpersonal communication, the pressure of finding employment, and poor self-management abilities. In 2005, eleven top scorers in the national college entrance examination were rejected from the University of Hong Kong after undergoing

personal interviews, the reason being that the university did not admit “bookworms”.

3.2 Viewing the current deficiencies in university-level physical education from the perspective of university students' health

3.2.1 In physical education classes, university students cannot achieve a theoretical understanding of health and personal healthcare and cannot satisfy the objectives of health education

Physical education at the university and college levels devotes a great amount of time to classroom education. In contrast, the theoretical knowledge of physical education is given comparatively little attention, only composing between fifteen and twenty-five percent of classroom content in a semester. Classes in physical education theory derive their content from *An Outline of Physical Education Culture*, edited by Yu Kehong and Jin Fuchun. Its educational content is primarily related to sports and physical education, such as the role of physical education in personal development, the Olympic Games, a comparison of physical education culture in China and the West, and the causes and treatment of sports-related injuries. It lacks instruction dealing with mental and physical health, as well as lifestyle-related content and theories. Students are unable to obtain a good understanding and comprehension of health theory or proper health care habits through theoretical study. The majority of the semester consists of practical classes that are based on the study and instruction of skills and techniques; students' grades are still based on skill evaluation. In these classes it is impossible to discuss and explain theoretical knowledge, and health education cannot be included. There are many ways to achieve an understanding of health. Physical health may be demonstrated through a physical education class, but mental health, social adaptability and moral health should be taught through other kinds of athletic activities; they cannot be taught dogmatically. Physical education teachers in universities have their own understanding and views towards health, but weekly physical education classes do not allow students to achieve a satisfactory collective understanding of physical education theory or skills and techniques. The basic quality of grading is steadily decreasing, and assessments and evaluations also continue to decrease their requirements.

3.2.2 Course selection still cannot satisfy students' interests or needs

Apart from required courses, students prefer teaching materials that are relaxing, lively, and exciting. Students enjoy dance (including “dance sport”, hip-hop dancing and aerobics), small-ball sports (tennis, badminton, shuttlecock), and other entertaining activities; they also desire to study traditional Chinese methods of health care. Male university students pay attention to major national and international sporting competitions, especially American NBA league matches and CBA games, as well as tennis competitions like the US Open and Wimbledon. These students wish to learn the basic knowledge used to enjoy, discuss and analyze these exciting sports competitions; they are also very interested in studying the methods used to referee these matches.

3.2.3 University students' physical education grades are still based on skill evaluation and participation
This grading system lacks a comprehensive evaluation of students' knowledge of health, their behavior or their personal health care skills.

University students' physical education grades are still based on skill evaluation and participation. These grades do not reflect physical health, mental health, or social adaptability and lack a comprehensive evaluation of students' knowledge of health, their behavior or their personal health care skills. This form of assessment – which only focuses on skill and technique and ignores the formation of good habits and the understanding of healthy exercise – still continues at present. As a result, students believe that physical education class is merely the study of athletic skill and only attempt to achieve passing grades.

4 What Path of Development Should Health Quotient Promotion-Based Physical Education Reform at the University Level Take?

Basic Requirements of the Health Education of University Student (Test), published by the former national education commission, mentions that “every institute of higher education must include health education in their curriculum. Additionally, according to their own needs and conditions, schools must offer lecture courses and electives in health education.” The publication offers a guarantee to research based on these principles. University students are a special group; the promotion of the health quotient involves students' use of proper healthy habits and strategies, observing and evaluating their personal state of health through the use of the health index, direct analysis and increase of their health scores, and improvement of their level of health. On these grounds, the strength of university-level physical education reform should be measured by the health quotients of university students. But if the increase

of university students' health quotients is made a part of university-level physical education and leads to the incorporation of health education, in what ways will it lead to it? (See figure 1)

4.1 Research on the relational degree between the health quotient and the objectives of university-level physical education

This publication gives prominence to health objectives that include allowing students to achieve comprehensive development in “the five areas of exercise participation, exercise skill and technique, physical health, mental health and social adaptation.” According to *Health Quotient*, edited by Professor Xie Huazhen, the health quotient consists of five dimensions (personal health care, health knowledge, lifestyle, state of mind, and life skills) and twenty factors (see picture 1). Achieving unanimity in regards to objectives is a prerequisite of increasing an individual’s level of health. Following is an analysis of the relationship between the dimensions and factors of the health quotient. Firstly, these dimensions and factors both place importance on achieving an understanding of health and the methods of maintaining a healthy mind and body. The health quotient emphasizes the use of a point-based score in regards to lifestyle and habits to judge an individual’s level of health. University-level physical education must incorporate the spread of information and behavioral instruction; it must help individuals as well as groups achieve an understanding of proper health and hygiene. Physical education at universities must establish proper concepts of health. Schools must willfully adopt a curriculum that includes courses and activities that support healthy behavior and a healthy lifestyle. Secondly, physical education does not give much attention to the healthiness of students’ lifestyles (smoking, alcohol, drugs, eating and drinking, nutrition) and also neglects to address students’ psychological health. Rather, students attend weekly physical education classes that only require them to understand certain athletic skills and techniques. Additionally, health education is essentially a kind of intervention. The time spent on this sort of intervention needs to be increased in activities both inside and outside class. The health quotient can be used to evaluate students’ personal health. Finally, in regards to using the aforementioned dimensions and factors to evaluate students’ states of health, physical education currently lacks any kind of specialized assessment or evaluation of its target areas. University-level physical education only bases its assessments on individual class grades; books are used to evaluate students’ knowledge of theory.

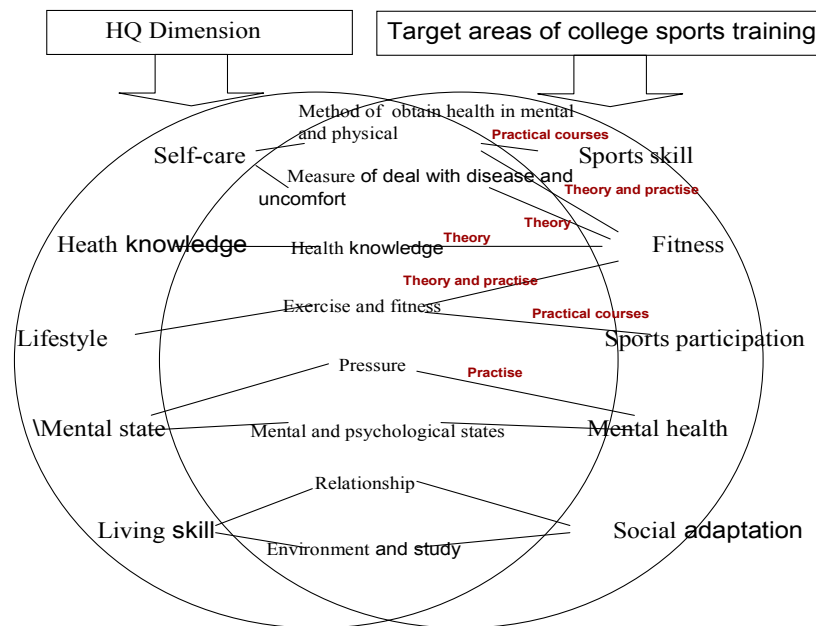


Figure 1 Relational Degree Between the Health Quotient and Target Areas of University-Level Physical Education

4.2 Research on health quotient-based physical education reform at the university level

4.2.1 Establishing a guiding ideology of “health first” and carrying out all-around student instruction in physical education classes

Firstly, if physical education courses at universities are to foster students' all-around development, their priority must be the cultivation of students' social adaptability. Educators can plan and implement group activities and use all sorts of different tools and settings to carry out group-based and individual challenges and tests. Examples include outdoor exercises, creative small group activities in musical athletic elective classes, and the psychological "trust fall" game. Through these kinds of activities and programs, individuals can gain an understanding of how to work with a group, the constant need for communication when cooperating with others; they can also promote interpersonal communication between students. Through cooperating, students will learn to accommodate the needs of others as well as the importance of group coordination; as a result they will be aware of group and social dynamics. This will strengthen students' willpower and allow them to view themselves and others from a proper perspective. These activities will result in an increase in students' social adaptability.

Secondly, in order to provide students with comprehensive, university-level physical education courses must also focus on cultivating healthy lifestyle habits. Doing so will ensure the increase of students' level of health. One way this can be carried out is through the distribution of pamphlets explaining healthy lifestyle habits. Also, splitting students into competing groups in the classroom will help give them a clear understanding of healthy lifestyle habits. Through the addition short essays on healthy lifestyles to physical education curriculums, students can learn about personal health care, understand how to live a healthy lifestyle, and also fulfill part of their physical education grade – how can one argue against implementing this?

4.2.2 The content of university-level physical education must be expanded

Classes on theory must include content on health-quotient education, particularly in respect to lifestyle, personal health care and healing. Practical classes should incorporate group-building activities. For instance, according to the respective needs of physical education programs, schools should add group-based practices and competitions that increase group awareness and collective competition. Such activities include group competitions in the form of large-ball games like basketball, volleyball and football. These competitions may be carried out between teams or even amongst different classes. These do not need to utilize a full court for these activities; many places may be used for small-scale activities. Students may freely organize teams for small-ball sports (table tennis, badminton, tennis); Shooting games may also be carried out. Activities with musical accompaniment (aerobics, hip-hop dancing, rhythmic exercises) can even test students' ability to create routines.

4.2.3 More time must be devoted to theoretical study in class.

Students must improve their understanding of health and health care and should learn how to determine their own state of physical health.

Classes on theory must be increased. Content taught in technique-based classes must be flexible and direct enough to incorporate instruction and perspectives related to the health quotient. Some students take a greater interest in learning about rather prominent health problems. Classes may provide a daily log for students; through constant attention, teachers may provide assistance to students or coordinate with other professional instructors to directly correct and maintain healthy behavior and habits.

4.2.4 Increasing the overall quality of university physical education instructors;

Carrying out a comprehensive evaluation of the objectives of physical education courses – physical health, mental health and social adaptability. Physical education instructors must not only possess athletic knowledge and skill but should also have an abundant knowledge of health and health care. In addition to evaluating students' physical abilities, they must be able to carry out the comprehensive analysis of the physical education course objectives of physical health, mental health and social adaptability.

4.2.5 University-level physical education must include health quotient-based education in its scope of evaluation.

Self-evaluation should be combined with the evaluation of students, not simply students' evaluation of their instructors.

5 Conclusion

The increase of university students' health quotient levels is intertwined with the permeation of health education in university-level physical education. Physical education classes can broaden students' understanding and develop their social adaptability. Through a series of lecture courses and theory-based classes on healthy lifestyle habits, schools can effectively use classroom education to

further educate them about the health quotient and to instruct them to practice personal health care in a scientifically sound manner. Under the guiding concept of “health first,” university-level physical education can carry out health-based education to truly achieve its goal of improving students’ health.

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School Physical Education and the Chinese National Sports Culture Innovation

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Abstract: This paper, beginning with a research of our national physical characteristics and aiming at the adverse situation of modern Chinese national sports development process, puts forward a strategy of promoting our national physical culture. Namely, unearthing Chinese national sports general rules so as to blend national physical culture into physical education field and school sports teaching activity into the essence of national physical culture. Meanwhile, processing and promoting national physical projects to achieve a goal, which is, rousing national spirit, strengthening national unity and enhancing the popularity of national sports culture from generation to generation. In addition, inheriting and carrying forward the excellent Chinese national sports culture through education position to walk along a road of national traditional sports development with Chinese characteristics.

Key words: The national sports; School sports; Sports culture

1 Introduction

Sports culture, created by human beings in sports life and sports practice, is reflected through tangible physical configuration, movement skills, sports equipment, material and intangible will, conception, age spirit related with social attributes and reveals the existence of the unique way. During the course of sports life and practice, body morphology changes and movement skills can be shown by the means of athletics, entertainment and education for the sake of healthy development both physically and mentally—and that is what sports culture with motion properties is. The inheritance of sports culture refers to the remaining certain characteristics of attributes handed down from different ages. Since the sports culture is based on body movements as its elementary form of expression, the body becomes the main way of heritage. However, the unique languages and characters attached to the sports culture also function powerfully in the aspect of inheritance. Some changes of content, structure and even mode may happen during the historical development course of sports culture, which is called the innovation of sports culture. Definitely, it is tortuous and tough to walk along a road of sports culture innovation. Nevertheless, it is generally moving forward and achieves the unity of progressive and twists.

The school sport is an important part of all-round development of school education all over our country. Furthermore, it plays a significant role in improving students' healthy level, enhancing students' physical fitness and enriching their cultural life. In addition, it can also produce a positive effect on students' overall development of intelligence, moral character, aesthetic ability, etc. Chinese national sport is precious cultural heritage of the Chinese nation. There are so many excellent national traditional sports, which are not only of high fitness value but also of great artistic value and can function well both in entertainment and education. Including national sports into school education, for one part, can be a significant supplement and development to the content of school education; for another part, can help to set up the "people-oriented" education concept and have a profound realistic influence on invigorating our national sports and cultivating students' national emotion.

2 The Cultural Characteristics of Our National Sports

There are 56 ethnic groups living in China and reproducing from generation to generation. The colorful and stylish traditional sports, created by each group, draw an outline of magnificent spectacle of Chinese sports and a splendid view of Chinese civilization. It plays a particular role in the national modernization construction, national fitness campaign and cultural blending between East and West.

2.1 Nationality and Heredity

Where there lives a certain ethnic group, there exists national sports culture and different ethnics show different distinct characteristics—that is what nationality refers to. Since an ethnic group depends on a certain area as its living space for long-term thriving, their sports activities and some national sports cultural phenomena, such as values and aesthetic taste, can be defined, to a great extent, by the region they inhabit. Therefore, the content and form of our national sports activities, seen from another angle, reflect the production mode and living way of a certain place and its social climate. Influenced by different geographical environment, varied, colorful but also distinctive national sports activities are formed in minority areas. And these activities are by all means one of the local folks' skills gained in the process of living, such as the boating race in south area, Northland ice-skating, camel racing in desert, mountain walking, horsemanship and archery in prairie, jungle shooting, etc, which all retain the trace

of production mode and lifestyle in diverse geographical conditions. Along with the development of local folk culture, these stylish sports activities with distinct local features still remain nowadays and continue growing maturity.

2.2 Fitness and Recreation

The fitness performance of national sports is self-evident. As early as in primitive society, people have realized the effect of exercise on the health of the human body; There is a popular analogy “moving things are unlikely to go bad”, and it doesn’t take a genius to see that people from ancient times had some awareness of movement value. In martial arts, for example, it puts great emphasis on the following factors: combination of form and spirit, cultivating of the inside other than the appearance, inner temperament refining as well as outer muscle practicing. In that way, martial arts have always been considered a way to, as advocated by the world, keep in good physical and mental health. All kinds of laws of boxing and kicking in martial arts have high demands in the flexibility and explosive power of body, in addition, give a lot of exercise to muscles and ligaments; Body work as “underhand, back-up, drop, fold and stack” have good training on the properties of human body coordination. Soft, slow and light shadow boxing, Eight-sectioned Exercise and Guide can regulate mood and relieve stress, effectively enhancing human health.

Entertainment is one of the greatest features of Chinese national sports. In ancient times, pleasant physical activity is an indispensable and important content of mankind’s cultural life. The stylistic features of traditional sports with combination of style are that sports and watchers are to be joyful mind, cultivate temperament, adjust taste, and satisfy the spiritual and cultural needs. In a number of traditional festivals, there are many singing and dancing, lively and amusing sports and entertainment activities with bright rhythms as the main content. Such as: “A’XiTiaoYue” of the Yi nationality, “XiangJiao Drum” of the Dai nationality, “DongBa dance” of the Naxi nationality, “LuSheng Jump” of the Miao nationality and so on. They are the sports and entertainment projects inclusive of fitness, entertainment, fun and art..

2.3 Season and diversity

In China’s minority areas where agricultural production is the main activity, sowing in spring, hoeing in summer, harvesting in autumn and stocking in winter are the pace of life. Steppe peoples dominated by animal husbandry and hunting are also under the influence of phonology and climate, thus their cultural life is associated with a certain season of life. Therefore, many national sporting events are often derived from a farming season and held in the season, such as the torch festival of the Yi nationality, the water-sprinkling festival of the Dai nationality, the autumn chasing festival of the Miao nationality, “Nadam Fair” of Mongolian, the harvest festival of the Goshen nationality and activities likewise. There are corresponding contents of national traditional sports activities in them so that the national sports activities implemented takes on a distinct seasonality.

On the vast territory of the motherland, each nation’s traditions, the subjective and objective conditions are not entirely the same, which accounts for the differences of interests and hobbies. Thereafter, sport will inevitably takes on a multiple characteristics. According to the statistics of “The Chinese nation tradition sports records”, China has sorted more than thousands of national traditional sports, which can be called in the world.

2.4 Integrity and Cultural Value

It has already been learned by people from the national sports activities of our country that human’s survival and development rely on groups. Integrity is the adhesive to bind different individuals. For example, in the sword dance of Jin Po nationality and the black tiger sacrifice of Yi nationality, participants act as a group and their movements are all the same. That increases their awareness of teamwork and overall approval, consequently forming the national affinity and cohesive power. What’s more, in many activities such as horse racing, bullfight and wrestling, the participating unit is generally a village. Besides strong awareness of competition, the participants should also have collective sense of honor. It is that trait that makes national sports plays an important role in the group education of minor nationalities.

The cultural attribute of traditional nation sports mainly reflect in its blending and absorbing for national culture. Traditional nation sports chiefly stem from the nation’s origin tales, the multiply of races, the primitive production, and the living and religious customs. This makes the traditional nation sports possess a variety of features of national culture, involving the national history, ethics, religions, philosophy, art etc. It reflects the value, the aesthetic view and the national emotion, which enables the traditional national sports to be the carrier, and also the important part, of national culture.

3 The Present Inheritance Situation of Chinese National Sports Culture

3.1 The Inheritance Dilemma

On the first half of the century, in the competition of national and foreign sports, though the national sports was once back with some kind of sports items being adapted and added to the national sports meeting, its returning was just a flash in the pan. In the sampling survey on the Zhan nationality of Guans Xi province on April in 2006, traditional national sports items are decreasing at a rapid speed, and the scale of the remaining items is also narrowing. For an instance, the research result shows that the number of remaining traditional national sports items of Zhan nationality in Guangxi province was 134, which reduced into 40 in 2006. Besides, the scale is narrowing and distribution area is decreasing. Previously, most of the traditional national items were blossoming everywhere. However, now there are only bits and pieces of activity clues exist in a few representative districts. Thereby, the problem of failing to hand down the traditional sports culture from our past generations is fairly serious.

The sports culture which are mainly based on exercise are chiefly universal types with extensive mass foundation, and they are deeply favored by the vast majority of people. But in the marketing economical system, their many contents are gradually disappearing from our life. There are several reasons. Firstly, with the reform and open policy, seas of new and novel entertainments are flooding to our life. People began to regard those traditional ones as obsolescent with nothing new, and they turned their attention to the newer types. That is to say, interest transfer appeared. Secondly, with the modern life pace accelerating, people are too busy to learn the fists in the traditional sports culture; in turn clumsy fists are tend to make the participants lose interest. Thirdly, it is because of the continuous improvement of the social productive forces, "art" is no longer the main source of income. People who still get income from their fists will find that the loss outweighs the gain. As a result, fewer people will learn it. Finally, people's concept towards folk festivals are gradually fading. Hosting the folk activities is nearly becoming the government action while some folk festivals are only remaining "festivals" never "a-day-off". Even if there are activities, people still can't afford the time to participate in. With the reasons mentioned above, the contents of this kind of traditional sports culture are gradually fading with some even already disappearing in our life.

3.2 Inheritance Driving Force of Our National Sports Culture

The formation and the development of Chinese traditional sports is a historical process, and its function determines is vitality. At the early time, in order to survive, our ancestors had to not only fight with natural living environment, but also resist foreign aggression and protect their own national interests from the invaders. This had promoted the development of martial arts, wrestling, riding and archery and some other traditional sports, whose functions were mainly to adapt to and meet the needs of production and normal life. With the changing times and rapid development of our nation's productive forces, national sports' functions of adapting to the production and people's lives are far from being able to meet people's growing material and spiritual needs. Chinese national sports teaching is not only of great value in exercise, entertainment and education, but also bears the power social function of culture heritage, national economy development and humanistic connotation highlight(see table1).

Table 1 National Physical Culture Items Classification

number	Category	National Sports
I	Combat sports	Boxing class: long boxing, Shaolin boxing, mantis boxing and other Instruments: hook shot, body type, single instrument, double instrument, the soft instrument
II	Recreational activities	Broomball: polo, pearl ball, soft ball etc Dance drama class: the dragon and lion dances, shaking the boat, the bamboo pole dance The boat show: the dragon boat, dragon boat, canoe, Saipi raft race Water play: swimming, diving Snow and ice skating, skiing, playing: ice GA Chess: chess, chess etc. Other categories: qianghuapao, swing, kite, shuttlecock, rope skipping etc.
III	Fitness sports	Tai Chi Class: the fitness of Taijiquan, Taiji sword, Tai Chi ball rod etc. Dancing class: Dunhuang style dance, dance Mulan, Mulan fan dance etc.
IV	Health Sports	Wuqinxi, muscle-bone strengthening exercise, eight section brocade

3.3 Inheritance Status of Our National Sports Culture

Sampling survey of sports projects in parts schools showed that 85% of the schools surveyed offer national sports in their physical curricula; 77% of students have great interest in national sports, including Long Fist, Tajik, folk dance, shuttlecock, spine, dragon dance, lion dance, kendo and so forth, among which Chinese martial arts takes the major part. Some sports like skating, swinging, swimming, archery, wood shooting, kiting and drum, which are greatly influenced by ethnic customs, territories, climate and some other factors, are quite universal among elementary and secondary schools in areas of minority nationalities. The survey also implies that sports teaching prepared in class appears in the games. Secondary and high school students have less interest in national traditional sports and most of them insist that theoretical teaching of national traditional sports should be added to physical curricula so as to provide them a better understanding of Chinese traditional culture, thus scaling them up globally.

About the understanding that national sports can be a part of school teaching content or not, only 45% students hold the view that it should be a part of school teaching content. According to the survey among teachers, 86.5% teachers believe that national sports are a part of school teaching content. Whether it is feasible that schools should have national sports or not, 76% students and 89% teachers think it is feasible. This consensus provides a good practical basis for national sports entering into schools.

With the development of society, many of national culture and traditional sports are on the verge of extinction in the local area. Faced with the situation, schools should consciously assume the responsibility of inheriting and developing the national culture. With the national sports activities as a breakthrough, we can sort out the national sports and organize some activities to popularize these sports. National sports, as an important part of distinctive culture of all ethnic groups, play a significant role in carrying forward national cultural, inspiring national spirit, promoting national sports cultural and strengthening national unity.

4 The National Characteristics of School Physical Education Core Value System

Exploring school physical education core value system in our country, we must establish connection with rich national cultural in our country. Meanwhile we'd better to consider it with the background of Chinese characteristic socialism core value system and the construction of socialist harmonious society. Of course, it is necessary to take the Marxism as the guiding ideology, reflecting the patriotism as the core of the national spirit and the Time Spirit with the reform and innovation as the core; even reflecting the socialist sense of honor and disgrace. School physical education core value system must firmly grasp the socialist orientation of advanced culture; carry forward the national excellent cultural tradition; draw lesson from beneficial achievements of human; advocate the idea of the harmony; cultivate the harmonious spirits; set up the common sports faith and ethic.

4.1 The connotation of the school physical education core value system

Physical education core value system reflects the core values of sports. Physical education system has been deepening continuously during the process of recognition of sports. Surely it forms from the function to the human and society. It is based on the multiple sports value. In fact, it is formed in the process of carrying forward leading, containing variety, discarding the dross and selecting essential, discarding the false and retaining the true, and blending. This system is clearly reflected in China's Confucian culture of "harmony is precious" and "harmony but not sameness" thought. Therefore, sports core values are essentially based on the multiple sports value system and it forms from the foundation of summing, concentration and innovation. The school physical education core value system map out of school education thought. It also plays a vital role in people's development lifelong physical education. The school physical education core value system shall be integrated into the essence of national culture and inherit rich national culture in our country.

4.2 The construction of school physical education core value system

The school physical education core value system is the root of building harmonious sports culture and has the important entry point of constructing the sports core value system with Chinese characteristics. Firstly, it must reflect the natural attribute of sports—the function of bodybuilding and entertainment. And it should reflect the joy of sports within the process of exercising and the change both in body and heart. Secondly, it should make the law as the foundation and maintain the justice and equality of sports. Only in the condition of rule by law, can the fair and justice of sports be achieved. And the pursuit of sports value by society and individuals can be guaranteed in the same condition, with

satisfying constantly the people's need of body fitness. Thirdly, it must establish a new relationship which is harmonious and between man and man, man and society, man and nature. As a result, sports can make people and nature more friendly and intimate. Bathing in the sunshine and dew, people accept the baptism in the embrace of nature.

4.3 The national characteristics of schools' corn physical education system

The schools' corn physical education system embodies our nation's national characteristics. Firstly, being a harmonious system, it can elaborate the educational function of schools' physical education and help students utilize sports to meet the differences existed in their needs. Secondly, it reflects the "people-oriented" education idea and cultivates students' fine personality traits. Furthermore, the spirits and pursuit of value shared by the whole country and nation are also being reflected in this system. Possessing distinctive characteristics, it reveals the specific essence and value orientation owned by physical education. Thirdly, the schools' corn education system is a constantly innovating opening system. It can inherit the excellent traditional sports cultures in our nation, learning and absorbing all achievements of civilization which are beneficial to the development of our national sports and improvement of whole nations' physical and psychological qualities. Developing and creating sports culture continuously meets people and society's demand for sports and provides inexhaustible drive power for our national sports' better and faster development.

5 School Sports' Inheritance and Innovation to Our National Sports Culture

5.1 School sports inherit our country's venerable sports cultural resources.

Schools' sports corn value is the optimal incarnation to all kinds of unique aspects, related to campus' physical education ideology, spirits, morality and humanism concept and value orientation. These aspects are formed and developed in the process of wide teachers' long-term physical education teaching, and students' action practices. They have co-created and continuously accumulated these aspects, the sports culture. Possessing long history, plenty contents, various formation, extensive influences, our national sports own the values of great ideology, edutainment, competitiveness, entertainment, appreciation, fitness as well as distinctive national characteristics. Promoting national physical education in schools is the distillation to the school's corn physical education system.

5.2 Our national physical education culture enriches schools' physical education contents

National sports and modern sports are reciprocally complemented and inseparably interconnected with each other. Accordingly, they are rich in content and combine the fitness, amusement and edutainment together, showing the extraordinary entertainment and appreciation, and functioning significantly both for strengthening bodies and entertaining minds. When the national physical education provides colorful activity content, it also plays an indispensable part in the development of schools' physical education teaching.

5.3 Our national sports culture cultivates students' patriotic sentiment.

In the process of implementing physical education, adding the national traditional sports' teaching and training can improve students' body constitution quality and educate them about patriotism, nationalism as well as collectivism. In addition, the fact that national physical education teaching process gives students access to share the perfect art and ingenious skills of national sports brings benefic to increase the mutual understanding and harmony between all nationalities, boost unity and enhance nation's cohesive force and centripetal force. Conducive to broaden students' horizons, invigorate their thought, cultivate their taste, the teaching about national traditional sports theory and practice promote school's physical education to develop in a diversified orientation. At the same time, these teaching practices are of considerable significances to enrich the school's physical education teaching material and activities, represent schools' national style and regional features, build training bases for national sports talents, foster national sports talents for country and regions, and serve the economic development. Being of great avail to disseminate the culture of national sports and carry forward national spirit, the teaching about national traditional sports theory and practice reveals our national sports' elegant appearance and national spirits.

6 Conclusions and Suggestions

The physical education reform demands that the country establish the instructive code of conducts that can standardize people's activities in the light of nation's strategic height, and ensure that our physical education develops at a balancing, fast, healthy and orderly pace. To adapt to the needs of changing social development, deepen the directed function of physical education reform, make definite

our nation's physical education direction, consequently, the national physical education culture are expected to be developed at a height of strategy.

6.1 Constructing and perfecting school's value system of sports culture, brightening our traditional advantaged sports item, maintaining the core competitiveness of school sports

Chinese sports culture should actively absorb the value that people have recognized on the basis of respect for other value systems. Our sports culture can be acknowledged worldwide because it has the value orientation of treasuring the harmony, the life attitude of harmony without uniformity, and the culture attitude of absorb anything and everything uncritically. Searching for the way to promote the elite of national sports can help achieve the value of our sports culture system. Firstly, we should stick to the sports spirit reflecting from the Chinese sports culture value. Then, considering the worldwide demand, we should actively absorb other countries' universal sports culture elements and consistently promote our sports culture's national and epochal character. Thirdly, in order to make our country reach out to the world, we must take drastic measures, such as excavating and clearing up our national advantaged sports items and continuously studying and developing national sports items, to forge the core competitiveness of Chinese school sports.

6.2 Study the regulate of national sports general rules, create innovation of China's national sports school-based curriculum

With the development and improvement of our society and with the widely spread of the modern sports, it is essential to further deepen national sports general rules, to make it develop towards the direction of competitiveness, gradually inform and perfect its scientific and standardized administration. On the base of keeping the national sports its own substitutive characteristic, develop towards the direction of more equal and open on competitiveness; more scientific and standardized on technique, tactics and training methods; more perfect and reasonable on administration and system (including competition rules, regulations and some other restriction mechanism). In order to conform to the trend of the world's sports development, take the law of modern sports development as reference, promoting China's national sports out of the region and step into the world. Simultaneously, the overall level of China's national sports will have a further improvement.

On one hand, we should consider its fitness, practicality and manipulation, on the other hand, we should also consider the suitable of region, season and the physical truth of our school, and choose the ones due to the place, time and people. Secondly, they should equip the pertinence and purpose of sports education. When developing and use the curriculum resources, we should renew the basic idea, choose with pertinence based on the general view of health of "physical, psychology and accommodation to the society", search regarding of the using scope and the educational target, then put the demand on sports of these projects into effect. Study the national sports short term effect and long term effect. Put national sports projects into the regulation of school sports curriculum, not only is the supplement and development of the school sports content, but also can enrich tremendously on school sports curriculum, which has a commendable interact effect on school sports curriculum's reform and the national sports system's inherit.

6.3 The department of education proceed promulgate relative policies, to ensure that China's tactic direction of implementing national sports teaching in school sports.

School education has a long-range and profound impact to national sports inherit. Schools should energetically inherit and promote national sports culture, foster students' consensus to the national sports, stimulate students' patriotic mind, appreciate China's national sports' implicated glamour. "China's sports spirit" gained sublimation. The traditional national sports which have strong national style and local characteristic gained a fast development, enriched people's mental culture life, strengthen national cohesion. School sports have become the main position of advocating advanced sports culture and fostering national spirit. Sufficiently express the function of national sports, to make sure that school sports work presents the prosperous scene of the combination of modern sports and national sports, performance and competition, entertainment and fitness. Promoting school sports enterprise developing forward vigorously.

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An Empirical Research of RMB Real Exchange Rate Volatility Effect on Sino-Japan Trade

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Abstract: The existing research did not give a consistency conclusion whether RMB exchange volatility has a significant effect on China's import and export trade or not. Based on the import and export demand equations, this paper establishes the import and export demand cointegration models to study Sino-Japanese trade decision factors. Research results found that RMB exchange volatility had no significant influence on the import and export trade, the two countries' respective domestic income has the biggest positive significant influence on bilateral trade. The RMB exchange rate against the yen and the breakout of financial crisis has significantly positive effects on export to China, but both had no significant effect on China's imports. Then the paper analyzes the reasons behind the results and puts forward relevant policy suggestions.

Keyword: Import and export demand equations; RMB exchange volatility; Sino-Japanese bilateral trade

1 Introduction and literature review

As close neighbors, the trade between China and Japan is developing very rapidly. In 1993, China began to become Japan's second largest trading partner, accounting for 6.7% of the proportion of the import and export of Japan, and in 2007, China overtook the US as Japan's biggest trading partner and kept up till now. Japan is China's third largest trading partner, the fifth largest export destination. Instead of 2008 US financial crisis's great shocks, Sino-Japanese bilateral trade volume is still up to US\$ 297.8 billion in 2010, surpassing the highest level before the financial crisis. Since 2005 RMB exchange rate reform and especially the outbreak of US financial crisis in 2007, the RMB exchange rate volatility has been increased, as shown in figure 1, the Japanese Yen against the RMB exchange rate volatility has experienced three times great volatility during successively ten years. So, does the RMB exchange rate volatility have any influence on the Sino-Japanese bilateral trade? And what factors have effectively influenced Sino-Japanese bilateral trade since the outbreak of US financial crisis? This paper tries to answer the aforementioned questions.

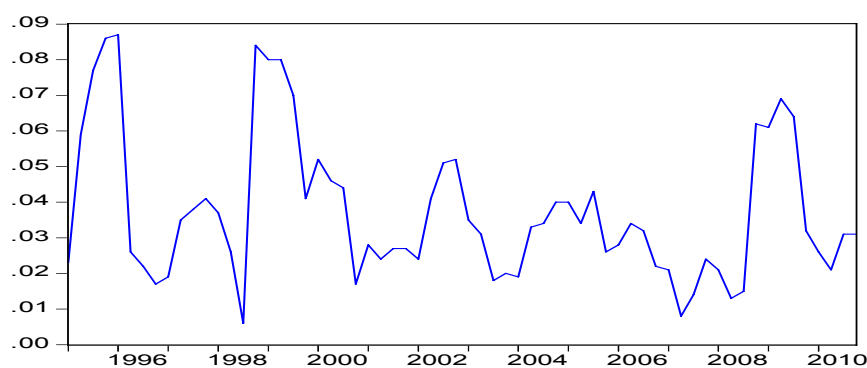


Figure 1 Exchange rate volatility of the Yen/ RMB exchange rate

About exchange rate volatility on the influence of international trade, there are many literatures completely reviewed (McKenzie, 1999; Bahmani - Oskooee and Hegerty, 2007, etc.). In a word, the economic theory of exchange rate volatility effects on export didn't get consistent conclusion, that the exchange rate volatility can promote or hinder a country's export. Early researches (Ethier, 1973; Clark, 1973) argued that, in the exporter's risk averse assumption, the exchange rate volatility is regarded as a kind of risk, when exchange rate volatility cause uncertainty about future cash flow and profit, the exporter will increase domestic sales proportion and reduce the proportion of export in order to reduce risk, so exchange rate volatility has negative effective on export. Under the assumption of exporter risk

neutral, Demers (1991) and Franke (1991) state that higher exchange rate volatility leads to more exports because exporters can reduce the uncertainty of volatility through the forward market transactions. De Grauwe (1988) argues that exchange rate volatility may have negative or positive influence on export, which depends on exporters marginal utility function is convex or not. Bacchetta and Wincoop (2000) research shows that the volatility has no significant effect. Empirical study also didn't get consistent conclusions. De Vita and Abbott (2004) study the British exports to the United States by the influence of exchange rate volatility, and find that the short-term volatility have no effect on exports, and long-term volatility has significant negative effects. Bustaman and Jayanthakumaran (2006) test the Indonesia's exports to the US as a result, supporting higher volatility hinders trade. Jiranyakul (2010) studies Thailand's exports to the US and Japan, finds that exports to Japan have been significant negative influenced and exports to the US have not been significant influenced.

Domestic investigations are relatively few. Li (2004) studies show that the risk of exchange rate volatility for classification trade exists two-way effect and difference of impact degree. Chen et al. (2007) show that the real exchange rate risk cause the more significant negative impact to export enterprises to. Gu and Gao (2007) find that the RMB exchange rate volatility influence on import and export depending on studying period, in the short term appearing the negative impact and in the long run appearing positive impact for import, but for export appearing negative impact. Chen and He (2008) find that by way of HS classification data, different types of export commodities show different affect, Xu and Zhao (2010) have similar conclusion. An and Huang (2009) find that the real exchange rate volatility influence on Sino-US trade is not significant, the real exchange rate volatility influence on Sino-Japanese trade is significant negative.

The research may exist the following aspects to be improved: first, the existing researches study exchange rate volatility effect from the perspective of export, few from import and export as a whole; secondly, few related researches study China and a single trading partner, especially analysis of Sino-Japanese trade; thirdly, as one country doesn't have monthly GDP data, related researches using monthly high frequency data take the industrial added value or industrial production index as GDP substitutional variables, and we know that in many developed countries the GDP proportion of industry is far lower than services, there may be errors with the industrial added value instead of monthly GDP data. Therefore, this paper uses relevant quarterly time series variable to study the main factors which influence the Sino-Japanese bilateral trade.

2 Model Specification, Variables and Data Sources

(1) Model specification. Estimation model adopts the traditional import and export demand function equation (Arize et al. 2000; Choudhry, 2005), factors which influence import and export include national income, commodity prices, and foreign exchange volatility. Considering the outbreak of the financial crisis in August 2007, introduce dummy variable d_t :

$$d_t = \begin{cases} 0, & \text{before financial crisis} \\ 1, & \text{after financial crisis} \end{cases}$$

In order to analysis the financial crisis and the influence of exchange rate volatility on trade, introducing dummy variable d_t and volatility interaction term form as the explanatory variables, denoted

$$\text{as } vd_t = v_t * d_t$$

Therefore, China's export demand equation is:

$$ex_t = a_0 + a_1 r_t + a_2 y_t^{jp} + a_3 v_t + a_4 d_t + a_5 vd_t + u_t \quad (1)$$

China's import demand equation is:

$$im_t = \beta_0 + \beta_1 r_t + \beta_2 y_t^{cn} + \beta_3 v_t + \beta_4 d_t + \beta_5 vd_t + \varepsilon_t \quad (2)$$

In the equations, and ex_t is China's export to Japan and im_t is China's imports from Japan in t time, y_t^{jp} and y_t^{cn} are China and Japan real GDP in t time; r_t is the the RMB exchange rate against Japanese Yen, v_t is the RMB exchange rate volatility against Japanese Yen, u_t and ε_t are random error terms. If export relative price increase, the export will decrease, so a_1 and $\beta_1 < 0$; If a country's

real GDP increase, the country's import will increase, so $a_2 \beta_2 > 0$; Financial crisis have side effect to import and export, therefore a_4 and $\beta_4 < 0$; The influence of exchange rate volatility on import and export not sure, and signs are not sure.

(2) variables and data sources

1) exchange rate. Due to the influence of the nominal exchange rate of import and export is uncertain, so here use actual and effective exchange rate. Real effective exchange rate for the nominal exchange rate (nom) after Sino-Japanese bilateral CPI index adjusted, calculation formula is:

$$r_t = \text{nom} \frac{\text{cpi}_h}{\text{cpi}_f}$$

cpi_h for China's consumer price index, cpi_f as Japan's consumer price index, the yen against RMB nominal exchange rate from the UBC 's Sauder business school's world currency database, CPI data from the International Financial Statistics (IFS).

2) the rate of exchange rate volatility s. Due to exchange rate volatility rate (risk) depends on the people to the prediction of exchange rate volatility s, can use rate of the actual value and the value predicted by deviation to measure. A method is to use rate logarithmic first-order difference standard deviation to measure the exchange rate volatility, another kind of method is Bollerslev's (1986) GARCH model to measure the condition of exchange rate volatility. Čorić and Pugh (2010) conclusion is different measure methods of exchange rate volatility will not affect research conclusion, in this paper taking the exchange rate logarithmic first-order difference standard deviation to measure the exchange rate volatility.

3) the import and export trade between the two countries and GDP. Because it is the quarterly data, both the X12 method through seasonal adjustment, and with cpi index flat reduced to remove the effect of inflation, specifically, China's export trade with China's consumer price index flat minus, China import trade with Japan consumer price index flat minus, data also comes from IFS.

All variables are the natural logarithm processing, sample period from 1995 to 2010 in 1st quarter in the fourth quarter.

3 The Empirical Test and the Result Analysis

Because most of the time series data is not stationary, so first of all to each variable between stationarity inspection. This paper use ADF (the Augmented Dickey - Fuller) inspection to discriminant variables whether there are unit root. Inspection results show in table 1.

Table 1 Unit Root Test Results

Variables	ADF	Test form	Prob.	Variables	ADF	Test form	Prob.
lnex	-0.3307	(C,0,4)	0.9133	Δlnex	-3.5866*	(C,0,4)	0.0090
lnim	-2.45077	(C,T,5)	0.3507	Δlnim	-3.65883*	(C,0,4)	0.0074
lnyjp	-2.70752	(C,T,1)	0.2374	Δlnyjp	-5.65042*	(0,0,0)	0.0000
lnr	-0.15254	(0,0,3)	0.6269	Δlnr	-3.20621*	(0,0,2)	0.0018
lnv	-1.37763	(0,0,0)	0.1548	Δlnv	-7.74121*	(0,0,0)	0.0000
lnycn	-2.68572	(C,T,5)	0.2462	Δlnycn	-3.85899**	(C,T,3)	0.0201

Note: test form (C, T, k) said method with ADF unit root test, regression equations including constant term and time trend function, (C, 0, k) only include constant term, (0, 0, k) no constant term and time trend function. *, ** said in respectively 1%, 5% significance level is significant, the same below. Critical value are given by EVIEWS6.0.

Table 1 shows that all variable original sequence non-stationary, the first-order differential stationary. Therefore, the original value variables are I (1) process, the differential variables are I (0) process, each variable single whole order number consistent, can to each variable, the author carries on a cointegration relationship inspection. The E - G two footwork of model 1 and model 2 cointegration test, after the return of the residual sequence for stationary sequence, the variable sequence that there is a cointegration relationship between variables.

Thus the establishment of China's export to Japan model cointegration equation for:

$$\text{Lnex} = -135.233096 + 11.389342 \text{lnyjp} + 0.806943 \text{lnr} - 0.002393 \text{lnv} + 1.55865 \text{D} + 0.373816 \text{VD} \\ (7.798769)^* \quad (0.608196)^* \quad (0.327756)^{**} \quad (0.046826) \quad (0.296679)^* \quad (.084430)^* \\ \text{Adjusted R-squared} = 0.919517, \text{Log likelihood} = 32.21869$$

It shows that Japan's income has significantly positive influence on China's export, export income elasticity is 11.39, the RMB against the yen exchange rate changes on China's export a significantly positive effects, which the devaluation of RMB (that is, the Japanese yen appreciation) will increase the export of China, both of which conform to the expectation, but the price elasticity is smaller than income elasticity, which means China's export depending on the Japanese domestic income. The real exchange rate volatility influence on export is not significant, supporting the point of view that exchange rate volatility has no effect on export trade. Financial crisis dummy variable and the interaction of exchange rate volatility are on China's export show a significantly positive influence, meaning the outbreak of the financial crisis has a positive influences on export, but a careful analysis can find China's export to Japan precede three is clothing, agricultural products and electronic products, clothing, agricultural products is the necessities of life, electronic products is also often for low-end products, the above products generally lower prices and elasticity of substitution is small, so after the financial crisis it will increase the low end products from China demand.

China's import from Japan model cointegration equation for:

$$\ln \text{im} = 6.508860 + 1.171508 \ln \text{ycn} + 0.513863 \ln \text{r} - 0.01372 \ln \text{v} - 1.388848 \text{D} - 0.340629 \text{VD} \\ (1.028922)^* \quad (0.063445)^* \quad (0.409965) \quad (0.058978) \quad (0.405893)^* \quad (0.109090)^* \\ \text{Adjusted R-squared}=0.918215, \text{Log likelihood}=17.00952$$

On display, China's income of China's imports from Japan has significant positive influence, but import income elasticity was 1.17 is far less than the export income elasticity. RMB against the yen, the actual exchange rate and exchange rate volatility influence on imports is not significant, and support point of view that exchange rate volatility has no effect on import. Financial crisis dummy variable and the interaction of exchange rate volatility of import have significant negative influence, the former and expected the same symbols, the latter shows that the financial crisis on China's exchange rate volatility times indeed import from Japan have a negative impact, the reason behind it is enshrined in the import trade of particularity, namely China often imported from Japan all kinds of intermediate product assembly exported after Europe and the United States, namely in the so-called "East Asian production network system" in Japan is the low value-added production links transferred to China, its production and export technology and capital intensive intermediate products to China, the latter after assembly to export the world. When the financial crisis after the outbreak of Europe and the United States since China's import decline, and indirectly lead to China from Japan imports also fall subsequently.

4 Conclusions

By using in q1 1995 to 2010 fourth quarter quarterly data, this paper the established the import and export trade cointegration model, the results of the study show that:

Firstly, there is a cointegration relationship between the volatility, China's export, significant income effect and price effect, and the income effect will far outweigh the price effect, the two countries exchange rate volatility has no significant influence on exports, but after the financial crisis in the export has significantly positive influence, and the financial crisis on China's export to Japan are significant positive influence.

Secondly, there is a cointegration relationship between China's import, real exchange rate and the volatility. China's imports from Japan are mainly affected by the domestic income, the real exchange rate and the volatility's influence on China's import is not significant, but the financial crisis and the exchange rate volatility on Chinese imports both have significant negative influence after the financial crisis.

Thirdly, due to the Sino-Japanese trade structure of the special reasons, influence factors of China's import and export have obvious differences. The first is the import and export demand elasticity has obvious asymmetry, China's export demand elasticity far outweigh the import demand elasticity, followed by export price elasticity size on export has significant positive influence on and import demand elasticity size on import not significant effect, once again, is the financial crisis on China's export to Japan has significant positive influence on and to import has significant negative influence.

Therefore, we put forward the following policy suggestions:

1. relaxing appropriately the yen against the RMB exchange rate floating range, further promoting the internationalization of RMB. The Yen as at present a few direct and RMB listed for trading foreign exchange types, the RMB exchange rate volatility by market forces should be more decision, and between the trade structure makes the exchange rate volatility will not influence China's export trade, and relaxing appropriately exchange rate floating range between the yen against the RMB can

promote the RMB exchange rate formation mechanism of the middle price marketization reform, attracting more trade enterprises to settlement by RMB or Yen.

2. between the two countries to speed up the establishment of a free trade area of negotiations, as a free trade area of the system construction to promote the further development of bilateral trade. At present the WTO talks stalled Doha agenda, which makes the members have to seek other way to promote international trade and economic development, and Free Trade Zone is a kind of conform to the status quo of economic development between the two countries the form of regional economic integration. This round of international financial crisis shows that the us and Europe east Asia economic depend on external market is unsustainable, Sino-Japanese bilateral trade is their biggest influence national income, speed up and complete the Sino-Japanese free trade negotiation, construct a unified east Asia regional internal market, between the two countries is to ensure economic trade one of the effective ways to sustainable growth.

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Analysis on the International Marketing of Bottom Billion Economies

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Abstract: This paper addresses an important contemporary phenomenon– the internationalization strategy from developing countries. The current and opportunities of international marketing in developing nations referred to as “bottom billion” as Paul Collier would put it, are ascertained in this study with reference to Namibia in some cases and inter alia. The authors also employ evidences and use aspiring quotes from different economies in the justification of creating value from developing nations for the international arena. The analysis of this paper is value-focused perspective from an economic and marketing view points to a substrate of cross-country differences. Some strategic implications that are imperative to developing economies to grow their manufacturing sectors through process of industrialization with the hope and objective for the bottom billion economies to be value creator and sustainer rather than being recipients or consumers of imported goods.

Key words: Bottom billion; International marketing; Value creation; Knowledge economy

1 Introduction

Managers around the globe are recognizing the increasing necessity for their companies and organizations to develop the skills, aptitudes and knowledge to compete effectively in international markets. The emergence of a more open world economy, the globalization of consumer tastes and the unabated expansion of Internet access globally all increase the interdependency and interconnections of nation economies across the globe. The need for managers to develop the skills to respond to these pressures affects companies of all sizes. Thus far, the paper theoretically attempts to analyze and pave strategies for developing economies to market their goods internationally.

On context of Namibia as a developing country in the southern part of Africa endowed with abundance of mineral resources among which is one of the world’s largest exporters particularly in uranium, diamond and gold. The country has the necessary and potential capabilities in terms of resources to be among the top billion economies in the world creating and offering value on the international scale. Namibia derives its income mainly from the export of raw materials, According to the National Accounts Tables 2010-2013 of the Bureau of Statistics. The question of what holds Namibia to be industrialized and what to be done to achieve industrialization with a link to international marketing that consequently drives creation of value by firms across the borders of the country is also stressed in this paper.

2 Theoretical Foundations on Cross Border Marketing

The Chartered Institute of Marketing defines marketing as the ‘Management process responsible for identifying, anticipating and satisfying customer requirements profitably’. Thus marketing involves:

- focusing on the needs and wants of customers
- identifying the best method of satisfying those needs and wants
- orienting the company towards the process of providing that satisfaction
- meeting organizational objectives.

However the focus of this research paper is on international marketing. Tapping into cross border markets for value creation and offering is an important strategic corporate initiative that enables firms to extend their current businesses, leverage their current capabilities, and diversify into related markets. Marketing internationally can be an important mechanism for corporate governance convergence in today’s world. In marketing products from developing countries it is important to understand the differences in internationalization strategy of firms from developed, emerging and developing countries as some factors still matters as the world is not flat but semi-globalized (Ghemawat, 2007). Many influencing factors in international marketing by firms from developed countries would be substantially different from those in the developing country, such as international experience and exposure, corporate governance, cultural background, government regulation, and maturity of the domestic capital market.

Two theories on the determinants of returns on cross border marketing offers a map clearly on firms and economies as a whole promoting cross-border marketing, namely the classical theories and the

neoclassical theories. The classical theories on the cross border marketing focused on diversification, operational efficiency and market power as sources. The neoclassical literature has focused on the changes in shareholder rights and changes in other corporate governance features implicit when acquirers and targets of acquisitions are from substantially different governance regimes.

3 Characteristics of Developing Countries in International Marketing

One common characteristic of many developing nations is that their exports are concentrated in a small number of primary products. There's much dependence on primary products. Inter- alia, are prevalence of imperfect markets and limited information, and dominance, dependence and vulnerability in International relations (Blink & Dorton, 2007).

3.1 Prevalence of imperfect markets and limited information

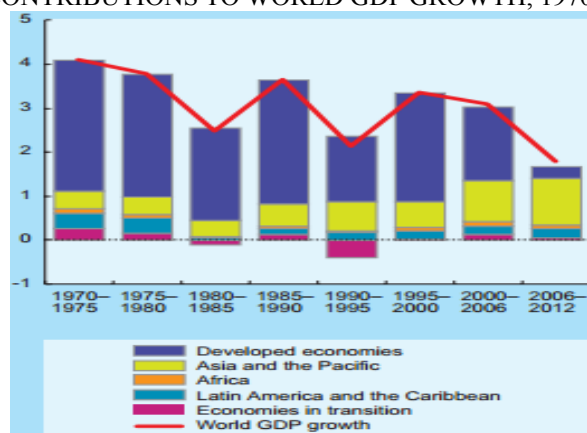
The trend in developing countries in the last 20 years has been towards a more market-oriented approach to growth. This has sometimes been promoted or encouraged by international bodies such as the IMF and the World Bank. However, this is possibly problematic, since while market-based approaches may work well in economies that are efficiently functioning, many developing countries face imperfect markets and imperfect knowledge. Developing countries may lack many of the necessary factors that enable markets to work efficiently such as lack of functioning banking system, which enables and encourages savings and then investment, lack a developed legal system, which ensures that business takes place in a fair and structured manner, inadequate infrastructure, especially in terms of transport routes of all types, which would enable raw materials, semi-finished products and final goods to more around the country, and to be moved out of the country, efficiently and at low cost, and lack accurate information systems for both producers and consumers, which often leads to imperfect information, the misallocation of resources and misinformed purchasing decisions.

3.2 Dominance, dependence and vulnerability in international relations

In almost all cases, developing countries are dominated by developed countries because of the economic and political power of the developed countries. In addition, they are dependent upon them for many things, such as trade, access to technology, aid and investment. It is not really possible for economically small, developing countries to isolate themselves from world markets. Developing countries are vulnerable on the international stage, and are dominated by, and often harmed by the decisions of developed countries over which they have no control. Some would argue that what is needed is for the developing countries to act as a bloc, to gain more power in trade negotiations.

The graphs below shows regional categorically value creation as measured by GDP growth, which portion of it should be potentially exported across borders. It can be seen from the graph that bottom billion economies particularly that of Africa and Latin America still lags in value creation. However, growth rates increased in Africa because of the continuing dynamism in sub-Saharan African economies and a partial recovery in the Northern African countries whose economies had been strongly affected by internal conflicts in 2011. However, it will be difficult for the latter countries to return to their 2010 GDP levels before 2013 owing to a slow revival of their tourism revenues, high unemployment and the recession in Europe which is an important market for them. In South Africa, strong growth in public investment continued to support economic activities in early 2012.

REGIONAL CONTRIBUTIONS TO WORLD GDP GROWTH, 1970-2012 (Per cent)

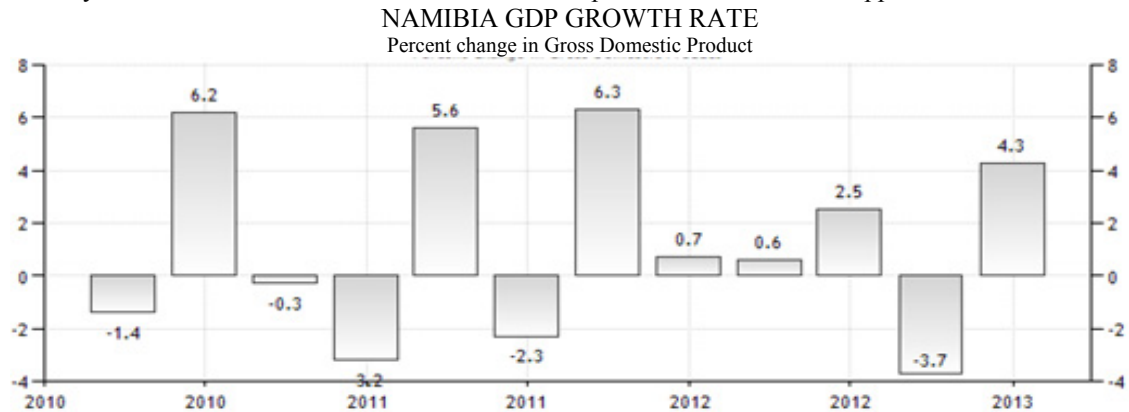


Source: World Bank, World Development Indicators.

Note: Data are averages for the periods.

4 Assessing Namibia's Value Creation

The Gross Domestic Product (GDP) in Namibia expanded 4.30 percent in the fourth quarter of 2012 over the previous quarter. GDP Growth Rate in Namibia is reported by the Namibia Statistics Agency. Historically, from 2004 until 2012, Namibia's GDP Growth Rate averaged 1.76 Percent reaching an all-time high of 13.30 Percent in September of 2007 and a record low of -8.80 Percent in December of 2004. Namibia has one of the biggest GDP per capita in Africa. Yet, due to an uneven distribution of income, there is still concern of the population lives in immiseration. The Namibian economy is dependent on the extraction and processing of minerals like diamonds, uranium, lead, zinc, tin, silver, and tungsten. Subsistence agriculture is the main source of income for 50% of Namibians. This page includes a chart with historical data for Namibia GDP Growth Rate. From the chart below we can posit that Namibia's GDP growth is not sustainable as keeps fluctuating giving a signal of lack of stability in value creation that arise from the domestic produce that cannot be supplied across border.



Source: Namibia Statistics Agency

The GDP Growth Rate shows a percentage change in the seasonally adjusted GDP value in the certain quarter, compared to the previous quarter. Because of climatic conditions and holidays, the intensity of the production varies throughout the year. This makes a direct comparison of two consecutive quarters difficult. In order to adjust for these conditions, many countries calculate the quarterly GDP using so called seasonally adjusted method. The Gross Domestic Product can be determined using three different approaches: the product, the income, and the expenditure technique, which should give the same result. In sum, the product technique sums the outputs of every class of enterprise. The expenditure technique works on the principle that every product must be bought by somebody, therefore the value of the total product must be equal to people's total expenditures in buying products and services. The income technique works on the principle that the incomes of the productive factors must be equal to the value of their product, and determines GDP by finding the sum of all producers' incomes.

5 International Strategic Options

The main objective of any international strategy should be to manage the large differences that arise at the borders of markets, according to Ghemawat (2007). With this objective, Ghemawat (2007) presents a strategic framework for meeting the challenges of globalization/internationalization. The framework is called "AAA Triangle," encompasses three effective strategic responses: adaptation, aggregation and arbitrage. These effective strategic responses are crucial bottom billion nations that realize the creation of value in offering sophisticated products across borders pays off, and not the exports of raw materials, agricultural products and minerals.

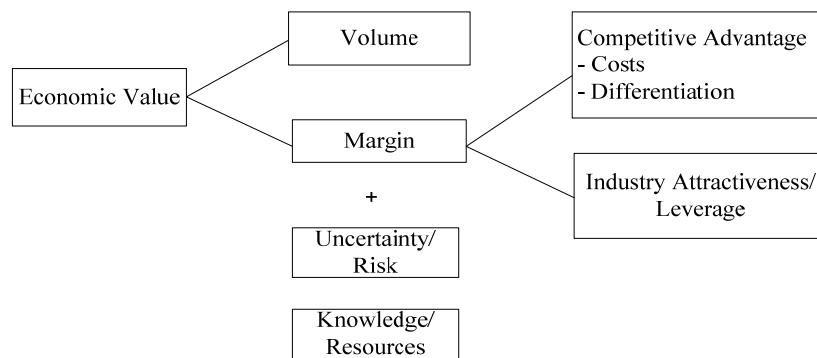
Adaptation is the strategy used by companies when they seek to boost revenues and market share by maximizing local relevance. Aggregation describes the attempt to deliver economies of scale by creating regional, or sometimes global, operations. Finally, arbitrage is when companies exploit disparities between national or regional markets, often by locating different parts of the supply chain in different places. Examples include call centers in Namibia, factories in South Africa to convert diamonds into sparkling jewelries, and retail outlets in USA. Adaptation strategies are designed to help companies adjust to differences across borders; Aggregation strategies are designed to help companies overcome some country differences by grouping them based on similarities; Arbitrage

strategies seek to profit from some of these national differences rather than treating them as constraints. To build sustainable competitive advantage is best to focus on one or two when trying to build competitive advantage.

One more framework to help companies deal with cross-border differences; it's called the ADDING value scorecard parses cross-border value addition (or subtraction) in manageable, commensurable components to facilitate robust and meaningful analysis of international strategies. This Framework is proposed by Ghemawat (2007) to help companies operate across borders. The ADDING Value Scorecard is a framework to help companies assess whether a particular strategic move makes sense to add value to the business both locally and globally.

The acronym stands for –

- A – Adding volume, or growth;
- D – Decreasing costs;
- D – Differentiating or increasing willingness—to—pay;
- I – Improving industry attractiveness or bargaining power;
- N – Normalizing (or optimizing) risk;
- G – Generating and deploying knowledge (and other resources and capabilities).



Source: Ghemawat (2007)

Once the company is able to track the above components into quantitative values is able to assess the followings;

$$\text{Your margin} = \text{industry margin} + \text{your competitive advantage} \tag{1}$$

$$\begin{aligned} \text{Your competitive advantage} = & [\text{willingness to pay} - \text{cost}] \text{ for your company} - \\ & [\text{willingness to pay} - \text{cost}] \text{ for your competitor} = \text{your relative willingness to pay} \\ & - \text{your relative cost.} \end{aligned} \tag{2}$$

Normalizing risk and generation of knowledge and other resources—reflect the large differences that persist across countries. Thus, they are customary add-ons in global strategy. To be effective at operational level need to recognize the value of options (alternatives) in an uncertain world. Strategy options often vary greatly in their "learn-to-burn" ratios – the rate at which they generate information about which scenario will come to pass versus the rate at which they commit resources to particular scenarios (Ghemawat, 2007). Once you take this kind of option value into account, it opens the door to additional strategic possibilities: e.g., mixed supply chains (rather than complete offshoring or on shoring), toeholds as ways of exploring new markets and, more generally, sequenced strategies.

7 Strategic Implications

7.1 “A journey of a thousand miles must begin with a single step.” - Chinese Proverb

Practical and realistic policies pay in a long run, meaning policies should achieve SMART goals, which is specific, measurable, attainable, realistic and timely. A developing country like Namibia has to learn lessons from the development experiences of South Korea. Namibian policies should not only enforce laws that give opportunity to private sector but enforce laws that allow the conversion of raw resources into physical goods and improving the service sector in driving the country's economic development. The import substitution industrialization approach still has merits in Namibia today. In fact no country developed without imposing a form of economic nationalism. Mercantilism which drove industrial revolution in Britain was actually a form of economic nationalism. American protectionism at the beginning of its industrialization revolution is well known. South-East Asia too had its share of

protectionism. The current gospel of free market and free trade is, as Ha-Joon Chang put it, “a clever device of kicking away the ladder”. This is the very ladder the developed countries climbed to greatness. Now, through liberalization policies they are kicking away the ladder so that the developing countries continue to be “the bottom billion”.

7.2 "Logic will get you from A to B. Imagination will take you everywhere." Albert Einstein

Bottom billion countries should invest more in innovation and information to transform the economies from mere production of agricultural products to a more knowledge economy that transforms the production of agriculture and mining into value chain innovations. Knowledge economies are determined by creative people through their creative imagination and ideas in bringing innovative products. Most inventions are from the West, while little from the African counterparts in the international trade, and while developing countries such as Korea exports Automobiles and other sophisticated products. Africa is the richest part of the world in terms of all kinds of resources such as oil, diamonds and agricultural yet are struggling economies due to what the authors would refer to as leadership myopic. Law makers in developing nations should get away from corruption and short term ambitions into economy transformation by embracing laws that strictly focus on value addition in the production of goods than trading raw minerals to developed nations that convert them into value products such as Swiss diamond rings and watches that are sold back to Namibia at unbelievable prices. Namibia should rather import the use of capital and know-how from developed nations through partnership than exporting diamonds and other raw resources without adding any value. Namibia's economy can boost like that of South Korea and China, through the trade of valuable physical products. Innovation is the key to an economy progress and transform into an industrialized and prosperous country; this is where Namibia and most bottom billion countries still fall behind in the international marketing.

7.3 “Never doubt that a small group of thoughtful, committed citizens can change the world.” - Margaret Mead

Bottom billion nations need to have commitments in making a change to be where they want to be. To achieve industrialization a country like Namibia has the capability, they nation should be committed in activities that drive the economy's prosperity, such as manufacturing and use of technology. Namibia and most developing nations are largely in the primary activities, the real economy which creates value and wealth is made up of secondary and tertiary industries. The primary industries sector is dominated by mining and quarrying. According to the Prebisch-Singer thesis the terms of trade between primary products and manufactured goods deteriorate over time. This means that revenue from the export of raw materials will diminish eventually. Prebisch and Singer suggested that developing countries like Namibia should embark on manufacturing if they want to gain from international marketing in the long run. This advice was taken seriously by South-East Asia especially that of South Korea as a perfect lesson for the developing nations.

8 Conclusion

The local private sector and government should intensify investments in innovation and the production of consumer goods. Through foreign direct investment the country should be able to leverage technology, capital and expertise in order to start manufacturing durable goods such as cars, iron and steel products. African nations should strongly unite to form a bloc to avoid economic disturbance from egoistic leaders and other nations competing for the African resources.

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Comparative Experience of Trade Relationships Between Mexico and China

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Abstract Mexico and China established diplomatic relations in 1972 and since the 1990s, Mexico and China have both made progresses in their foreign trade. Expansion of their trade volumes and overseas markets, the overlapping parts of their exporting products and markets have been being enlarged. This paper analyses the trade relationship between Mexico and China in the context of the economic openness enacted by both nations, also analyses the current trade relations between Mexico and China, presenting similarities and logical relation along with the results of their commercial policies and specific business practices.

Key words: Mexico; China; Foreign Trade

1 Introduction

Mexico and China established diplomatic relations in 1972 and a strategic partnership in 2003. Mexico and China relations enjoyed steady progress in 2010. Friendship and mutually beneficial cooperation between the two sides were strengthened across the board. Since the 1980s, Mexico and China almost simultaneously began to implement policies of economic liberalization and open trade. These phenomenon occurred as a result of changes in the international economic system and in the socio-economic structures of each country and the perspectives of their leaders, rooted in ideology and based on domestic political conditions. By the 1990s, China and Mexico have both made progress in their foreign trade in the background of the global integration and the regional consolidation, which makes them outstanding in the developing economies.

The expansion of their trade volumes and overseas markets, the overlapping parts Mexico's and China's exporting products and markets have been being enlarged, for sure in some extend a fierce competition exists between the two nations. Some scholars turned to the competitive or complementary trade relation between Mexico and China and made relevant empirical analyses on it. Soler (2003) finds that China has deteriorated Mexico's export more or less. By comparing the trade competitiveness indices among China, other Asian economies and Latin American countries, Lidoy et al (2004) believe that there's significant rivalry between Mexico and China. Bernard et al (2004) make comparison between China and other US' main import origins, and argue that the exports similarity between Mexico and China is relatively higher. Peters (2005) suggests that China, after its accession into the World Trade Organization (WTO), has affected Mexico's position in the US market due to their similar resource endowments and export-oriented policies. Jia (2005) investigates the competitiveness and complementariness in Sino-Latin America trade and find there is much resemblance in the exports of the pre-mentioned two countries. Liu (2007) reports the competitive industries between the two nations through empirical studies.

However, trade disputes between Mexico and China will be raised and resolved in multilateral dialogues, as an example; in June 2013, the presidents of Mexico and China agreed to broaden relations between their countries and expand trade ties, including opening the Chinese market to imports of Mexican tequila and pork. After meeting privately both presidents, Mexico's Enrique Pena Nieto and China's Xi Jinping said they are transforming the relationship into a "strategic partnership" and taking steps to move toward balancing their trade, which now is heavily in favour of China. The leaders signed a dozen memorandums of understanding and cooperation agreements in areas including energy, mining, education and infrastructure. "Today, we are giving way to a new relationship, a new phase of the relationship," Pena Nieto said in a joint statement. Xi said China wanted better relations with Mexico, which he called "a great friend and a great partner in the Latin American region." The Mexican President Pena Nieto said the new agreements are aimed at balancing trade between the two nations and also seek to increase Chinese investment in Mexico. He said Mexico hopes to become a "platform" for Chinese companies to trade with other nations in the region. This paper analyses the trade relationship between Mexico and China in the context of the economic openness enacted by both nations, also analyses the current trade relations between Mexico and China, presenting similarities and logical

relation along with the results of their commercial policies and specific business practices.

2 Mexican and Chinese Economic Openness

Ever since the 1980s, Mexico and China have been implementing extensive economic liberalization policies that are somewhat similar in essence but possess very different characteristics. Both countries began their opening processes because of historical, political, economic and social asymmetries. Moreover, the future prospects of the nations and the objectives of their leaders at that time were very different. Accordingly, “Mexico’s globalization strategy came straight out of the Washington Consensus handbook [...] and China took a more gradual, government managed approach to globalization” (Gallagher 2008).

Actually, Mexico’s economy is clearly not complementary to China economy, but from a standing start they would have to be seen as being in direct competition and in many ways similarly structured. While Mexico has sought to develop domestic industries through interaction with the external market in North America, China has done the same in East Asia. Mexico established the system of maquiladoras for multinationals and companies from the US to take advantage of cheaper Mexican labour and less corporate regulation often accompanied by more profitable tax and financial environment. China established (relatively) large-scale Special Economic Zones (SEZs), and then Export Processing Zones (EPZs) in major cities to import technology and to produce goods for export in much the same way as the maquiladoras operated. Costs of production are clearly an important determinant of the Mexico–China trade pattern and their competition. According to most estimates, labour is on average approximately three times more expensive in Mexico than in China, with higher ratios experienced in some sectors (Carrillo, Chen, and Goodman 2011).

China began its economic opening process in 1971 with Nixon’s visit to China. The obvious reason for China’s rapprochement with the US was to further the strategy of establishing a new global geopolitical balance (especially China–US–USSR). The modernization led by Zhou Enlai and Deng Xiaoping promoted contacts with Western countries, resulting in a strong acceleration of trade in the early 1970s. At this time, emphasis was placed on the importation of industrial plants and modern equipment. Trade more than doubled between 1970 and 1975, reaching 13.9 billion USD in 1975. Growth during this period was approximately 9 per cent a year. As a proportion of GNP, trade grew from 1.7 per cent in 1970 to 3.9 per cent in 1975. In 1976 the atmosphere of uncertainty resulting from the death of Mao and pressure from the Gang of Four, whose members opposed reliance on foreign technology, brought another decline in trade (Kuang, Li, and Meng 2005: 119-120). In the late 1970s China resumed its pace of modernization through economic liberalization and foreign trade. As Jiang (2008: 30) stated, China embarked on a process of economic liberalization more than a decade before the collapse of the Berlin Wall. As market forces began to play an increasingly important role in China’s economic development, and as the country integrated into the global economy, the living standards of the Chinese people began to rise. China clearly understood that its economic liberalization programme depended on a peaceful and stable international environment in the post-Cold War era, in turn recognizing the need to adjust its foreign policy toward that end.

China reforms began in the agricultural sector, reversing the process of collectivization during the Maoist era. After that, the reforms were extended to the liberalization of prices, following the process of fiscal decentralization. As part of the reforms, more independence was granted to business enterprises owned by state government. This led to the creation of various types of privately held enterprises within the service and manufacturing sectors. The banking system was also diversified, and Chinese stock markets started to develop and grow as economic reforms in China took hold. There is a consensus that market liberalization in China has brought about both economic growth and economic polarization between social classes and between rural and urban areas. Nevertheless, China is currently the world’s second-largest economy, only after the United States. During the past 30 years, growth rates averaged approximately 10 per cent. In 2011 China became the world’s top manufacturer, surpassing the United States. Concomitantly, China is the largest exporter and second-largest importer of goods in the world. In 2011, the country’s Gross Domestic Product (GDP) (measured in terms of Purchase Power Parity, PPP) was 11.3 trillion USD, and GDP per capita (in PPP) was 8,400 USD (Central Intelligence Agency 2012).

In the meantime, Mexico since the 1980s has alternately served as a model of market-oriented economic restructuring and a cautionary tale of the limitations associated with a market-led development strategy. It was a leader in the process of structural adjustment and economic reform that

swept Latin America. The change in policy came in response to the 1982 debt crisis and the apparent “exhaustion” of the import-substitution industrialization model; successive Mexican governments shifted away from state-led, essentially inward-oriented development policies. They embraced a “new” economic model. Reformers liberalized trade, deregulated foreign direct investment (FDI) and financial markets, and aggressively privatized state-owned enterprises. The pace and breadth of the reform process made Mexico a paradigm for economic liberalization (Middlebrook and Zepeda 2003: 3). As a result of the economic liberalization, Mexico emerged as an important exporter of manufactured goods. This, however, did not translate into economic growth; instead, the expansion of trade and foreign investment significantly increased the Mexican economy’s vulnerability to external shocks.

Facing openness and liberalization, the results have been different for Mexico and China. One of the most striking differences is the growth in GDP. According to World Bank data, while China achieved an annual average growth of about 9 per cent in the 30 years between 1981 and 2010, the corresponding increase in Mexico was 3.2 per cent. This feature is evident in Table 1, which covers the ten years from 2001 to 2010. Other important indicators that explain the differences in the behavior of Mexico’s and China’s GDP are the Gross Capital Formation (which in the case of China was 80 per cent higher than Mexico’s in the decade from 2001 to 2010) and growth in FDI. Total reserves are also significant.

Table 1 Main Economic Indicators of Mexico and China (2001 - 2010)

	Mexico						China						
	2001–2005	2006	2007	2008	2009	2010	2001–2005	2006	2007	2008	2009	2010	
GDP (in billion USD at current value)	716	952	1,036	1,096	0,883	1,040	GDP (in billion USD at current value)	1,722	2,713	3,499	4,521	4,991	5,879
GDP (annual growth %)	1.4	5.2	3.3	1.5	-6.1	5.5	GDP (annual growth %)	9.6	12.7	14.2	9.6	9.2	10.3
GDP per capita (in current USD)	7,077	9,137	9,840	10,307	8,217	9,580	GDP per capita (in current USD)	1,334	2,069	2,651	3,414	3,749	4,393
Gross national income per capita PPP (in current international dollar)	10,620	13,510	14,410	15,120	14,200	15,010	Gross national income per capita PPP (in current international dollar)	3,258	4,790	5,610	6,250	6,860	7,570
Gross capital formation (% GDP)	23	26	26	27	22		Gross capital formation (% GDP)	40	43	42	44	48	
Total reserves (incl. gold) (in billion USD at current value)	58.6	76.3	87.2	95.3	99.9		Total reserves (incl. gold, current USD) (in billion USD)	4,776	1,080.7	1,546.3	1,966.0	2,452.9	
FDI, net inflows (BoP, in billion USD at current value)	23.243	20.103	29.083	24.913	14.462		FDI, net inflows (BoP, in billion USD at current value)	54.938	78.095	138.413	147.791	78.193	

Source: World Bank 2011; UNCTAD 2011.

The highly asymmetrical economic structure between Mexico and China is the result of large differences in the strategies implemented by both nations’ policies of liberalization and economic openness. Furthermore, differences in political system, economic structure, and the national objectives of the two nations’ leaders have led to different outcomes and constitute the background of current trade disputes between Mexico and China.

3 Mexico’s Foreign Trade

For several Mexican presidential administrations, foreign trade has been defined by a policy of diversification. Since the 1990s it has not had the expected results. Mexico has strengthened ties with the US, one plausible explanation for which being that Mexican foreign policy during the last few years has mainly been driven by internal factors. Mexican entrepreneurs, confronted with difficult markets in the Asia-Pacific area, which are characterized by complex distribution channels and which receive little support from government agencies, have preferred to look northward (Faust and Franke 2005). Mexican economy is particularly vulnerable to external factors, especially to the economic behavior of the United States, given the highly integrated nature of its manufacturing sector with that of its northern neighbor and given its high dependency on the US as both a destination of exports and a source of FDI. The vulnerability of Mexico in relation to changes in the global economy is reflected in the GDP reduction of 6.1 per cent in 2009 when external demand declined sharply (Table 1). In Table 2, in 2009 there was a reduction of 24.26 per cent in foreign trade, which shows the high correlation between economic growth and foreign trade in Mexico. The effects of global economic changes on the Mexican economy remain a major concern for the country’s ruling classes. The current situation has deep roots in the economic policy implemented by Mexican political elites. With the objective of promoting economic growth, the government of Mexico designed and implemented a “new” economic model based on the principles of liberalism.

Two other markers of the economic liberalization policy of the Mexican government were the maquiladora programme established in the 1960s and the signing and implementation of NAFTA in 1994. After the signing of NAFTA, Mexico continued negotiating and signing other trade and

investment preferential agreements (known as free trade agreements, FTAs) based on the traditional idea of economic diversification. Mexico's pursuit of free trade with other countries was a way to bring added benefits to the economy and to reduce economic dependence on the United States. By 2005, Mexico had signed 11 treaties with 41 countries. Existing treaties between Mexico and partner countries include ones with the United States, Canada, Chile, Bolivia, Costa Rica, Nicaragua, Uruguay, Guatemala, El Salvador, and Honduras. Mexico has also negotiated FTAs outside of the Americas, in July 2000 entering into agreements with Israel and the European Union. Mexico became the first Latin American country to have preferred access to these two markets. The Mexican government expanded its outreach to Asia in 2000 by entering into negotiations with Singapore, Korea and Japan. In 2004, Japan and Mexico signed the Economic Partnership Agreement, the first comprehensive trade agreement that Japan had ever signed with any country.

Mexico began trade liberalization in the early 1980s; its trade with the world has risen rapidly. Mexico's exports are increasing more rapidly than its imports. Mexico's trade balance with all countries went from a deficit of 7.7 billion USD in 1993 to a surplus of 13.4 billion USD in 1995. Following that, Mexico had maintained a comfortable surplus until 2010, when it reported a deficit of 3.1 billion USD (Table 2). The trade balance with the United States went from a deficit of 2.4 billion USD in 1993 to a surplus of 72.5 billion USD in 2009. Exports to the United States increased from 42.9 billion USD in 1993 to 234.6 billion USD in 2008, and then declined to 184.9 billion USD in 2009. Mexico's imports from the United States increased from 45.3 billion USD in 1993 to 152.6 billion USD in 2008, and then declined to 112.4 billion USD in 2009 and 72.2 billion USD in 2010 due to the economic downturn (Villarreal 2010: 1).

Table 2 Mexico's Foreign Trade, 1993 - 2010 (in billion USD)

Year	Exports	Imports	Total	Balance	Total Trade Change (%)
1993	51.832	59.468	111.300	-7.636	
1994	60.817	72.347	133.164	-11.530	19.6
1995	79.541	66.162	145.702	13.379	9.4
1996	96.004	81.470	177.474	14.533	21.8
1997	110.237	99.207	209.444	11.030	18.0
1998	117.539	114.193	231.732	3.346	10.6
1999	136.362	128.795	265.157	7.567	14.4
2000	166.121	159.382	325.503	6.739	22.8
2001	158.780	154.934	313.713	3.846	-3.6
2002	161.046	154.099	315.145	6.947	0.5
2003	164.766	154.481	319.247	10.286	1.3
2004	187.999	178.997	366.996	9.001	15.0
2005	214.233	201.218	415.451	13.015	13.2
2006	249.925	234.777	484.702	15.148	16.7
2007	272.044	258.723	530.767	13.321	9.5
2008	292.637	289.380	582.016	3.257	9.7
2009	229.620	211.201	440.821	18.420	-24.3
2010	271.237	274.363	545.600	-3.126	23.8

Source: Secretaría de Economía and Banco de México.

In addition, to the flow of imports and exports in Mexico, a very positive role has been played by the international transfer of wealth by Mexicans who are living abroad (mostly in the United States). These transfers accounted for 21.2 billion USD in 2009 and 21.3 billion USD in 2010. In 2011 Mexico entered 22.7 billion USD in remittances, a 6.68 per cent higher figure than the 21.3 billion USD collected in 2010, according to the Bank of Mexico (Banco de Mexico 2012). Mexico's foreign trade has performed impressively, with an average annual growth rate of 11.26 per cent from 1993 to 2010. These data contrast with the small economic growth performance over the last 30 years, whose average annual growth rate is 2.4 per cent. In Figure 1, from 2000 to 2010, the situation was the same: While growth in foreign trade was 10.5 per cent, the increase in GDP was 2.5 per cent. This shows that there is no direct correlation between economic growth and foreign trade, but GDP growth also depends on

other factors.

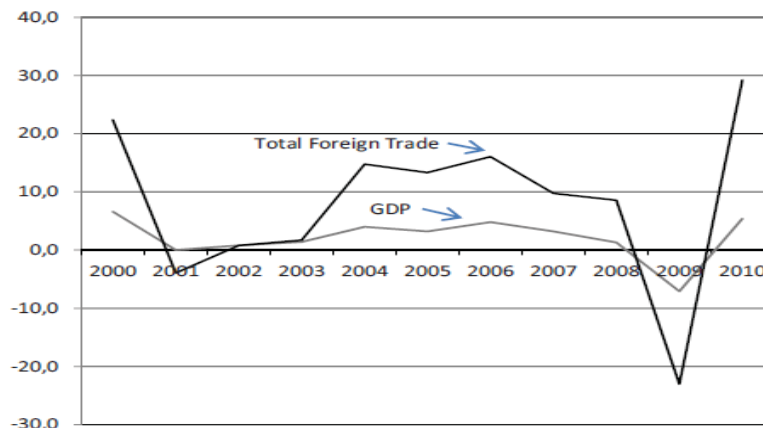


Figure 1 Mexico: Relation between GDP and FDI, 2000-2010 (in per cent)
 Source: United Nations 2009; Secretaría de Economía 2011.

4 China's Foreign Trade

China's relations with the outside world have gone through long periods of opening and closing. The first 30 years of the current regime have been characterized by little or no relationship with the West, but from the late 1970s onward, an opening has characterized China's relations with the world. China's foreign trade has dramatically changed the country's relationships with its trading partners, as a product of internal political conditions and its relationship with the international system. The first ten years of the socialist regime, approximately 70 per cent of trade was made with the Soviet Bloc. After the conflict with the USSR, China conducted its foreign trade through Hong Kong and began to increase its trade relations with Western Europe, Japan and Australia. Over the last 20 years China has emerged as a major force in international trade, particularly in manufactured goods. Its huge markets, vast supply of low-cost labour and growing manufacturing competence have attracted large amounts of foreign investment that have led to dramatic increases in China's exports and imports. In turn, these increases have resulted in major changes in global trade volumes and patterns (Lenz 2003).

In the last 30 years, China's foreign trade growth has been very impressive. From 1980 to 2010 it rose from 38.1 billion to 3 trillion USD, and in the past ten years averaged an annual surplus of 133 billion USD. China's 2010 foreign trade level of 2.97 trillion USD, was one third more than it was 2009, which had decreased from 2008 because of the global economic crisis. In 2010 Chinese exports grew by 31.1 per cent while imports increased by 38.7 per cent. The overall growth is estimated to be 34.7 per cent (Figure 2).

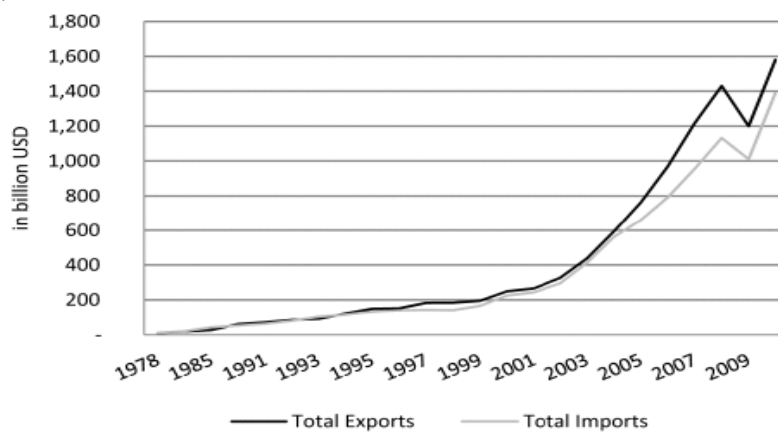


Figure 2 China's Foreign Trade, 1978 - 2010
 Source: National Bureau of Statistics, various years; Xinhua 2009, 2010.

The change in China's production structure is reflected in its foreign trade. China's trade expansion has been achieved almost totally in manufactured goods; 88.6 per cent of the goods it exported in 2001 were manufactures, up from 71.4 per cent in 1990 (Lenz 2003). In 2008, as shown in the table 3, 94.5

per cent of its exports were manufactured goods, and only 5.5 per cent were commodities. Regarding imports, 68 per cent were manufactured goods and the remaining 32 per cent, primary commodities.

Table 3 Total Value of Imports and Exports in China, 2004 - 2008 (in billion USD)

	2004	2005	2006	2007	2008
Total value of imports and exports	1,154.6	1,421.9	1,760.4	2,173.7	2,563.3
Total exports	593.3	762.0	968.9	1,217.8	1,430.7
Primary goods	40.6	49.0	52.9	61.5	78.0
Manufactured goods	552.8	712.9	916.0	1,156.3	1,352.7
Total imports	561.2	660.0	791.5	956.0	1,132.6
Primary goods	117.3	147.7	187.1	243.1	362.4
Manufactured goods	444.0	512.2	604.3	712.9	770.2
Balance	32.1	102.0	177.5	261.8	298.1

Source: National Bureau of Statistics 2009.

5 Trade Relationships between Mexico and China

Trade relations between Mexico and China started with the reestablishment of diplomatic relations in 1972. During the early years, there were some attempts to satisfy the market needs of both parties, but the institutional conditions for trading were still very difficult, so direct trade exchange remained small and their commercial value was low. Since the 1980s, trade between Mexico and China has experienced unprecedented growth. With both countries' implementation of economic openness, their commercial relationship has changed dramatically. The dynamics of regional integration and the participation of both countries in multilateral institutions like the World Trade Organization and the Asia-Pacific Economic Cooperation (APEC), through which both countries acquire rights and commitments that shape their participation in the regional economies of Asia and the Americas and in the global market, have an impact on the economy. The trade and flows of capital influence the configuration of the domestic production structure, balance of payments, technology transfer, competitiveness, employment and the environment.

Trade between China and Mexico is characterized by its focus on a few products. China's major exports to Mexico include electrical equipment, electronic devices, audio-video equipment and spare parts, mechanical equipment and spare parts, toys, game products, optical and photographic medical equipment, and plastic products. China's imports from Mexico include base metals, minerals, electro-mechanical equipment, transportation equipment, plastic, rubber, chemical products, and leather products. Bilateral trade between China and Mexico has other important attributes we should pay attention to. First of all, from 1996 to 2010, it was reported that trade increased 37.63 per cent annually, but the Mexican deficit has also risen 41 per cent annually, as shown in Table 4. Mexican exports to China depend heavily on auto parts (25 per cent), followed by several raw materials such as copper, ores slag, iron, steel and aluminium (accounting for 37.4 per cent in 2010).

It should be noted that there is a big difference in the trade figures reported by China and Mexico as a result of each country's method of compiling statistical information. In 2008, Mexico reported a deficit of 39.3 billion USD, while China reported a deficit of 10.2 billion, as shown in Table 5. Compared to Mexico's calculations, China reported more imports of Mexican products in their national figures and a much lower level of exports to Mexico. This probably reflects the triangulation of bilateral trade through third economies (Hong Kong, Singapore and the United States) (Dussel Peters 2005a: 50-61).

6 Conclusions

Mexican and Chinese Economic Openness processes were almost simultaneous. However, these concurrent events led to very different results due to each country's particular political and economic situation. For much of the nineteenth and twentieth century's, direct trade between China and Mexico was almost non-existent, as Mexico was fighting for independence and internal disorder ruled in China. Direct trade relations between China and Mexico started in the 1970s with sporadic exports and imports of some commodities in small volumes. The current trade boom between the two countries began in the 1980s and was the result of the change in the trade policies of both China and Mexico. In this new context of global exchange, Mexico-China trade relations have gone far beyond a bilateral relationship, as they now include triangular production and marketing relationships with the US; an interchange with

and within North America (Roett and Paz 2008) and the East Asian region and with the world economy as a whole; partaking in the global commitments defined by international agencies; and a new international division of labour. In short, throughout history, the trade volumes between Mexico and China have had drastic ups and down. This has been caused by domestic political factors as well as changes in the international political system.

Since the 1990s, China and Mexico have made progress in their foreign trade. With the expansion of their trade volumes and overseas markets, the overlapping parts of their export products and markets have enlarged, which has brought about competition between the two nations (Yue 2009). However, it is also clear that there are opportunities for complementary production and marketing. The commercial relationship between Mexico and China (and consequently, their production relationship) is complex and difficult. In Mexico, there are concerns in sectors of manufacturing about the role of China in world trade and especially about the trade relationship between the two countries. Both countries need to find new formulas of cooperation, including bilateral trade and commercial relations with the rest of the world.

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An Empirical Analysis on Passenger Unexpected Events of Civil Airports under Flight Delays Scenarios*

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Abstract: It becomes very urgent how to prevent and reduce the adverse social impact of flight delays, since flight delays caused by a variety of reasons occur frequently and passenger clashes increase too. Based on the questionnaire and interview conducted by relevant departments of an airport, the problems of passenger unexpected events are analyzed under flight delays scenarios from the perspective of the airport. The improving suggestions replying to passenger unexpected events of civil airports are proposed, including improving flight delays compensation standards, establishing the early warning system of passenger unexpected events caused by flight delays, consummating the mechanism of communication and coordination between various departments and innovating the learning mechanism relating to passenger unexpected events of civil airports.

Key words: Flight delays; Unexpected events; Compensation standard

1 Introduction

With the booming of our national economy, the development of Chinese civil aviation transportation is rapid, civil aviation transportation total turnover volume has been ranking the second in the world since 2005, becoming the great aviation power and making huge achievement. In 2011, each index of the airport throughput at historic high. The 2011 national airport production statistics bulletin, published by China civil aviation administration in March 2012, shows that the passenger throughput of China transport airport is 620.537 million people in 2011, more than 2010 growth 10.0%. In 2011, the aircraft movement of China transport airport is 5.98 million, increasing 8.1% from the previous year. With the expanding of civil aviation traffic and passenger volume, various passenger emergencies caused by flight delays increased year by year, especially in recent years, a large number of conflicts and dissensions happened because of flight delay, even lead to group incident and affected the social harmony and stability. For example, on September 8, 2004, Hainan airlines flight HU7435 by Haikou turning Shenzhen flying to Xuzhou delayed nearly four hours, enraging all the passengers. A large number of Guangzhou BaiYun airport flights delayed caused by rainstorm on April 13, 2012, raising an event of radical passengers created confusion in the airport. Flight delaying has always been a big problem struggling with civil aviation both in China and abroad. Thus the flight delaying management, especially dispute management caused by flight delaying is problems that urgently need to be solved for sustainable development.

By consulting literature domestic and oversea, the research on the passenger conflict events caused by flight delaying is extremely rare, the main reason lies in the differences of compensation mechanism between countries in the world and lacking of uniform compensation standard. Foreign airlines provide food and accommodation, transportation and communication service according to transportation condition. And to compensate for flight delaying is very little, in cash is rare and the passenger conflict caused by the flight delaying is rarer. With the number of conflicting events caused by flight delaying, relevant domestic scholars have done some research and gained rich research achievements since 2000.

Xu Hong(2007) analyzes the causes of passenger group incidents from the perspective of the legislation and policy, airlines and airport, passenger itself and media. Yu Lan (2009) argues that poor airline service, inaccurate compensation and failure communication would result in flight delaying group events. Yang Lei(2010) thinks the flight delaying caused by the aviation company accounted for a large proportion of the whole. The reasons are listed as follows: one is machine fault, the other is flight deployment, the third is unit business that flying flight unable to execute the task because of its own reasons and leading to the occurrence of group incidents. Yuan Donglin(2011) argues that the flight delaying is a complicated process and the civil aviation should ensure the safety of the passengers, any link will all bring flight fault and passenger conflict while going wrong. Li Weihua(2010) thinks that neglecting passengers' feeling is the main reason for the conflict after flight delaying. Shi Xinliang(2012)

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thinks that most of passengers understand the reasons for flight delaying, but the airline service, which is an important reason for both conflict. From the literature we can see flight delaying are result from many factors, which caused by airlines, airport and passengers. The airport plays an important role in such conflict events, and there is a few researches on passengers conflict from the perspective of airport. In order to prevent and reduce passenger conflict events on the adverse effects caused by civil aviation, this research analyzes the problem in passenger conflict while flight delaying and putts forward the civil airport passengers conflict strategies based on practical investigation on an airport.

2 Data Source

This paper chooses a certain airport comprehensive management department, business department, the Department and other 5 departments as the research sample questionnaire survey, 151 questionnaires were sent out, 140 were reclaimed, the recovery rate is 92.72%, 135 were effective, efficiency of 96.43%. The questionnaire was investigated the basic information as shown in table 1. From the survey of gender perspective, proportion in 1:1, degree level in college or above, at the age of 40 years old; Look at years of work, the staff whose years of work below 10 years accounted for 40%, more than 10 years accounted for 60%. Overall, survey sample was comprehensive and representative, research conclusion has strong reliability and persuasion.

3 Passengers' Emergent Situation in Flight Delaying

3.1 Current Compensation Provisions in Flight Delaying

In order to improve normal flight rate, reduce the conflict caused by flight delays, General Administration of civil aviation of China release a "Civil Aviation Administration of China on domestic airlines for their own reasons to cause delays to give passenger economy compensation guidance (Trial) " in 2004. "Directive opinion" (for Trial Implementation) specified in the compensation is conditional; airlines give financial compensation only on its own causes to flight delays.

Table 1 The Research Staff's Rational Understanding about the Current Compensation Provisions

Sort	The original serial number	Option	Percentage (%)
1	(2)	Not rational	77.8%
2	(3)	Unclear	18.5%
3	(1)	Reasonable	3.7%

From Table 1, 77.8% of the airport staff think compensation standard about the flight delay at present is not reasonable, 18.5% was not clear, only 3.7% of people choose the reasonable. As can be seen most of the staff did not satisfied the flight delay compensation, its reason has the following three points: One is the compensation standards are not uniform. Civil Aviation Administration of China issued the "guidance" to the standard of compensation is not uniform, but advised Airlines establish compensation scheme according to their own situation. The airline specific situation is different, so the compensation standards will differ, the passengers was easy to dissatisfy individual airlines or trigger clashes after encountered flight delay; Two is the Civil Aviation Administration of China issued the "guidance " of the flight delay compensation have no legal effect, does not belong to the legal laws and regulations, no mandatory binding, belong to advices of the economic compensation, there is no direct to the airlines and passengers to produce legal effects; Three is the Civil Aviation Administration of China's guidance is different from international conventions. Current flight delay compensation method of regulation is not the same all of the world, but most countries have no unified flight delay compensation standard. Foreign airlines only in its general conditions of carriage for provisions provide accommodation, transport and communications services after flight delay, but put forward the compensation explicitly is very small.

3.2 Passenger Emergency Problems Solving in Flight Delaying

Research results show that: 85.2% of the airport staff thinks the existing passenger emergency problems of airport flight delay is mainly stem from the poor coordination among relevant departments; 66.7% of those surveyed thinks the vulnerable spot in passenger emergency caused by flight delay lies in the related policies and laws weak.

The statistical results of Table 2 show that the airports take the following actions to cope with the vulnerable spot in passenger emergency rooted from flight delays:

- (1) The coordination among relevant departments should be strengthened, not only the

reinforcement of the coordination among internal sectors, but also the coordination speed among airports, Airlines, air control center and so on. In the meantime, corresponding service of each sector and the service consciousness should be further improved.

Table 2 Deal With the Problem of Flight Delays Travelers Emergencies Exist at the Airport

order	original order	options	percentage (%)
1	(2)	poor Coordination between departments	85.2%
2	(6)	weak policies and laws	66.7%
3	(3)	fail to foresee and grasp the trend	44.4%
4	(5)	poor disposal ability	40.7%
5	(1)	Lack of awareness	33.3%
6	(4)	lack of related professional knowledge	25.9%
7	(7)	others	8.9%

(2) Related policies, laws and regulations need to be further perfected. In current situation of increasing civil aviation volume and airspace resources shortage, the flight delay is inevitable. In order to reduce the dispute between airline companies and passengers, the airlines should take feasible measures to guarantee flight normal, formulate establish unified flight delay compensation standard as soon as possible, establish and perfect the flight delay compensation mechanism, and build a convenient, safe and harmonious environment.

(3) Through the interview we understand that the deficiencies in coping with emergency include airport staff fail to reach the place in time and the manager who is on duty needs to strengthen the ability to deal with emergencies.

3.3 Vital Approaches to Improve Emergency Dealing Abilities

Research results show that 84.1% of the airport staff think improve work personnel emergency main way is to learn emergency professional knowledge; 80.1% of the airport staff think improve work personnel emergency main way is usually to strengthen emergency drill, accumulate the related processing experience. 73.0% airport staff thinks improving work personnel emergency is a main way to actively participate in emergency treatment.

Table 3 Main way Civil Airport in Improving Emergency

order	original order	options	percentage (%)
1	(3)	Learning expertise about emergency	84.1%
2	(6)	strengthen emergency drill	80.1%
3	(4)	Actively participate in emergency treatment	73.0%
4	(2)	Strengthen awareness	48.1%
5	(5)	Increase relevant training	33.3%
6	(1)	Strengthen the sense of responsibility	29.6%

Statistical results of Table 3 show that learning professional knowledge of emergency, strengthening emergency drill and participating in emergency treatment actively can effectively improve the ability to deal with emergencies.

4 Conclusion

Of the civilian airport flight delays contexts respond to emergencies in management status through a questionnaire survey and interviews showed that: From the point of view of the airport most of the staff is not reasonable to think that the compensation standard provisions flight delays. Flight delays contexts travelers emergencies main problems, including the organization coordination between the departments is not enough quickly and effectively, and related administrative law is weak. Improve the airport to cope with emergencies main ways to include the expertise of learning emergency, emergencies drills, and accumulated experience in handling, actively involved in the handling of emergencies. To reduce and avoid the occurrence of such events, and suggestions for improving the flight delay compensation standard administrative regulations, the establishment of an early warning system for flight delays passengers emergencies, and perfect the mechanism of communication and coordination between various departments and innovation airport learning mechanism to deal with

incidents of travelers four aspects of the improvement of hope some inspiration flight delays passenger emergency management situations.

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Evaluation on Performance Management of Vehicle Repair Cost Effectiveness Based on F-AHP

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Abstract: Aiming at the current deficiency of performance management of vehicle repair cost effectiveness, F-AHP method is used to evaluate performance management of vehicle repair cost effectiveness. The F-AHP method based on the principle of performance management is supplied to analysis of vehicle repair cost evaluation index. Determine the membership degree of each index by using expert scoring method and the weight coefficient of each index by the analytic hierarchy process (AHP). Establish the evaluation method of F-AHP. And performance management level of vehicle repair cost effectiveness of some unit is studied as an example. The results show that: this evaluation method can accurately grasp the situation of the performance management of vehicle repair cost, find out the influence of performance management level, and improve the efficiency of management.

Key words: Vehicle repair; Cost; Performance Management; F-AHP

1 Introduction

Performance management of vehicle repair cost effectiveness is conducive to making and planning the decisions of optimization of vehicle repair cost in a given financial conditions, improving the management efficiency of vehicle repair cost effectiveness, completing repair tasks efficiently, and achieving the organic combination of military and economic benefits.

2 Establishment of Evaluation Index system of Performance Management of Vehicle Repair Cost Effectiveness

In view of the fuzzy and relative evaluation on performance management of vehicle repair cost, and considering about many factors that influence vehicle repair, the author puts forward the evaluation index system based on the F-AHP (Table 1):

Table 1 Evaluation Index System of Management of Vehicle Repair Cost Effectiveness

	First-level Index	Second-level Index
Performance Management of Vehicle Repair Cost Effectiveness U	A_1 Supply Efficiency of Repair Cost	Realization Extent of Repair Goal B_{11}
		Quality of Repair B_{12}
		Timeliness of Repair B_{13}
		Innovation of Repair Technology B_{14}
		Military and Civilian Repair Capacity B_{15}
	A_2 Management System of Vehicle Repair Cost	Organizing Agency B_{21}
		Management System B_{22}
		Management Style B_{23}
	A_3 Quality and Abilities of Personnel	Professional Quality B_{31}
		Attitude toward Work B_{32}
		Degree of Education B_{33}

3 Evaluation on Performance Management of Vehicle Repair Cost Effectiveness

According to the actual situation of Evaluation on performance management of vehicle repair cost effectiveness, evaluation index system is established and performance is evaluated combined with F-AHP.

3.1 Calculate the Weight of Each Index

The evaluation index system is established for the system with the size and importance of different, and it can be given with different weight to this difference between the evaluation indexes. In this paper, the application of AHP is used to determine the weight of each index. The weight coefficient of the index calculated by AHP is actually based on the establishment of orderly index system and the comprehensive evaluation results are used to compute weight coefficient of each index through pairwise comparisons between indexes to Evaluation on each index in the system. This method has been widely applied in the analysis of complex system. In recent decades, many kinds of improvement or deformation of AHP have been developed. This paper uses an AHP method based on consistent matrix.

According to the actual situation of Evaluation on performance management of vehicle repair cost effectiveness, experts and judges are invited to score for the relative importance of each index. Scoring rules based on 1-9 scale of AHP are used to construct judgment matrix of every index layer:

$$B = \begin{bmatrix} u_{11} & u_{12} & \cdots & u_{1j} \\ u_{21} & u_{22} & & u_{2j} \\ & \vdots & \ddots & \vdots \\ u_{i1} & u_{i2} & \cdots & u_{ij} \end{bmatrix}$$

Product method is used to determine weight factor matrix and judge the consistency. The specific steps are as follows:

1) Normalize each column of judgment matrix:

$$\bar{u}_{ij} = \frac{u_{ij}}{\sum_{i=1}^k u_{ij}} \tag{1}$$

2) Add the judgment matrix treated by row up:

$$\bar{w}_i = \sum_{j=1}^k \bar{u}_{ij} \tag{2}$$

3) Normalize $\bar{w}_i = (\bar{w}_1, \bar{w}_2, \dots, \bar{w}_r)^T$, i.e.

$$w_i = \frac{\bar{w}_i}{\sum_{j=1}^k \bar{w}_j} \tag{3}$$

Obtain result: $w_i = (w_1, w_2, \dots, w_r)^T$. It presents the weight vector of the relative importance that element on the same level compares with corresponding element on the upper level.

4) Consistency Test

Because of the complexity of the objective things and vague and diversity of people's understanding, the judgment matrix is not entirely consistent, so it is necessary to carry out the consistency test. First, calculate the maximum characteristic value λ_{\max} of judgment matrix.

$$\lambda_{\max} = \sum_{i=1}^k \frac{(p_w)_i}{kw_i} = \frac{1}{k} \sum_{i=1}^k \frac{(p_w)_i}{w_i} \tag{4}$$

In the formula: $(p_w)_i$ presents the i-th element of vector p_w :

$$p_w = \begin{bmatrix} (p_w)_1 \\ (p_w)_2 \\ \dots \\ (p_w)_i \end{bmatrix} = \begin{bmatrix} u_{11} & u_{12} & \cdots & u_{1j} \\ u_{21} & u_{22} & & u_{2j} \\ & \vdots & \ddots & \vdots \\ u_{i1} & u_{i2} & \cdots & u_{ij} \end{bmatrix} \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_i \end{bmatrix} \tag{5}$$

$$CI = \frac{\lambda_{\max} - N}{N - 1} \tag{6}$$

Type: CI represents consistency index.

$$CR = CI/RI \tag{7}$$

When $CR < 0.10$, it is generally believed that the consistency of judgment matrix is satisfactory.

Otherwise, it should be adjusted. RI is the average random consistency index. Table 2 presents the value of RI of 1-10 order.

Table 2 The Value of RI:

Order	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49

3.2 Evaluation Based on F-AHP

Performance management of vehicle repair cost effectiveness based on F-AHP can be represented by comprehensive evaluation index which consists of 4 elements:

1) The evaluation factor set (U_i). It includes the collection of various main factors affect the assessment object:

$$U_i = \{u_{i1}, u_{i2}, \dots, u_{ij}\}$$

2) The evaluation set (V). The comment for evaluation object may be as follows:

$$V = \{v_1(\text{excellent}), v_2(\text{good}), v_3(\text{general}), v_4(\text{poor}), v_5(\text{very poor})\}$$

3) Fuzzy subset of index weight coefficient:

$$\tilde{A} = \{a_1, a_2 \dots, a_k\}$$

4) The fuzzy evaluation matrix R:

$$R = (R_2, R_3 \dots, R_i)^T = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{15} \\ r_{21} & r_{22} & & r_{25} \\ & \vdots & \ddots & \vdots \\ r_{i1} & r_{i2} & \dots & r_{i5} \end{bmatrix} \tag{8}$$

R_i of i-th line, belonging to the vector R, reflects the membership degree of i-th factor for the comment of evaluation set. The j-th column reflects the extent of factors of evaluation object taken from j-th comment of evaluation set, including: $i=1,2,\dots,11; j=1,2,3,4,5$. The (U, V, R) is called as evaluation index system of performance management of vehicle repair cost effectiveness based on F-AHP.

Fuzzy set of fuzzy matrix is:

$$B = A \times R = (a_1 a_2 \dots a_i) \cdot \begin{bmatrix} r_{11} & r_{12} & \dots & r_{15} \\ r_{21} & r_{22} & & r_{25} \\ \vdots & \ddots & \ddots & \vdots \\ r_{i1} & r_{i2} & \dots & r_{i5} \end{bmatrix} = (b_1 b_2 b_3 b_4 b_5) \tag{9}$$

4 An Example

Now performance management level of vehicle repair cost effectiveness of some unit is taken as an example, combining with the algorithm model proposed, to evaluate its effectiveness. The specific process is as follows:

4.1 Obtain judgment matrix from scoring by experts, calculate consistency weight and test matrix

Table 3 Judgment Matrix (U-A):

U	A_1	A_2	A_3	W	Consistency test
A_1	1	1.3431	1.9893	0.4440	$\lambda_{\max} = 3.0061$
A_2	0.7428	1	1.5215	0.3333	CI=0.0031
A_3	0.5124	0.6597	1	0.2227	CR=0.0060<0.10

Table 4 Judgment Matrix ($A_1 - B_1$):

A_1	B_{11}	B_{12}	B_{13}	B_{14}	B_{15}	W_1	Consistency test
B_{11}	1	0.6248	1.2348	0.8421	0.6998	0.1658	$\lambda_{\max} = 5.0033$
B_{12}	1.6145	1	1.9864	1.3452	1.1429	0.2671	CI=0.0033
B_{13}	0.7895	0.5132	1	0.6679	0.5714	0.1336	
B_{14}	1.2167	0.7486	1.5146	1	0.8571	0.2007	CR=0.0026<0.10
B_{15}	1.3896	0.8754	1.7428	1.1684	1	0.2327	

Table 5 Judgment Matrix ($A_2 - B_2$):

A_2	B_{21}	B_{22}	B_{23}	W_2	Consistency test
B_{21}	1	0.7101	0.4875	0.2212	$\lambda_{\max} = 3.0808$
B_{22}	1.6667	1	0.9851	0.3717	CI=0.0404
B_{23}	2.1242	1.0153	1	0.4071	CR=0.0777<0.10

Table 6 Judgment Matrix ($A_3 - B_3$):

A_3	B_{31}	B_{32}	B_{33}	W_3	Consistency test
B_{31}	1	1.4357	2.4132	0.4728	$\lambda_{\max} = 3.0150$
B_{32}	0.7143	1	1.6067	0.3271	CI=0.0075
B_{33}	0.4386	0.5987	1	0.2001	CR=0.0144<0.10

4.2 Judgment matrix of fuzzy evaluation matrix

This evaluation, with the evaluation team composed of 10 experts, will evaluate with five orders: excellent, good, general, poor and very poor (Table 7):

Table 7 Performance Management Level of Vehicle Repair Cost Effectiveness:

First-level Index	Second-level Index	Excellent	Good	General	Poor	Very poor
Supply efficiency of repair cost	Realization Extent of Repair Goal	0.3	0.3	0.2	0.1	0.1
	Quality of Repair	0.4	0.3	0.1	0.2	0
	Timeliness of Repair	0.6	0.1	0.3	0	0
	Innovation of Repair Technology	0.4	0.2	0.3	0	0.1
	Military and civilian repair capacity	0.7	0.1	0.1	0.1	0
Management system of vehicle repair cost	Organizing Agency	0.5	0.1	0.1	0.1	0.2
	Management System	0.5	0.2	0	0.2	0.1
	Management Style	0.4	0.2	0.3	0	0.1
Quality and abilities of personnel	Professional Quality	0.7	0.2	0.1	0	0
	Attitude toward Work	0.5	0.3	0	0.1	0.1
	Degree of Education	0.4	0.3	0.2	0.1	0

4.3 Obtain fuzzy evaluation matrix of repair cost supply efficiency (R_1):

$$R_1 = \begin{bmatrix} 0.3 & 0.3 & 0.2 & 0.1 & 0.1 \\ 0.4 & 0.3 & 0.1 & 0.1 & 0 \\ 0.6 & 0.1 & 0.3 & 0 & 0 \\ 0.4 & 0.2 & 0.3 & 0 & 0.1 \\ 0.7 & 0.1 & 0.1 & 0.1 & 0 \end{bmatrix}$$

The corresponding weights matrix is:

$$W_1 = [0.1658 \quad 0.2671 \quad 0.1336 \quad 0.2007 \quad 0.2327]$$

Second-level comprehensive evaluation can derive repair cost supply efficiency of first-level evaluation factors:

$$B_1 = W_1 \cdot R_1 = [0.4593 \quad 0.1779 \quad 0.1442 \quad 0.0965 \quad 0.1221]$$

The same procedure may be easily adapted to obtain second-level comprehensive evaluation indexes from the first-level evaluation factors of management system of vehicle repair cost and quality and abilities of personnel:

$$B_2 = W_2 \cdot R_2 = [0.3670 \quad 0.1594 \quad 0.1258 \quad 0.0780 \quad 0.0852]$$

$$B_3 = W_3 \cdot R_3 = [0.5746 \quad 0.2527 \quad 0.0873 \quad 0.0527 \quad 0.0327]$$

4.4 Comprehensive Evaluations

1) Comprehensive evaluation matrix of first-level indexes (R) is composed of B_1 , and B_3 :

$$R = \begin{bmatrix} 0.4593 & 0.1779 & 0.1442 & 0.0965 & 0.1221 \\ 0.3670 & 0.1594 & 0.1258 & 0.0780 & 0.0852 \\ 0.5746 & 0.2527 & 0.0873 & 0.0527 & 0.0327 \end{bmatrix}$$

2) Comprehensive weight matrix of first-level index is:

$$W = [0.4440 \quad 0.3333 \quad 0.2227]$$

Performance management evaluation matrix of vehicle repair cost in this unit is:

$$B = W \cdot R = [0.4542 \quad 0.1884 \quad 0.1254 \quad 0.0806 \quad 0.0899]$$

The results of evaluation show that: performance management level of vehicle repair cost in this unit is that 45.42% of the people think excellent, 18.84% think good, 12.54% think general, 8.06% think poor, and 8.99% think that is very poor. According to the maximum membership rule, performance management level of vehicle repair cost in this unit is excellent.

5 Conclusion

In this paper, the application of the AHP method and fuzzy evaluation method are used in performance management Evaluation on vehicle repair cost. Combination of the qualitative and quantitative analyses makes the procedure easy to operate ,grasps the situation of the performance management of vehicle repair cost accurately, find out the influence of performance management level, improve the management efficiency, and promote performance management level of vehicle repair cost to upgrade continuously.

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An Empirical Research on Competitiveness Evaluation of Services Based on Factor and Cluster Analysis: Taking 30 Provinces in China as Example*

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Abstract: The paper tried to evaluate the competitiveness of services scientifically in a region based on factor and cluster analysis method, and then provided efficient and visualized reference data for the scientific development of regional services. It used the statistical data of 30 provinces and autonomous regions in China in 2008, and gave the evaluation results and the gradient distribution which was substantially the same with the gradient of economic development. Finally, some suggestions about services in a region were put forward based on the previous results.

Key words: Services; Scientific evaluation; Factor analysis; Cluster analysis

1 Introduction

Services are also colloquially known as the tertiary industry. Both are long used at domestic. Since 1985, the National Bureau of Statistics has defined the concept of "the tertiary industry", that is, the general term for all industries except agriculture, manufacture and construction industry. In the service economy age, the proportion of service industry in developed countries has accounted for more than 70%, while only about 55% -60% in the developing countries including China, and most of them are on the junior level showing the state of unbalanced development in various provinces and cities. However, the level of the service industry is an important way to measure the level of economic development in a region or even a nation. According to the experience of developed countries and domestic practice, the scientific development of the service industry plays a role in the overall improvement and the sustained and stable development of the national economy, employment and the optimization and upgrading of industrial structure. Therefore, it is theoretically and practically significant for the promotion of scientific and sustainable development of the service industry to identify the main factors that affect the development of the service industry, and to analyze why different levels of development of the service industry exist^[1]. Competitiveness is the most intuitive and direct indicators reflecting the comprehensive competitiveness and level of development of services. The development of the service industry depends on their competitiveness. Competitiveness of regional service industry has become an important support for sustainable development of China's regional economic science^[2]. The economic growth and the promotion of comprehensive level in a region or even a nation are relied on highly competitive service industry^[3].

2 Construction of Evaluation Index System

Competitiveness of Service industry is a comprehensive system covering the services itself and other indicators such as the relevant elements, relationships, and behavior etc. The construction of a reasonable evaluation index system is the premise of the scientific evaluation in the multi-index comprehensive evaluation^[4].

Competitiveness and Evaluation Research Center of Renmin University of China said, competitiveness of services is an integrated system covering service industry itself and the elements, relationships, and behaviors etc., therefore, the evaluation of the service industry should be systematic. According to the scientific, systematic, dynamic and operable principles, index system that can comprehensively evaluate the level of the development of services is constructed from the size, structure, innovation, growth and management¹. These include: scale competitiveness, structural competitiveness,

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¹ Competitiveness and Evaluation Research Center of Renmin University of China. Report on services Competitiveness of China's 31 provinces. China Information News[N], 2003.8.22 (in Chinese)

growth competitiveness, innovation competitiveness and management competitiveness.

Finally, according to the principles of comparability, science, operability, systematicness, and combining absolute principle with relative principle, then evaluation index system of services competitiveness were built from four aspects of the economic strength, the overall situation of services, the development performance of main services, scientific and technological strength in the reference “comprehensive evaluation of competitiveness for our provincial services” by Wu Shiyuan^[5]. Thus this study selected 17 indicators to build the evaluation index system of services competitiveness. (seeing Table 1)

Table 1 Evaluation Index System of Services Competitiveness

	First level indicators	Second level indicators
Evaluation index system of services competitiveness	economic strength	GDP per capita(X1)、 Per capita disposable income of urban residents (X2)、 Services output value (X3)、 The total number of Services (X4)、 urban fixed asset investment of services(X5)、 Urbanization rate (X6)
	the overall situation of services	The added value of services in GDP (X7)、 Services output per capita (X8、 The proportion of employees in Services (X9)
	The performance of main services	Traffic volume (X10)、 wholesale and retail total of consumer goods per capita and catering Accommodation Total (X11)、 Telecommunications per capita (X12)、 amount of financial and insurance per capita (X13)、 tourism income total (X14)
	scientific and technological strength	The number engaged in scientific and technological activities per million people (X15)、 the number of college students per ten thousand people(X16)、 patents total per ten thousand people (X17)

3 Empirical Research on Comprehensive Evaluation of Services Competitiveness

The factor analysis may identify a representative factor in many variables by Classifying variables of the same nature as a factor to reduce the number of variables, and may also examine the relationship assumptions among the variables. This paper used factor analysis to evaluate the services competitiveness in a region, that is, each index can be integrated to a comprehensive variable that can assess competitiveness of services. Firstly, principal component analysis was used for the evaluation index in order to obtain the factor-fit-testing table, from which we can see whether the value of the KOM and the value of sphericity test is in line with conditions of factor analysis. Then, the selected data was used to make the common factor scree plot. According to the scree plot, some appropriate factors were selected as the main factors.

According to the characteristic roots of the main factors, the weight formula of each main factor is obtained as follows:

$$W_i = \frac{\lambda_i}{\sum \lambda_i}$$

λ_i (i=1,2) is the characteristic root corresponding to each main factor, which can be used to construct the competitiveness evaluation model for services.

$$F = W_1F_1 + W_2F_2$$

(i=1,2) is score matrix of each factor, from which evaluation score can be obtained.

This paper selected evaluation data from 30 provinces and autonomous regions as samples (except the province of Tibet, Taiwan, Hong Kong and Macao Special Administrative Region) to do integrated factor analysis and evaluation. The sample data are obtained from “the tertiary industry in China Statistical Yearbook 2009”^[2] as well as provincial and municipal Statistical Yearbook.

The number of variables is 17, and the sample size is 30. Factor analysis was done by using SPSS statistical analysis software. Results of KMO and Bartlett test (0.821) were shown that the correlation matrix was the identity matrix, which was suitable for factor model. Subsequently, the common factor scree plot was made through the selected data (not shown). As the scree plot can be seen, when one or two common factors were extracted, eigenvalues changed a lot; when more than three common factors were extracted, the changing of eigenvalues almost leveled off. Therefore, following the principle that eigenvalues were greater than 1, two common factors were selected, which reached 88% in the cumulative variance contribution rate, that is, they contained most information and have a significant representation that can fully reflect competition level of the 30 provinces and municipalities. Therefore,

they can be extracted as common main ingredients.

These three indicators had a great load explanatory power for the scale of development of services and explained the previous development situation, so that F2 factor was called as the development factor.

$$F = 0.7436F_1 + 0.2564F_2$$

The scores and ranking of comprehensive competitiveness in China's 30 municipalities and regions can be obtained by using SPSS 20.0 (Table 2). Cluster analysis was used to deal with the selected 17 indicators by using the software SPSS (results not shown), then the competitiveness gradient distribution (Table 2) of services in 30 provinces and cities can be obtained.

Table 2 Scores and Ranking of 30 Provinces and Autonomous Regions' Services competitiveness

region	F1	F2	Comprehensive scores	ranking
Beijing	3.63262	-0.65589	2.12	1
Shanghai	2.70622	0.1129	1.73	2
Guangdong	0.49832	2.20736	0.87	3
Zhejiang	0.70647	1.35506	0.79	4
Tianjin	1.50482	-0.72318	0.76	5
Jiangsu	0.3155	1.99029	0.7	6
Shandong	-0.38029	2.27265	0.34	7
Liaoning	0.10577	0.40039	0.17	8
Fujian	0.10776	-0.10227	0.04	9
Hubei	-0.18318	-0.0321	-0.12	10
Inner Mongolia	-0.18142	-0.31949	-0.2	11
Chongqing	-0.13296	-0.45531	-0.2	12
Hunan	-0.5094	0.37843	-0.22	13
Jilin	-0.03832	-0.7608	-0.22	14
Henan	-0.83654	1.18318	-0.23	15
Hebei	-0.53822	0.42346	-0.23	16
Sichuan	-0.66986	0.71733	-0.24	17
Shaanxi	-0.30864	-0.27583	-0.26	18
Heilongjiang	-0.2035	-0.54819	-0.27	19
Shanxi	-0.31525	-0.28043	-0.27	20
Anhui	-0.75073	0.63857	-0.31	21
Hainan	-0.12737	-1.31305	-0.41	22
Jiangxi	-0.55538	-0.33915	-0.44	23
Xinjiang	-0.35555	-0.9427	-0.46	24
Guangxi	-0.68176	-0.1237	-0.46	25
Ningxia	-0.32656	-1.26716	-0.53	26
Yunnan	-0.70074	-0.3437	-0.53	27
Gansu	-0.54397	-1.05465	-0.61	28
Qinghai	-0.47223	-1.35897	-0.64	29
Guizhou	-0.76563	-0.7831	-0.68	30

4 Conclusions

As Table 2 was shown, the provinces and cities of the top composite score were Beijing city, Shanghai city, Guangdong province, Zhejiang province, Tianjin city, Jiangsu province, Shandong province, Liaoning province and Fujian province. All of these provinces and cities lie in the eastern region of China, of which eight are located in the coastal zone. F1 scores of Beijing and Shanghai were far ahead, that is, huge development potential which was due to the local economic strength, the

scientific and technological strength, and political and financial support by government.

Tianjin, a portal of the Beijing-Tianjin-Tangshan region as one of the three major economic groups in China started late in the development of the tertiary industry without enough accumulation. However, Tianjin has great potential in the development of the tertiary industry as the Free Trade Zone, series of policies and funds support.

There were nine provinces and municipalities ranking last, which were Hainan, Jiangxi, Xinjiang, Guangxi, Ningxia, Yunnan, Gansu, Qinghai and Guizhou. Except Jiangxi and Hainan, most of them are located in the western region without good geographical conditions and transportation, so that its slow economic growth affects the investment in the tertiary industry.

12 provinces ranking in the middle are located in the central and northeast region of China, with good foundation of industry and agriculture, abundant labor resources as well as relatively good infrastructure and transportation construction. However, the burden of excessive population reduced per capita indicators. Inner Mongolia Autonomous Region had an eye-catching performance score in the 12 regions, because Inner Mongolia has rich mineral resources. Its industrial development and GDP growth rate far exceeded the national average, which led to the development of the tertiary industry, realizing the combination of manufacture and services.

It is not difficult to see from the weight and the score that the main factors affecting the competitiveness of China's services are economic base, industrialization and government policy, while the influence of scientific and technological strength and new service industry on competitiveness is not great. In the meanwhile, there are uneven development happening in different regions, which differs from Western developed countries.

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A Comparative Research on China's Accounting Standards and International Financial Reporting Standards

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Abstract: International Financial Reporting Standards (IFRS) is a standard system of accounting which issued by the International accounting standards board (IASB), making each country do business easily in International economic relations. Based on the previous studies, this paper objectively analyzed the status of the objectives and benefits of IFRS. We comparatively analyze the differences between China's Accounting Standards and IFRS, and work out the reasons. Finally, some conclusions and proposes have been put forward.

Key words: IFRS; China's Accounting Standards; Comparative analysis; Accounting

1 Introduction

International Financial Reporting Standards (IFRS) is a standard system of accounting which issued by the International accounting standards board (IASB), making each country do business easily in International economic relations. IFRS is a global financial rule, based on the international standard operation standards of financial management. The function of IFRS is to regulate accounting work within the scope of the enterprise or other economic organization all over the world. Generally speaking, there exists only one accounting rule in each country, to avoid some unnecessary financial losses for different standards having different calculation methods. Especially, the IASB is to train the professional senior accountants by entrust the professional accounting organizations, such as International CPA Professional Senior Accountants (AIA). So far, it already has more than 100 countries in the world has passed this standard, including some countries in Europe, China, Hong Kong, Russia, Australia, etc. Actually, the most vital function of IFRS is to establish an effect standard and to meet SME's requirements in business. As a rapidly developing standard, IFRS will bring great benefits to the society and have good prospects for development

2 IFRS' Objectives and Characteristics

Correct and reasonable intentions have a very good guidance for the business.

First of all, the IFRS is to develop a high quality, clear, enforceable and global set, which can be accepted by international financial reporting standards (IFRSs) and the IASB (standard-setting body). That is, high quality financial statements provide useful information to a mass of users, including investors. While, some key factors are required, including the accurate economic reality depiction, less managerial manipulation, timeliness. (Ray Ball, 2006, p11). Compared to the legalistic, political, and tax-influenced standards, which is typified by the Continental Europe, IFRS is designed to a highly sensitive barometer of the economic substance, the economic growth or losses, the economic information and the useful balance sheets. Also, IFRS aims at creating some hidden reserves and the potential economic losses from the public perspective. The ISAB already has a vigorously system, which requires the enterprises reporting in line with the rules of high quality, transparent and comparable information. The governance and oversight of the activities are undertaken by the IFRS Foundation and its standard-setting body rests with its Trustees, which are also responsible for safeguarding the independence of the IASB and ensuring the financing of the organization. The Trustees are publicly accountable to a Monitoring Board of public authorities. In pursuit of this goal, the IASB works hard for the close cooperation with stakeholders around the world, including investors, national standard-setters, regulators, auditors, academics, and others who are interested in the development of high-quality global standards. The brand could gain more great experiences or supports to pay for promotion and find out commons by some communications with each other. Actually, the progress of approaching this goal is steadily developing. All major economies have built time lines to converge with or employ IFRSs in the coming future. The international convergence efforts of the organization are also supported by the Group of 20 Leaders (G20) where, on September 2009 meeting in Pittsburgh, US called on international accounting bodies to redouble their efforts to achieve this objective within the context of their independent standard-setting process. In particular, they asked the IASB and the US

FASB to complete their convergence project. (The IFRS Foundation Web, 2013). Benefit from the continuous efforts of this organization, the goal is approaching. Related industries will have a lot of positive change. Also, people's life style will change a lot in the future.

IFRS is to meet the financial requirements of emerging economies and small and medium-sized enterprises. SMEs have become integral parts of the market and they really matter in the whole society economic growth. Consequently, meeting their needs is really essential. SMEs serve as a backbone to keep an economy going and boosting it up when facing the hard time, such as the great economic recessions. They are considered as the main source of modernization, innovation and entrepreneurial spirit. Several companies, irrespective of their size, are constrained to the statutory rules of a particular country in which they undertake to prepare financial reports to confirm the specified set of accounting principles. There are much ongoing debate on whether the suitability of one set of accounting standards in a country for all its operating enterprises, regardless of their size. As well as IFRSs, the Board has issued IFRS for SMEs, to meet the needs and capabilities of small and medium-sized entities (SMEs) and users of their financial statements. Any company, no matter what its size is, is eligible to use the IFRS for SMEs, provided it does not have public accountability. An entity has public accountability if it is publicly traded, or it is a financial institution or similar entity. The IFRS for SMEs is based on IFRSs but is much less complex. Hopefully, the IFRS for SMEs is a self-contained standard of 230 pages, designed to meet the needs and capabilities of small and medium-sized enterprises (SMEs), which are estimated to account for over 95 per cent of all companies around the world. Compared with full IFRSs (and many national GAAPs), the IFRS for SMEs is flexible in a number of ways; to read more about how complexity was reduced. In this paper, the topics not relevant for SMEs are omitted, such as earnings per share, interim financial reporting, and segment reporting. While full IFRSs allow accounting policy choices, the IFRS for SMEs allow only the easier option. For instance, they only consider some issues like the no option to revalue property, equipment or intangibles, a cost-depreciation model for investment property unless fair value is readily available without undue cost or effort. Many principles for recognizing and measuring assets, liabilities, income and expenses in full IFRSs are simplified. Such as, mortise goodwill, expense all borrowing and R&D costs, cost model for associates and jointly-controlled entities, no available-for-sale or held-to-maturity classes of financial assets. Significantly fewer disclosures are required (roughly a 90 per cent reduction). The standard has been written in clear, easily translatable language. To further reduce the burden for SMEs, revisions to the IFRS will be limited to once every three years. (IFRS Foundation Web, 2013) The standard is available for any jurisdiction to adopt, whether or not it has adopted full IFRSs. Each jurisdiction must determine which entities should use the standard. The IASB's only restriction is that listed companies and financial institutions could not use it. The IFRS for SMEs provides a lot of convenience and build a good platform to small and medium-sized entities, so that exchanges and cooperation with large companies could become simpler, and the benefits for each enterprise would be maximized in this extensive business environment.

3 Comparative Analysis of China's Accounting Standard and IFRS

With the rapid economic growth of China, the CAS (China's Accounting Standard) is studied by more and more scholars. And the issue on identifying the differences between the CAS and IFRS is popular recent years. This paper concludes three differences which are showed in table 1 following.

Table 1 The Differences Between China's Accounting Standards and IFRS

	<i>Difference (a)</i>	<i>Difference (b)</i>	<i>Difference (c)</i>
CAS	CAS is the top standard of all the accounting standards.	The reliability of the information is of the first place and the relevance is of the secondary.	The CAS contains the "profit" factor.
IFRS	The framework of IFRS is established to help evaluate the existed IFRS. When a conflict is occurred, the details of the existed IFRS talk.	The relevance of the information is of the first place and the reliability is of the secondary.	The IFRS doesn't contain the "profit" factor.

Note: CAS denotes China's Accounting Standards.

We are convinced that the reasons why the above differences occurred are the different standards

system and legislation system. On the other hand, the different capital market also matters. Different levels of capital market have various demands towards the accounting information. The details of the reasons are as follows.

Table 2 The Reasons Why the Differences Occur

	<i>The Different standard systems and legislation systems</i>	<i>The Different Capital Market</i>
CAS	(a)The general framework of CAS is one of the parts of the existed accounting system. (b)CAS has the force of legislation.	In China, the capital market is not mature. As a result, the reliability of the accounting system is more important.
IFRS	(a)From the western countries' accounting system aspect, the framework of IFRS is the theoretical base of the accounting system. (b) Do not have the force of law.	In most western developed countries, the capital market is well developed. As a result, the relevance of the accounting information is more important.

However, the IFRS is the most popular international accounting system today. So it is of social value and of theoretical value to study further the IFRS. And this can also help us to improve the China's Accounting Standards.

The adoption of International Financial Reporting Standards has created a number of benefits.

(a)Through the strengthening of cross-border comparability of financial information, it can improve something such as transparency of information (actually, one of the main objectives of International Financial Reporting Standards is to improve the comparability and transparency.)and market data, changes in market liquidity, reducing the cost of capital and increased cross-border investment. It is considered that holding direct impact on the wide spread of International Financial Reporting Standards. To achieve these goals, the investors can acquire a better understanding of the company and market performance at a lower cost. Therefore, investors are more confident and comfortable for the domestic and international investment. The company could access to capital easier with a lower cost, and cross-border investment will increase. About the advantages of the International Financial Reporting Standards elaborated mainly for two different objects. One is public sector and especially the other is Chinese companies.

(b)The public sector reporting calls for high requirements. At the same time, they also need to develop a work plan by related data and materials. So it is necessary to implement a wide range of appropriate financial reporting standards. The objective of financial statements is to provide information about the financial position and performance of an organization that will be useful to a range of people in making economic decisions, and additionally for public sector accounts, demonstrating how taxpayers' money has been spent to the various stakeholders. The general experience is that stakeholders show little interest in the accounts and few authorities expect this to change any time soon. One practitioner said: They didn't mean much before and they mean even less now. The fundamental issue has been lost sight of, which is to provide stakeholders and local taxpayers with a clear picture of what has been spent on the provision of what services and how this compares to the budget on which their tax demand was based. (Peter Bateman,2012) The focus is on entities that are public benefit entities (PBEs) in the public sector, including Government Departments, DHBs, Tertiary Education Institutions and Local Authorities. In the UK, public sector financial reporting is undergoing the most fundamental change since the introduction of resource accounts. IFRS will be used to produce the annual financial statements for central government, health bodies and certain other public sector bodies from 2009/10. The 2008/09 accounts will also have to be restated using IFRS principles. For local government the timetable runs one year behind these timescales. (Stuart Wayment and Technical Information Service,2009) Then under IFRS, there are stricter requirements, including accruals, for staff benefits such as accrued leave. For some government departments, this will be a significant challenge, not only because of the size of the payrolls, but also due to the nature of leave arrangements. For example, the MoD has various arrangements, most notably for serving personnel. Here the movement in accrued leave due to operational requirements may vary significantly year-on-year, whereas for other departments the year-on-year movement may be insignificant. Local authorities are well placed to develop universal success after the first year of IFRS accounting. CIPFA has noted concerns to the guidance and complexity of the accounts of local authorities. The institute responded: "The transition to IFRS was a significant challenge for the local government sector. Bodies should therefore be congratulated on managing the change so well. Though, the successful transition should not be a

surprise given local government's track record in implementing such changes.”

(c) With the advent of economic globalization, that China is developing rapidly and it is inevitable of making communication and cooperation with other countries in many ways. In the economic field, the trend towards the development of a set of globally accepted accounting standards is inevitable. We find that significant steps toward convergence occurred through the issuance of four successive Chinese GAAPs: 1992, 1998, 2001, and 2006. Convergence occurred both through the direct import of standards from IFRS and progressive changes to Chinese GAAP. Direct import was observed for items either reflective of traditional Chinese accounting practice or ones that addressed situations not considered or not relevant under the previous accounting model. Progressive changes to Chinese GAAP were observed on items substantially different from traditional practice. Overall, we conclude that the phased implementation, combination of direct import has been practical and effective methods for demonstration in Chinese accounting standards and international financial reporting standards (Elsevier Inc, 2009). Convergence to International Financial Reporting Standards (IFRS) has benefited the Chinese economy, by making accounting earnings more informative and therefore more useful to domestic and international investors. The researchers examined all Chinese companies which listed on the Shanghai Stock Exchange and Shenzhen Stock Exchange provided investors with more information between 2003 and 2009, to understand IFRS convergence in its financial statements. The study looked for changes to the value-relevance of earnings-the degree to which changes in reported earnings affect share prices -and found that this increased following IFRS convergence in 2007, and was almost certainly the result of convergence itself. Actually, the incentives of the enterprises really matter when IFRS convergence led to companies improving the quality of disclosures (ACCA global web, 2013). To evaluate the integration process, we determined key measurement items and matched in each treatment in the International Financial Reporting Standards. In the period from 1992 to 2006 of the four stages of the development of China's accounting standards, this step allows us to measure the level at each stage of the Chinese accounting standards convergence. We found that the Chinese government is continuing taking efforts to improve the quality of accounting standards and it has been successful in promoting IFRS convergence, consistent with the predictions of teleological process theory. By analyzing the changes in the content, we identified specific practices in the efforts of China Convergence, from an accounting concept and with time go by gradually changing the direct import, it related factors associated with these successful practices. If these factors are interested by other countries, they could consider of the use of International Financial Reporting Standards.

4 Conclusions

In the context of XBRL global rapid promotion, the promotion and protection of the International Financial Reporting Standards (IFRS) is adopted on a global scale unanimously. International Accounting Standards Committee Foundation (IASCF) was launched in 2002. Based on IFRS XBRL Taxonomy formulation, XBRL team officially formed in 2005, which is responsible for formulating the taxonomy of IFRS. Accordance with decision feedback, IASCF decided to use the same classification of the standard technical architecture between the full version of IFRS and the SME IFRS. It contains the SME IFRS 2010 IFRS Taxonomy draft released on February 19 2010 and officially release on April 30.

In the near future, the pursuit of a global scale for IFRS may be not the best choice. According to the experiences of implementation of IFRS, full adoption of IFRS involves that not only a change in accounting principles. However it will be involved in the change of company processes and systems, and even management statements and performance measurement methods may be adjusted accordingly, the level throughout the company has affected. If the company converted to IFRSs, it required lengthy planning and execution. Then the control of progress is also very important. During the conversion process, different companies often find many new issues, which could affect the progress of the original conversion. In addition to time, good conversion plans could avoid the unexpected switching costs. The key of the IFRSs convert to success lies in good planning, effective implementation, good communication and the assistance of experts.

China's economic is roaring in the past years and has a good growth trend, which means the CAS should be changed to fit the varying demands of the capital market. As a result, we should take some measures to improve the external environment of the accounting standards and narrow the gap the CAS and IFRS.

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Analysis of Risk Perception Behavior of Entrepreneurial Team Based on Members Personality

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Abstract: Entrepreneurial activity is accompanied with risks itself, entrepreneurial teams risk perception as the name suggests that entrepreneurial teams have the sensory and cognitive for the possible risks of entrepreneurial activity, which are also the cognition of members who based on risk perception of the overall. This paper analysis the principal personality factors affecting risk perception of entrepreneurial team, and then proposed the optimization strategy based on personality behavior Patterns of team, which is expected to offer guidance to entrepreneurial team.

Key words: Risk perception; Entrepreneurial team; Members personality

1 Introduction

Facing the increasing pressure of employment, many people chose the way of self-employment, consisting of individual entrepreneurship of entrepreneurial team gets the attention of people gradually. There are no uniform standards and metrics in the current study on the definition of entrepreneurial teams. In the previous study of entrepreneurial team, which many scholars have had many different definitions. Leon Schjoedi thought: the entrepreneurial team was made up of two or more people, they were responsible for the future of enterprises, shared a common financial or other obligations, and depended on each other in the work to accomplish the common goal, they were responsible for their entrepreneurial teams and enterprises as well. In the early stages of entrepreneurship (including before the establishment of the enterprise and its inception) they were in the position of the execution layers^[1]. Also some scholars studied on the association between the entrepreneurial decision and the personality of entrepreneurs, put forward the relationship of personality between entrepreneurship and the founders^[2]. Entrepreneurial personality of the variables in the previous studies were summarized by Li Hailei et al., they thought that these variables included seven aspects roughly^[3]. Li yan based on the entrepreneurial personality theories in Holland proposed the view that the entrepreneurial personality formed on the basis of genetic predisposition, in repeated activities, in school, family, relatives and friends according to the different environment types provide opportunities to form and strengthen^[4]. On this basis, some scholars have studied the entrepreneurial risk perception also. Liu Wanli etc considered risk perception was cognition that entrepreneurs in the startup phase could meet all kinds of risks at the beginning of the project selection^[5].

From what has been discussed above, we find that many scholars mainly studied on entrepreneurial team traits or entrepreneur personality traits of the individual, and there was no clear definition and classification for the personality traits. There are some researches about entrepreneurs' risk perception and the relationship of entrepreneurial decision-making, but only focusing on the aspect of risk perception, the analysis of personality of entrepreneurial team members and entrepreneurial teams risk perception are rare. Based on existing research, this paper mainly discusses the analysis about the members of the personality of entrepreneurial team risk perception behavior.

2 The Principal Personality Factors Affecting Risk Perception of Entrepreneurial Team

2.1 The Principal Personality Factors

(1) Personality Factors

Members in entrepreneurial team must have differences in personality, and some may be sociable. Generally, they are lively, enthusiastic, positive, and some of them may be practical and hard-working. Such different character in the entrepreneurial process results in different risk perception behavior. Specifically, sociable and lively members are not too sensitive to risk. They are careless in many respects because of their outgoing personality, which make them not too sensitive to what is happening and predicting. Under these circumstances, their risk perception becomes low. Those more honest, taciturn and introverted members are more sensitive to what is happening, and have higher risk

perception than extroverted people.

(2)Attitude Factors

There are positive aspect and negative aspect in attitude factors of risk perception of entrepreneurial team. Confident and optimistic members tend to think of the bright side in subconscious. They generally think that problems can be solved. So their risk perception in entrepreneurial process is relatively low. Conversely, when negative and pessimistic people are in trouble, they are easily immersed in the problem, which is not conducive to find a solution to the problem. In risk perception process, they are generally much more sensitive to risk, and thus have a higher risk perception.

(3)Emotional Factors

A person’s emotion can easily affect the working efficiency and quality. Good mood at work can play a multiplier effect. In the entrepreneurial process, entrepreneurs need to maintain a stable emotion, meaning that they can’t act on impulse. For those people who are emotionally sensitive, a little emotion swings can easily lead to unfavorable situation such as decision failure. They are very easy to worry about the future because of the present adverse conditions. In this case, their risk perception is easily too high because of emotional factors.

(4)Awareness Factors

Awareness includes many aspects. In this paper, we focus on the study of the impact on innovation of risk perception of entrepreneurial team. In the entrepreneurial team, members with innovative mind put more emphasis on developing thinking when finding a solution to problems, which tend to show more initiative. Innovation itself represents a risk. Successful innovation can promote better development. If it fails, it means money, time and technology inputs. Therefore, to some extent, innovation is risk-taking behavior. Innovative weaker members may be more willing to do step by step, which tend to avoid risk.

2.2 Correlation Analysis of Personality Factors and Risk Perception of entrepreneurial team

Entrepreneurial team composes of different members. In the team’s operations and development, different types of “Team Personality” will be shaped. In this study, based on the above four factors, “Team Personality” is divided into three kinds, extroverted “Team Personality”, introverted “Team Personality” and compound “Team Personality”.

Extroverted “team personality” is created because of the dominant members in the team are more lively, optimistic, emotional and creative. They are more inclined to outward manifestations, and always maintain a positive mood, like to try, and are willing to take risks. Therefore, the Entrepreneurial risk perception of this “team personality” will be “risk-seeking”. Introverted “team personality” manifests that dominant members in the team are generally more stable and careful. Also they are more willing to be with their feet on the ground, and unwilling to take risks. The Entrepreneurial risk perception of this “team personality” will be “risk averse”. Compound “Team Personality” is created by the extrovert’s and the introvert’s neutralizing effect. The dominant members in the team have both extroverted, lively personality and the introverted, cautious personality. The formation of this compound “team personality” in the risk perception of entrepreneurial team is “risks neutral type”. Specific analysis of Team Personality and entrepreneurial risk perception is shown below:

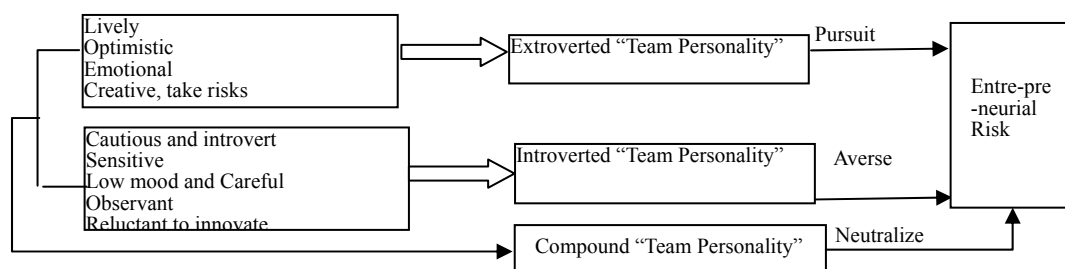


Figure 1 Correlation Analysis of Personality Factors and Risk Perception of entrepreneurial team

(1)Risk Perception Behavior Patterns of Entrepreneurial Team Based on Extroverted Personality

The model of risk perception of entrepreneurial team has a great relationship with “team personality”. Different “team personality” will create different behavior patterns. Risk perception of entrepreneurial team has extroverted personality characteristics because extroverted personality which plays a dominant role in the team will creates the extroverted “team personality”.①Generally the overall

atmosphere of extroverted entrepreneurial team will be lively, optimistic, positive, and quick thinking. They are more inclined to find pleasure in creating, and willing to take risks for the unknown factor. ② Extroverted entrepreneurial team shows confident and optimistic in all respects, and tend to forecast good results. Thus, they also have a positive outcome of the unknown result in decision-making. ③ Extroverted entrepreneurial team specializes in interpersonal relationships, which provide them a very good condition for using social resources in the entrepreneurial process. In the meantime by using social resources actively to solve business problems in the process, they also realize risk sharing in the entrepreneurial process. Therefore, because of the more optimistic predictions of the future and a positive attitude towards the occurrence of risk, subjective risk perception of extroverted entrepreneurial team is relatively low.

(2) Risk Perception Behavior Patterns of Entrepreneurial Team Based on Introverted Personality

Since introverted entrepreneurial team reflects the personality characteristics of introverted personality as a whole, when facing risk, they tend to be cautious. Subconsciously, they will tend to take risk-averse behavior. ① Those who have introverted personality generally lack a sense of security, and they are unwilling to expose their inner mind, and more adept at hiding themselves, so they are more hesitant in decision-making. ② Introverted entrepreneurial team has higher requirements for implementation and program. The implementation is more accustomed to take a single approach, which also makes the introverted entrepreneurial team lacks adventurous spirit, and it prefers to make decisions which are quite sure. ③ There is a subconscious unspeakable fear for the person with introverted personality towards the outside. They are more addicted to their inner world because they do not like or with other reasons and refuse to contact with the outside world. With the communication to the outside world, they actually are worried about the occurrence of risk. Therefore, the introverted entrepreneurial team is more sensitive to risk perception, and is trying to avoid the occurrence of risk because of personality factors. In fact, the paper argues that introverted “Team Personality” may be existed, but introverted entrepreneurial team will face many problems in the actual business.

(3) Risk Perception Behavior Patterns of Entrepreneurial Team Based on Compound Personality

Due to a team has both extroverted members and introverted members in the dominant role, Compound “team personality” is created. Thus it shows a more balanced state. Compound entrepreneurial team is necessary to consider both optimistic estimates of extroverted members and careful analysis of introverted members in decision-making. In this way, the understanding of risk can be neutralized and the risk perception is more at rationalization in entrepreneurial management. It is easy for compound entrepreneurial team to combine members’ respective strengths and play their active role in decision-making in the development. But it may be more time-consuming when two opinions agree.

3 Optimization Strategy Based on Personality Behavior Patterns of Team

3.1 To Strengthen Communication within the Team

Now as an entrepreneurial team, members should cooperate with each other and promote each other, and the personality, attitude, ideology of members should complement each other and they should make best use of the advantages and bypass the disadvantages in the development process. Communication between people and between people and the team is about the process of thoughts and feelings passing and feedback. Good communication can achieve consistency thoughts and clear expression of feelings. In the entrepreneurial team, there are two forms of communication: ① Verbal communication; By oral, written, pictures and other forms to communicate and to achieve the transfer of information and expression. ② Body language to communicate; For example, by using gestures, facial expressions, gestures and sounds to express feelings and to achieve mental and emotional exchanges. Friendly physically express will have a positive effect for team members in the feelings and emotional aspects.

In entrepreneurial team, communication is helpful to achieve harmonious exchanges, so that we can strengthen the consciousness of cooperation among the members, and establish goals for the common determination. By the bidirectional communication or more directional, members can realize the advantages of others, find their weaknesses, and thus improve their own personality deficiencies. Meanwhile, risk communication also promotes members easily to reach consensus on risk perception in the process of cooperation.

3.2 To Strengthen the Quality Development of the Team

Quality development activities are the process for team members strengthening exchanges and

promoting team integration. With an experiential learning, most of the curriculum will be held in the outdoors and through a series of new and exciting scenarios, participants can experience and solve problems actively. When participating in the process, their mental is challenged, and their mind is inspired so that they can think, discover and awaken in a particular environment. Also they can rediscover and reposition the individual and the team. Therefore, not only quality development activities can stimulate, adjust, enhance and sublimate the team members' psychological, physical, and moral qualities, but also they make members' self-confidence, responsibility, adaptability, innovation, team work and other aspects be enhanced. Besides, they can inspire imagination and creativity to improve the ability to overcome difficulties, and then enhance team spirit and develop teamwork skills.

Quality development is also very important in entrepreneurial team. Team members can achieve deeper understanding and mutual understanding, strengthen team cohesion, and put the team's interests in the first place through a number of scenarios and games. Extroverted members who play positive role in transferring the atmosphere, adjusting attitude, and organizing processes can guide introverted members. Meanwhile, the introverted members can also analyze more rigorously and tend to be more rational in decision-making. With the quality development of the team, team members can achieve mutual understanding and strengths, and improve their own personal problems actively, and then improve the "team personality." Thus, in face of the entrepreneurial risk, the members are not only easy to reach agreement in risk perception, but also can collaborate in solving problems actively, and play their respective roles better.

3.3 To Establish Incentive and Restraint Mechanisms of Personality Development

To establish incentive and restraint mechanisms of personality development is that team members achieve complementary advantages from the mechanisms. Incentives are an integral part of management activities. Effective incentive is conducive to promote the team members to make progress better, and to promote team goals to come true. Introverted members in the team should be encouraged to innovate boldly, be inspired their enthusiasm, and be promoted them to exchange actively. For extroverted members, it is better to encourage them to look at the problem rationally, and they should not easily make decisions because of a moment of enthusiasm. Constraint mechanism is to enable members to build and develop "what can be done and what cannot" in the team. We should train members of the moral sense and a sense of duty, and make it become a habit with the constraints of external forces.

4 Conclusion

The risk associated with the entrepreneurial process always can't be avoided, so entrepreneurial team needs to perceive risk reasonably and actively mitigate risks. Through the above analysis, we find that the "team personality" shaped by the dominant personality in the team is on behalf of the entire team's personality characteristics and operational characteristics largely. This "team personality" also makes the team shape their risk perception behavior. However, the "team personality" affects the operation of the entire team. In the continuous process of development, we must continue to improve and optimize it so that the entrepreneurial risk perception becomes rational and accurate.

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Study on Reconstructing the Contribution Model of Education to Economic Growth

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Abstract: Based on the productivity function by Cobb-Douglas this paper reconstructs the dynamic productivity function on the educational input to productivity growth. With the relevant data between 1980 and 2005 the coefficients related with the reconstructed model have been measured and calculated, and their reliability has been analyzed. Through the Cobb-Douglas productivity function, we reconstruct the contribution model of education to economic. As a result a new model to measure and calculate the contribution of education to economic growth is proposed.

Key words: Education; Economic Growth; Contribution Rate

1 Introduction

In 1930s when American mathematician C.W Cobb and economist D.H. Douglas were researching into the role of labor and capital in American manufacturing on industry they successfully proposed a productivity function, famously named as Cobb-Douglas Productivity Function^[1]:

$$Y = AK^\alpha L^\beta \quad (1)$$

Among which, Y means output, A means the constant of technological level, K means capital input, L means labor input, α means the elastic coefficient of capital output, and β means the elastic coefficient of labor output, with the prerequisite as the below:

$$\alpha > 0, \beta > 0, \alpha + \beta = 1 \quad (2)$$

Considering the contribution of education to the improvement of labor quality, such a contribution can also be regarded as helpful for increasing the initial labor input by certain ratio. In his paper of the Contribution of China Education to Economic Growth in 2000 CUI Yuping creatively divides L of labor in the Function into the product of L_0 for labor multiplied by and E for education input^[2]. Therefore, the Cobb-Douglas Productivity Function can also be expressed as:

$$Y = A_t K_t^\alpha (L_{0t} E_t)^\beta \quad (3)$$

Where it means the variable of time.

Since any education has its certain period for completion, its contribution from a student after his graduation from primary school can be laggard for at least six years, and that from a graduate from university can be as long as 16 years. When such a laggard is taken into consideration the function mentioned above can be further modified as:

$$Y_{t+n} = A_{t+n} K_{t+n}^\alpha (L_t E_t)^\beta \quad (4)$$

in which n means the laggard of education

The laggard of contribution from education can be measured and calculated by:

$$n = \sum n_i h_i \quad (5)$$

in which n_i refers the study length for different levels of degree, and h_i refers to the percentage of the educated people for different degree over the total educated.

Based on the data in 2000 the laggard period of contribution from education can be measured by the above equation as:

$$n = 6 * 34.4\% + 9 * 49.99\% + 12 * 8.44\% + 16 * 5.45\% = 8.4488 \quad (6)$$

If the increased governmental emphasis on education and the quick expansion on higher education are considered, the educational level for average people can be expected much higher. As a result, the laggard from education contribution can even much longer. For the convenience of calculation, such a laggard of 8.4488 can be simplified as 9 years. So, the Cobb-Douglas Function can be written as:

$$Y_{t+9} = A_{t+9} K_{t+9}^\alpha (L_t E_t)^\beta \quad (7)$$

If the natural logarithm is conducted from either part of the equation, the Time t is derivated, and then the differential equation is approximately substituted by the difference equation, the equation as

below can be reached:

$$y_{t+9} = a_{t+9} + \alpha k_{t+9} + \beta l_t + \beta e_t \tag{8}$$

in which, y_{t+9} refers the economic growth in the year of $t+9$, a_{t+9} and k_{t+9} respectively refer to the technological progress and capital growth in the period of $t+9$, l_t refers to the growth rate of education scale, and e_t refers to the growth rate of educational investment. From this equation the contribution from education to economic growth can be regarded as the ratio of $\beta l_t + \beta e_t$ over y_{t+9} . So the model to measure the rate of educational contribution to national economy can be reconstructed as:

$$c_e = (\beta l_t + \beta e_t) / y_{t+9} \tag{9}$$

in which c_e refers to the share of educational contribution to the annual growth rate of national economy.

2 Parameter Measurements

The equation of

$$y_{t+9} = a_{t+9} + \alpha k_{t+9} + \beta l_t + \beta e_t \tag{10}$$

can be a derivation from Cobb-Douglas Function. For convenience of calculation the variable of a_{t+9} for technological progress can be regarded as a constant, so this equation can be used as a three-element regression linear equation. Hereinafter the data from 1980 to 2005 are used for regression analysis into this linear equation.

Table 1 Growth Rate

Year	Growth Rate of Total Fixed Assets Investment (Price Factor Considered)	Growth Rate of Education Scale	Growth Rate of Education Investment (Price Factor Considered)	Actual Growth Rate of Annual GDP
1980				7.8
1981	3.03	0.502623	5.05	5.2
1982	25.64	0.416181	9.98	9.1
1983	14.51	0.593876	11.14	10.9
1984	24.67	0.512263	13.44	15.2
1985	27.53	0.397335	15.26	13.5
1986	15.75	0.507205	14.25	8.8
1987	13.24	0.141739	-0.29	11.6
1988	-1.04	1.134219	2.40	11.3
1989	-21.01	1.485178	-1.84	4.1
1990	5.32	-0.08636	9.83	3.8
1991	13.07	1.83948	11.88	9.2
1992	23.67	-0.48684	10.80	14.2
1993	31.45	0.769069	7.26	14.0
1994	18.09	2.276704	10.90	13.1
1995	10.93	0.895903	2.07	10.9
1996	10.06			10.0
1997	7.03			9.3
1998	14.12			7.8
1999	8.03			7.6
2000	7.22			8.4
2001	7.87			8.3
2002	8.88			9.1
2003	7.63			10.0
2004	4.26			10.1
2005	8.46			10.2

Whereas in the table:

(1) the Growth Rate of Total Fixed Assets Investment = [(Current-Year Total Fixed Assets Investment — Total Fixed Assets Investment in Year Before)/Total Fixed Assets Investment in Year Before]/Price Index of Current-Year Fixed Assets Investment — 1;

(2) Growth Rate of Education Investment = [(Current-Year Education Investment — Education Investment in Year Before)/ Education Investment in Year Before]/Current-Year Retailing Price Index — 1;

(3) Growth Rate of Education Scale = [(Current-Year Education Scale — Education Scale in Year Before)/ Education Scale in Year Before];

(4) Education Scale = Primary Education Scale*1 + (Junior Education Scale + Senior Education Scale*1.277 + Associate College and Above Education Scale*1.603 (Index based on Mincerian Rate of Return in China proposed by Prof. MIN Weifang^[3]).

The results are calculated by SPSS as listed in the Table below.

Table 2 Relativity between the Growth Rate of Education Investment and Economic Growth

Coefficients(a)						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.727	1.302		2.862	.015
	VAR00001	.250	.043	.918	5.839	.000
	VAR00002	4.811	1.093	.517	4.404	.001
	VAR00003	-.130	.107	-.194	-1.222	.247

a Dependent Variable: VAR00004

From the results it can be found that there is no relativity between the growth rate of education investment and that of economic growth, so the former variable can be eliminated from the regression equation. By linear regression analysis the results are reached as listed in the Table below.

Table 3 Mathematical Model

Coefficients(a)						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.572	.955		7.933	.000
	VAR00001	.202	.051	.741	3.974	.002
2	(Constant)	3.003	1.184		2.537	.026
	VAR00001	.215	.032	.789	6.637	.000
	VAR00002	0.773	1.107	.534	4.494	.001

a Dependent Variable: VAR00004

Through such a regression analysis the mathematical Model to measure the education contribution to economic growth can be constructed as:

$$y_{t+9} = 3.003 + 0.215k_{t+9} + 0.773l_t \tag{11}$$

3 Conclusions

From the modeling and regression analysis it can be concluded that: (1) the growth rate of both capital and education scale has positive impact on the economic growth rate^[4]; (2) There is no evidence that the economic growth rate can be influenced by the growth rate of education investment. The quantitative analysis shows that from 1980 to 2005 the elastic coefficient of capital output is 0.215 and that of labor output is 0.773, which means the contribution rate of capital investment to economic growth can be 0.215 and that of educational development to economic growth can be 0.773.

3.1 The High Economic Growth Rate Owes to Educational Development

The rapid growth over10% of Chinese GDP in recent years has attracted world attention, which

makes China the second largest economy. Without the strong emphasis of education development such a high growth rate of economy can never realized. From the modeling and analysis we may easily find that education has contributed quite a lot to the economic development by means constantly providing sufficient skilled labor forces. To maintain the sustainable development of Chinese economy in the context of world economy slowdown, the investment into education should be increasingly expanded by keeping the goal of education investment maintained at least 4% of the GDP.

3.2 Education Development Contributes more than Capital Investment to Economic Growth

From the modeling and quantitative analysis it can be concluded that the contribution of education development to economic growth can amount to 0.773, which is as higher as 3.6 times than that from capital investment. The successful economic recovery and rapid development in Japan after the World War II further confirms that governmental emphasis and continuous investment on education have positive impact on sustainable development of economy. Much can be learnt from this experience that China should continue its heavy emphasis and increase input into education development for the purpose to maintain its social and economic development.

3.3 Contribution of Education Development to Economic Growth Can be Universal

Quantitative research by American scholar A. Maddison shows that in recent 20 years the contribution rate of education development to economic growth in the United States of America is 0.7^[5], which is quite similar with our conclusion of 0.773 for that in China. This could add evidences about the universality of contribution of education development to economic growth no matter wherever the economy is.

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A Firm Capability and Foreign Market Entry Modality: Art of Management Versus Diversification of Strategies

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Abstract: This research firstly, investigates and set an overview about mainly strategies posture on the firm about the mode of the entry in the market. These strategies identified exert some impacts on the choice on an international and global market. After analyzing the different types of paradigms, theories and concepts and their criticisms, we develop an ideal choice of entry in foreign market based on a continuum approach made by strategies and art of management. Secondly, goal of this research act as an introduction to the entry mode special issue about the combination's theories by outline issue's objectives and the contribution to it.

Key words: Firm capability; Foreign market entry modality; Art of management; Strategy

1 Introduction

The International Business (IB) and the New Globalization of Labor are led to increasingly globalization environment typified by tremendous opportunities for abroad expansion. This decision to operate in international market is one of most critical decision for the companies (Xu, Y. and al., 2011). The companies have different approaches to operate in foreign market mainly in order to get competitive advantage. Then, entry mode is one the most important strategy because it represents the organizational policies in the international context and has been considered as a new research field on internationalization of firms.

Early in 1986, M. Porter distinguishes multi-domestic from global strategies according to the activity concentration in the value chain, the location and the coordination between activities regards to the level of delegated autonomy. This distinction allows state that the degree of the coordination and the concentration coupled with the environmental impacts pushed the organizations to adapt its services to overseas market. In the literature, there are voluminous empirical and theoretical researches that relate diversifications strategies with the different options about the way of doing business in abroad. Mostly, there are four basic types of entry mode: foreign trade, contractual arrangements like licensing and franchising, joint venture and wholly-owned subsidiary (WOS) (Xu, Y. and al., 2011). Each entry mode has its specificities, advantages and barriers according to different theories and paradigms that mark the field of international management studies.

When analyzing the entry mode choice, different issues have been debated. The scholars proposed a variety of theories such as the transaction cost theory, organizational capabilities theory, eclectic theory, evolution theory, contingency theory, and bargaining power theory. Here in our studies, we will focus on the first three of them that are mostly used in the literature.

The goal of this paper is to shed light on the different theories, paradigm and conceptual framework about the mode of entry. In this research, we realise that the optimal entry mode decision is affected by some factors the competition intensity in the market, the size of the enterprise, its general commitment and of course its general knowledge about the market. Under these conditions where all the theories and paradigms on the entry mode on the market suffers from a deficiency in relation to their exploitation, we wonder if the company's internationalization process should not be guided by art of strategic management? The first section presents the concept and the framework of the international entry mode choice and the contribution of the main theories and paradigms in the international business. Based on the scholars, we provide a persuasive explanation of them for the real comprehension. In the next section we dedicate it for the research methodology. In the last section follows up with the use some variables related to foreign market entry choice using in entry mode to provide a unifying paradigm that accounts for the many diverse forms taken by organizations.

2 Background about theories and conceptual frameworks of the entry mode

The research of Otto allows us to make the different about theories and conceptual frameworks that help to increase scientific understanding through a systematized structure capable of both explaining and predicting phenomena. Otto (1997) states that a conceptual framework is not a theory since it will not

have all the prerequisites of theoretical constructions.

Since two decades, some scholars have tried to define the concept of internationalization and entry mode. Whereas some scholars described as the outward movement in a firm’s international operations others perceived it as a part of outgoing strategy process of most business firms. According to Otto A., (1997): “Internationalization is the process of adapting exchange transaction modality to international markets”. This definition includes both entry mode strategy and international market selection. Entry mode has been defined as an institutional arrangement for organizing and conducting international business transactions, such as contractual transfers, joint ventures, and wholly owned operations (Root 1987).

3 Foreign market entry mode and mains paradigms

3.1 The early contribution of classical internationalization theories and limits

Robert A. Mundell (1957) refers to the factor mobility to explain the internationalisation. Mobility involves the movement of factors between countries either within industries or across industries. His theory demonstrates that international factor mobility can act as a substitute for international trade in goods and services. For this author, free trade can be benefits not only for the countries but also for the workers. However this theory is limited because even the nations work to abolish the trade tariff, the phenomena of the internationalisation of the firm is far to be stopped. Hymer (1960) stated that the companies possess firm-unique advantages or monopolistic advantages not available to other countries’ enterprises before going to foreign market. MNEs’ monopolistic advantages include: i) superior knowledge advantages; ii) economies of scale; iii) access to raw materials; iv) cost and financial advantages; v) production efficiency and product differentiation. However, Hymer’s monopolistic advantage theory could not explain why MNEs choose FDI rather than exporting or licensing very well. Vernon (1966) developed the theory of product life cycle, based on the study of internationalization of American manufacturing firms. Vernon considered that the monopolistic advantage theory analysis was relative static, and it could not explain how enterprises would choose between export and FDI. He divided product life cycle into 3 stages: new product, maturing product and standardized product. Buckley and Casson (1976) take market imperfections as the precondition of theoretical analysis. Internalization theory stresses that enterprises prefer to retain monopolistic advantages within the enterprise because of market imperfection and transaction cost. This theory does not show the motivation of the companies to operate internationally.

3.2 Entry Mode and the Transaction Cost Approach (TCA)

With his theory about transaction cost, Williamson explains why companies exist, and why companies expand or source out activities to the external environment. For him, when external transaction costs are higher than the company’s internal bureaucratic costs, the company will grow, because the company is able to perform its activities more cheaply, than if the activities were performed in the market. For instance, if a company is thinking about offshoring outsourcing, joint venture its production of a given product, it may assess the costs related to such a transaction with the environment. The TCT was used and still used by different scholars in different field of studies (Anderson and Gatignon, 1986, 1988; Otto, 2007, Hennart 1982, 1988a, 1991a, 2009, 2010). By 2009, John Dunning wrote that “for much of the last two decade the theory of internalization . . . has been the dominant explanation of the existence and growth of the MNE” (Dunning 2009: 44).

However, resource constraints severely restrict SMEs in their choice of equity entry modes, even when internalization is rational (Erramilli & Rao, 1993). First, SMEs lack important resources (Cheng & Yu, 2008). Second, SMEs generally lack knowledge and experience related to internationalization (Lu & Beamish, 2001). Thirdly, SMEs with inexperienced managers, for instance, inevitably lack the legal, social, and political discernment to operate abroad (Buckley, 1989).

3.3 Entry mode and the internationalization process of the firm

In their researches, Johanson and al. (1997) have developed the model of internationalisation process of the firm that focuses on the development of the individual firm.

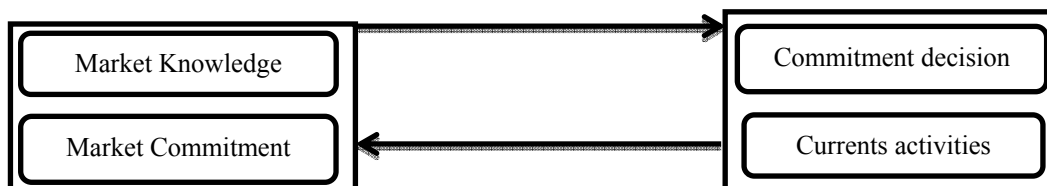


Figure 1 The Basic Mechanism of Internationalisation – State and Change Aspect (Johanson and Al, 1977)

Particularly, on its gradual acquisition integration and the use of the knowledge about the foreign markets and operations, and its successful increasing to foreign markets (Johanson and al. 1977). The figure 1 below displays the basic mechanisms of the processes of internationalization of the firms.

For these authors, the resources commitment, the market commitment and the knowledge commitment about the foreign market are crucial and important for the internationalisation.

3.4 Entry Mode and the Organizational Capability Perspective

Recently the organizational capability (OC) perspective has been introduced to explain entry mode choices. According to Madhok (1997), the OC perspective perceives the firm as a bundle of relatively static and transferable resources, which are then transformed into capabilities through dynamic and interactive firm-specific processes (Otto, 1997) where individual skills, organization and technology are inextricably woven together. The OC perspective seems to be somewhat restricted as concerns the predicted modes of entry: Madhok's (1997) focus on internalization vs. collaboration.

3.5 Entry mode and the eclectic paradigm

Dunning (1980, 1988) suggests that the following factors will influence a firm's choice of entry-mode: Ownership Advantages, Locational Advantages, and Internalization Advantages. Ownership (O) advantages are firm-specific assets and skills. Locational (L) advantages reflect how attractive the specific country is, and the attractiveness of a country has been characterized in terms of its market potential and investment risk (Root 1987). Finally, the internalization (I) advantages are concerned with the costs of choosing a hierarchical mode of operation over an external mode (Dunning 1988, 1993). The eclectic paradigm permits researchers to create new determinants in order to predict entry mode but this theory lacks to plan an important role of innovation in sustaining and upgrading the competitive advantages of firms and countries needs to be better recognized. It also needs to be more explicitly acknowledged that firms may engage in FDI and in cross-border alliances in order to acquire or learn about foreign technology and markets. Second, the paradigm needs inter-firm cooperation or collective competition, which tend to address issues of static efficiency, need to be widened to incorporate questions of dynamic efficiency... Third, the eclectic paradigm needs to acknowledge that the traditional assumption that the capabilities of the individual firm are limited to its ownership boundaries is no longer acceptable whenever the quality of a firm's efficiency-related decisions is significantly influenced by the collaborative agreements they have with other firms (Dunning 1995). The eclectic paradigm, contrary to the internationalization model, is static in nature.

4 Study Methodology

Our study methodology is based on the mains theories and empirical cases studies recently about the internationalisation. Our analysis focuses on the foreign market entry mode decision according to the size of the companies. We use perish (Harzing 2010) to collect some important research about our subject. The dependent variable is the entry mode which was discussed according to the previous mains theories and paradigms. The independents variables are related to the strategies typologies that influenced the mode of entry. There are: foreign market opportunity, country risk factors, institutional, psychic distance and cultural factor, and knowledge commitment. Our below analysis will focus on these factors.

5 Entry Mode and Independent Variables

We have identified in the literature some variables that impacting the mode of entry mode choice in different situation. These variables are:

- ✧ Foreign market opportunity: Before going to international it better to get first some global information about the market. It can help reduce uncertainty in decision making and maximize your opportunity;
- ✧ Country risk factors: The risks in a host country, and the cultural distance between the host country and home country, are two of the most prominent variables identified as environmental determinants of foreign market entry mode choice. Then the company which decide to go abroad for its business should first consider country risk in the target country.
- ✧ Institutional psychic distance and cultural factor: The differences in the national cultures of two countries can be measured by cultural distance (Xu, and al 2011).
- ✧ Knowledge commitment: In internationalization process model knowledge commitments in the relationships between shareholders help to trust each other. The more knowledge a firm has about a market, the more valuable is the resource and the higher will be the commitment to the

market.

It is worth noticing that each theory has their strengths and weakness. Erramilli and D’Souza (1993) found that the differences between smaller and larger firms are negligible when capital intensity is low, but become substantial when capital intensity increases, and that the effect of external uncertainty on entry mode choice is moderated by firm size. The mode of entry depends on the art of management of leaders and managers of the firms.

6 Entry modes and the art of management

Management is not only about strategies or theories. Most of people refer art to the panting, poem, opera or lyrics. Jack Adamson (1989) defines art as “any personalized or stylized way of expressing an idea, product, skill or service”. For this author, art and creativity are synonyms. According to that definition, we can state that everybody somehow are creative in something.

In our case, the theories and paradigms about entry mode can give to managers, leaders, economic operators some skills about their decisions to go abroad but they need to be creative. The art feeds their skill and their competences. Then, we need more artistic manager. Furthermore, the artistic or creative manager is the one that figure out the future of the company, its global policies. The manager should be a visionary. We are better that every theory or axioms. Our mind is terrible to spoil. “He does not fight the things he cannot control, but he does dive in his own imagination and fight the things he can control” (Adamson, 1989).

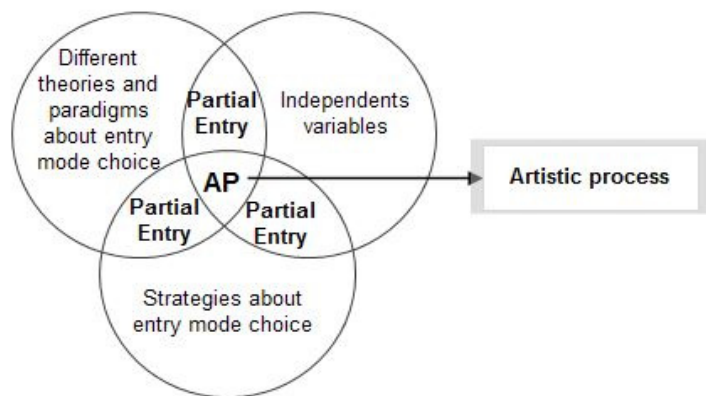


Figure 2 Artistic Process of Entry Mode Strategy

The figure 2 displays that in any situation the artistic power of the manager is really important. The following passage compares excellently the roles of managers like artists. “Just as artists master their crafts, business managers need to perfect their skills in dealing with people and in expressing themselves verbally; just as artists need visions and passion to realize them, managers need imagination and audacity to redesign their organizations; and just as great masters communicate their visions, great leaders inspire those who work for them...If a manager loses heart and does not follow any dream or vision, the organization is doomed” (Henry M. Boettinge 1975). The imbalance between the characteristics causes partial entries.

7 Conclusion and Future Research

Finally, it is important to say that different company has several choice of mode of entry. The choices could be export, international subcontracting, outsourcing, the license agreement, the transfer international technology, joint venture (joint venture) international merger and acquisition or subsidiary as appropriate input mode. Each mode of entry has some independent variables that impact its operations in the foreign market. However be international is not to produce in higher volume the products and move it somewhere else. It needs some strategies coupled with an art.

This research provides some evidence in specific topic: entry mode choice in international setting. We found some empirical support from the literature that helps us to understand the topic and give some limits about each conceptual framework. We should use not only best strategy depending on the size or situation of our company but also we need to also artistic manager. However, it is really qualitative and solely based on the literature.

Future research may focus on the clean-up about the multiplicity of the theories and the paradigms. A research that could put together overall of the theories will help the International business studies to move ahead. Many theories are interested mostly in the organization's mode of entry forgetting that internationalization of the firm generates the New Global Division of Labor. Theories must also take into account this aspect which nowadays becomes an important field of study. The majority of researches are concentrated on the entry modalities of economic enterprises regardless if it is small, medium or large. Nevertheless, they we did not find some research that focuses on the entry mode of Non-Government Organization which constitutes also an important research field of international management.

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A Study on Improvement of Service Perception of College Staff Based on Internal Marketing

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Abstract: The staff plays an extremely important role in university education system. Therefore, it is very critical for colleges to promote their staff's enthusiasm. The paper describes the status of staff service, and makes a detailed analysis about the application in colleges on the basis of internal marketing, so as to prove that the internal marketing is critical and quite adapt to the universities. Then, it put forward that the way to improve the perception of staff service includes several stages: participation, satisfied, loyalty. All in all, the paper has certain significance for it will provide new ideas for the better development of higher education system.

Key words: Internal marketing; College Staff; Service Perception; Construction;

1 Introduction

Colleges are important places to spread knowledge, cultivate talents, have innovation of knowledge and create new knowledge, and are the only education base that involves and relates to the spread, innovation and production of knowledge and information^[1]. College staffs are engaged in both teaching, and college students' ideological and political education, daily management and college students' quality education and cultivation, and thus play an increasingly important role in the entire higher education system.

Therefore, with the rapid development of service industry currently, it is of very important significance to enhance college staffs' service perception. The objects of college elementary trade union work are teaching and administrative staffs, and the core is to safeguard the legitimate rights and interests of staffs under the leadership of the party, and comprehensively promote and mobilize all positive factors of staffs, fully activate all thoughts that are beneficial for the development of higher education, fully release all resources that are beneficial for the development of higher education, and give full play to all kinds of enthusiasm that are beneficial for the development of education^[2]. Therefore, how to mobilize and give play to the enthusiasm of staffs and enhance the service perception of college staffs is very important for college elementary trade union.

2 Service Status of College Staffs

With the acceleration of the pace of life in the society, college staffs also face great pressure in terms of physical and psychological aspects etc. The entire society and the academic circle concern this a lot, and have made relevant theoretical and empirical researches.

Li Hongchang (2011) pointed out that: with intensive teaching work, heavy research tasks, busy family life and social affairs, coupled with constant reforms, college staffs increasingly felt the intensity of competition and the instability of life and work^[3]. Li Shuwang and Wang Fei et al (2011) also mentioned in the literature that: in recent years, elites of many colleges died young, which sounded the alarm to school management personnel and the society^[4]. In addition, in the literature of Li Hongchang (2011), we could know a survey on the occupational stress of college staffs, and this survey indicated that, 228 of 286 people had great pressure for a long time, accounting for 80%, 21 people often felt fatigue, accounting for 75%, 131 people often had insomnia and could not sleep well, accounting for 46%, while 100 people had memory loss, accounting for 35%^[3].

For these phenomena, scholars also proposed corresponding measures for improvement. Feng Xiaolan (2009) analyzed the current situation of motivation of college staffs and proposed strategies to motivate college staffs^[5]. Gou Junping et al (2010) also mentioned in "Analysis of psychological motivation mechanism in college personnel management"^[6] measures to effectively implement psychological motivation in college talent management. Besides, many scholars also studied measures to promote physical health of college staffs, including empirical studies on the relationship between health-related fitness and sports participation^[4], building of sports clubs^[7], improvement of artistic accomplishment, and establishment of harmonious atmosphere^[8] etc. These guided the work of college trade union to a certain extent, so that services that college staffs had received were more humanized

and diversified. However, literature mainly discovered physical and psychological problems, and found solutions, lacked of consideration of the overall situation, and could not fundamentally solve the problem of service perception of college staffs.

Although scholars constantly propose improving recommendations and the service improving measures of college trade union are also constantly conducted, we actually see more about: college staffs generally feel mentally fatigue and even exhausted with lots of work such as scientific researches, teaching, professional title appraisal and job competition etc. Services that college staffs have received are not as complete as imagined. Therefore, based on previous studies, we should consider about ways to enhance service perception of college staffs from an overall perspective, so that the trade union could truly be the home of staffs, and staffs are more satisfied with and more loyal to union services.

3 Study on The Application of Internal Marketing in Colleges

With economic globalization and further promotion of China’s ownership reform, competition of domestic industries is increasingly intense. Internal marketing could help enterprises enhance internal market performance, increase organizational capacity and obtain long-term advantages that competitors could not imitate. So, in reality, enterprises that focus on internal marketing indeed show better staff attention, department coordination and sensitivity to market changes. Therefore, the powerful charm of internal marketing could be seen.

Internal marketing refers to “a process of creating market atmosphere within organizations to ensure that the needs and desires of internal customers could be met.” [2] Its content could be generally divided into two parts. Firstly, carry out marketing by regarding internal staffs as consumers, and secondly, coordinate the relationship of internal staffs which are also internal consumers. Although internal marketing is mostly used in enterprises, we could also use it in colleges to give play to more roles, which is showed in previous literature. Zhang Jinfeng (2010) pointed out that, to obtain better sources of students, colleges should start from internal marketing, carry out external marketing on the basis of improving internal marketing, to get twice the results with half the efforts [9]. Duan Jun (2011) discussed about the application of people-oriented internal marketing concept in higher vocational education management, in order to give better play to the initiative and creativity of staffs in higher vocational colleges, and thus improve their schooling level and management level [10]. Zeng Xiaojun (2011) built a contractual relationship model between internal marketing and the psychology of college young teachers by analyzing and studying, in order to develop related marketing ways and improve the psychological contract level of young teachers [11].

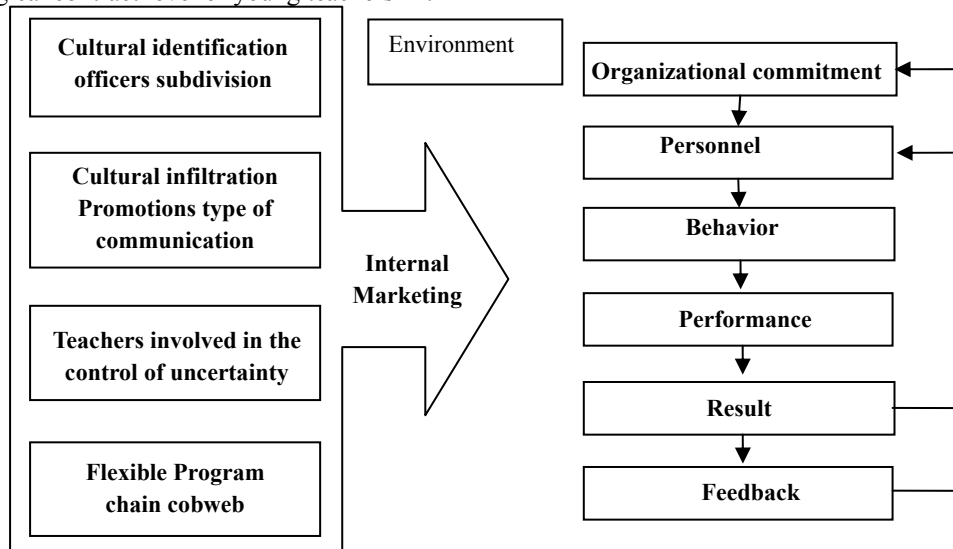


Figure 1 Based on Internal Marketing Management College Staff

From Figure 1, with social development and the reform of education system, internal marketing also gradually becomes a powerful way to enhance competitiveness of education industry. By analyzing the importance of enhancing the service perception of college staffs mentioned above, and the status of generally low service perception of college staffs, we realize that we should consider ways to solve

problems fundamentally from an overall perspective. Besides, internal marketing has been applied in colleges, and good results have been achieved. So, this paper aims to analyze ways to solve service perception problem of staffs from internal marketing.

4 Measures to Enhance Service Perception Based on Internal Marketing

Internal marketing for college staffs could be understood as taking college staffs as customers, and improving the participation of internal customers through a series of similar marketing activities, in order to promote the satisfaction of internal customers and thus improve their work efficiency and loyalty.

4.1 Take multiple forms of services simultaneously and encourage staff participation

College staffs are a special group, with high degree of education, their own views for harmony and freedom, and individual needs of services. So, they do not like dogmatic rules, or speak favorably of mandatory requirements. To enhance service perception of staffs, we should firstly let them participate more in these services. Therefore, to carry out internal marketing, we should firstly start from the real needs of these internal customers, and create diversified forms of services, in order to encourage them to participate in more freely and independently.

According to previous literature, scholars have proposed that we should increase sports participation, enhance artistic atmosphere, and strengthen psychological counseling and health testing etc for staffs respectively. In addition, by referring to a variety of counselors in counselor system of U.S. colleges, carry out service forms that could maximize students' interests^[12]. We divide service forms of college internal customers—staffs into psychology clubs, sports clubs, art clubs and academic clubs etc. These clubs would be established by trade union organizations, and staffs participate freely, and carry out activities with the principle of activity forms trying to be close to staffs. On the one hand, this avoids the mandatory nature of making staffs participate in activities, increases the level of activities in the form of clubs, and also eliminates the resentment of staffs. On the other hand, diversified clubs allow staffs to receive physical and psychological services according to their interests, cultivate their temperament and indirectly improve their work efficiency during activities.

4.2 Smooth communication starts from the heart and promote staff satisfaction

It is far from enough to enhance the service perception of college staffs by only improving their activity participation. As people are social beings and would seek benefit maximization, after successfully involving staffs in this service circle, the heart of staffs should be impressed by a series of measures so that they could be satisfied with this service.

According to Maslow's hierarchy of needs theory, people have physiological needs, security needs, interaction needs, esteem needs and self-actualization needs. Also, when low-level needs are met, people would seek a higher level of needs. Therefore, after improving physiological, security and interaction needs etc through the form of trade union clubs, colleges should have the goal of meeting a higher level of needs of staffs, that is, esteem needs and self-actualization needs. This should be based on good communication.

Communication is critical for any enterprises or people. With poor communication, it is likely to be misled, and even causes more serious consequences. Therefore, colleges should pay attention to communication with staffs. For such a group of highly educated and high-quality people, communication should focus on heart-to-heart communication, that is, attach great importance to the role of "esteem" during communication.

Therefore, on the one hand, colleges should pay attention to improving channels of communication with staffs, and maintain smooth upward communication and horizontal communication, so that staffs could exchange thoughts, emotions and information with leaders and colleagues, and thus meet their interaction needs and demand of expression of interests. On the other hand, colleges should fully respect the needs of young staffs for expression and decisions of interests, establish a mechanism that staffs participate in management, cultivate their sense of ownership and sense of belonging, and thus enhance their commitment to the organizations.

4.3 Fully carry out people-oriented emotions and enhance staff loyalty

With the improvement of service participation and satisfaction of staffs, it is difficult to eventually make staffs be loyal to services to some extent, but plays a critical role in truly enhancing staffs' service perception. To realize this purpose, besides using the concept of internal marketing perfectly, colleges should optimize services with an emotional line by being people-oriented. Specifically speaking, fully stand on the ground of staffs, know their difficulties, and solve problems for them from a humanized

perspective.

For example, for the phenomenon that most of staffs have a strong thirst for knowledge and urge for improvement, colleges could provide training mechanism and ways that are suitable for academic development of staffs, in order to meet their strong needs of career development. In addition, colleges should be concerned about staffs' psychological needs of increasing salary and welfare, and implement performance-based pay system, so that staffs' salary could be effectively connected with work performance, in order to enhance staffs' motivation and sense of belonging, and thus improve work performance. Meanwhile, to better reflect esteem for staffs' academic power, colleges could have some incentives appropriately, so that staffs could have teaching and researches etc according to their style and academic interests etc.

To sum up, colleges should be truly "people-oriented", try to provide rich academic resources for staffs, create a relaxed, harmonious and free academic atmosphere, and stimulate staffs' motivation for academic researches and academic development. Thus, colleges could meet their strong esteem needs and self-actualization needs to a maximum degree, and enhance their loyalty and they could maintain a high degree of service perception for a long time.

5 Conclusion

With today's rapid development of service industry, to truly enhance the service perception of college staffs, internal marketing should be ultimately relied on. However, the purpose of enhancing staffs' service perception by the concept of internal marketing cannot be accomplished in an action, but should go through three indispensable stages namely participation, satisfaction and loyalty. Only by this way, can the enhancement of staffs' service perception be truly realized, and thus ensure the high quality of college education system. However, it is an eternal topic to enhance staffs' service perception. With the development of the times, needs are constantly changing, and thus measures should change accordingly. However, as long as the trade union adheres to the concept of internal marketing, constantly devotes itself to innovative service means, deepens service content, and enhances staffs' service perception, and China's college education would usher in a better tomorrow.

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A Study Psychological Capital and Demography Variables

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Abstract: Firstly, this paper summarized the theoretical research of psychological capital. Then with taking domestic enterprise staff as the research object, the paper preliminary explored the effects of demography variables on psychological capital and other factors based on the investigation and study. Finally, it verified the significant difference between gender, education level, job time and hope, optimism, tenacity, and some or all of the psychological capital. The authors expect the work to provide reference for enterprise decision-making.

Key words: Demography variable; Psychological capital; Scheffe method

1 Introduction

The research of psychological capital at home has just started. The concept of psychological capital appeared in economics, investment and sociology in the literatures for the first time over abroad, which is coming from the theory of human capital and positive psychology at home. It can be approximately divided into three parts on how to define the concept of psychological capital on the summary of experts' views: trait theory, state theory and synthesis theory^[1]. But there are few literatures related to the effects of demographic variables on psychological capital and its structural elements in the previous studies of psychological capital. This paper preliminary explored the effects of demography variables on psychological capital and other factors with domestic enterprise staff as the research object, based on numerous studies of pertinent literatures at home and abroad.

2 Questionnaire Design and Survey

The author divided the psychological capital into three parts: hope, optimism and tenacity. And adopted the scale that Fred Luthans (2005) studied on Chinese employees' psychological capital^[2]. Then defined the standard scores sum of the three variables of hope, optimism and tenacity as psychological capital's measured value. The questionnaire evaluated grade in using Likert5 system^[3]. Taking four variables: gender, age, education level and time in job as demographic variable.

To make sure of the convenience of collecting the questionnaire and the accuracy of the results, the author adopted a different approach to accomplish this process. The author took advantage of the internet and distributed the questionnaires via email. In total, 120 questionnaires were distributed, among which 118 were returned and 106 were valid.

3 Data and results analysis

3.1 Independent sample's t test for different gender

Set gender as group variables, and hope, optimism, tenacity and psychological capital as test variable. Conduct the difference examination in using the t sample. Here are the results:

Table 1 The Result of Independent Sample's t Test for Different Gender

Test Variables	Gender	Number	Average	Standard Deviation	F	T	Significance
Hope	Male	51	20.6275	3.57189	0.003	0.075	0.959
	Female	51	20.5686	4.32784			
Optimism	Male	51	33.6863	5.12441	4.247	-.879	0.042
	Female	51	34.4706	3.78604			
Tenacity	Male	51	52.3725	7.10763	4.220	2.168	0.043
	Female	51	49.7255	5.05204			
Psychological Capital	Male	51	106.6667	12.48466	6.720	0.872	0.011
	Female	51	104.8039	8.78184			

From the table, we found that: the difference between male and female staffs in optimism, tenacity,

psychology capital is significant; female’s value is higher than male in optimism and obviously lower in tenacity and psychology capital.

3.2 The variance analysis for different staffs

People will be divided by age into four parts^[4]; Conduct the difference examination in using the analysis way of single factor. Here are the results:

Table 2 The Analysis Result of Different Age Groups

Test Variables	Age groups	Number of people	Average	Standard Deviation	F	(Sig.)
Optimism	under 25	28	34.3214	4.8994	0.496	0.686
	25-35	69	34.0290	4.4125		
	36-45	4	32.2500	3.7749		
	over 46	1	38.0000			
Tenacity	under 25	28	50.9286	5.7602	1.389	0.251
	25-35	69	50.7246	6.4052		
	36-45	4	57.2500	6.6521		
	over 46	1	52.0000			
Psychology Capital	under 25	28	106.6071	11.5801	0.677	0.568
	25-35	69	104.9855	10.5712		
	36-45	4	110.0000	9.6609		
	over 46	1	116.0000			

From the table, we found that there is no obvious difference in hope, optimism, and tenacity between different group ages. So there are no obvious effects between ages and the value of hope, optimism, tenacity, psychology capital.

3.3 The variance analysis of different education lever

We will divide people into three parts by education lever for the convenience and accuracy of investigation in using single factor analysis of variance method^[5]. Here are the results:

Table 3 The Variance Analysis Result of Different Education Lever

Test Variables	Education lever	Number of people	Average	Standard Deviation	F	(Sig.)
Hope	under bachelor	20	20.2500	2.1491	3.319	0.04
	Bachelor	62	19.6935	3.2823		
	master or above	20	21.6000	2.0105		
Optimism	under bachelor	20	31.9000	3.4167	1.642	0.199
	Bachelor	62	33.6774	4.2302		
	master or above	20	33.5000	2.8928		
Tenacity	under bachelor	20	52.4000	4.3698	0.571	0.567
	Bachelor	62	50.7258	6.8835		
	master or above	20	50.7000	5.9921		
Psychology capital	under bachelor	20	104.5500	7.4796	0.058	0.943
	Bachelor	62	104.3548	10.8976		
	master or above	20	105.2000	6.7481		

From the table, we found that there is obvious difference in hope between different education lever staffs, and there is no obvious difference in other factors.

Then we will explore what kind of education lever has the obvious difference by the way of scheffe’s multiple comparisons.

Table 4 The Scheffe's Multiple Comparisons' Result of Different Education Lever

Dependent variable	Educated lever(I)	Educated lever(J)	average difference (I-J)	(Sig.)
Hope	under bachelor	bachelor	0.55645	0.755
		master or above	-1.35	0.338
	bachelor	under bachelor	-0.55645	0.755
		master or above	-1.90645(*)	0.041
	master or above	under bachelor	1.35	0.338
		bachelor	1.90645(*)	0.041

* The mean difference is significant at the .05 level.

From the table, we found that there exists obvious difference between bachelor degree and master degree or above, and the bachelor is lower in hope value.

3.4 The variance analysis of different time in job

According to the length of time staying in the company, they are falling into four groups, and we can get results as follows under the method of single factor analysis.

Table 5 The Variance Analysis Result of Different Time in Job

Test Variables	Time in job(year)	Number	Average	Standard deviation	F	(Sig.)
Hope	<1	50	19.6800	2.96538	4.150	0.019
	1~5	49	20.5306	2.90188		
	5~9	3	24.3333	0.57735		
Optimism	<1	50	32.0200	3.30423	3.111	0.049
	1~5	49	32.2449	3.38828		
	5~9	3	37.0000	4.00000		
Tenacity	<1	50	50.4400	5.84549	0.473	0.625
	1~5	49	51.6735	6.83553		
	5~9	3	51.0000	3.60555		
Psychology capital	<1	50	102.0400	7.19399	2.629	0.077
	1~5	49	104.7143	10.31585		
	5~9	3	112.3333	7.02377		

According to the above table, after the variance analysis of the employees which vary in the length of time in the current company. We can found that the staff differs in hope and optimism, but there is no significant difference in resilience and psychological capital.

When it comes to the obvious difference in hope and optimism of the employees vary in time length staying in the company. We adopt multiple comparison compare method and scheffe method to explore specific period of time which lead a significant difference and the test results are as followed:

Table 6 The Scheffe Comparison Result of Different Time in Job in Hope and Optimism

Dependent variable	Time in job(I)	Time in job(J)	Average difference (I-J)	Significance
Hope	<1	1~5	-0.85061	0.35
		5~9	-4.65333(*)	0.03
	1~5	<1	0.85061	0.35
		5~9	-3.80272	0.094
	5~9	<1	4.65333(*)	0.03
		1~5	3.80272	0.094
Optimism	<1	1~5	-0.2249	0.946
		5~9	-4.98000(*)	0.049
	1~5	<1	0.2249	0.946
		5~9	-4.7551	0.064
	5~9	<1	4.98000(*)	0.049
		1~5	4.7551	0.064

* The mean difference is significant at the .05 level.

From the above chart, there is a significant difference in hope and optimism between the employees who work less than a year and those who work for 5 to 9 years, the fact is that the latter has less hope and optimism than the former.

4 Conclusions

This paper verifies that it is partially or totally different in hope, optimism, tenacity and psychological capital among the testes that differ in gender, education and the time staying in the company. According to the result, enterprise can develop some plans about exploiting and motivating human resource and some relative rules of it, so that the company can gain a maximum output with a minimum input and reduce the risk of input-output. At the same time, due to various reasons, this paper only studies that how demographic variables influence the psychological capital and structural elements of it, and there is no further dig in the degree of influence on how much the demographic variables work on psychological capital, which can be one of research priorities in the future.

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A Novel Electronic Cash Application Model of Conditional Anonymity Based on Trusted Third Party

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Abstract: Internet payment is the core part in Electronic Commerce and direct related to the development of Electronic Commerce. This paper firstly analyzes the characteristics of electronic cash as the network currency. On this basis, we propose a novel electronic cash application model of conditional anonymity based on trusted third party, which refers the making, issuing, the payment process of the electronic cash, as well as the functions of electronic cash software (ECS); Finally, the feasibility of this electronic cash model is discussed.

Key words: Internet payment; Electronic cash; Conditional anonymity; Electronic commerce

1 Introduction

Cash flow operation based on Internet and financial private network is the important part of the electronic commerce, which also is an important guarantee for the smooth development and application of electronic commerce. At present the main ways in the Internet payment market are through network bank and the smart card payment in China, lack of diverse means to pay, especially the lack of small payment means suitable for e-commerce. While electronic cash can make up for this deficiency, provide a new way to pay for the Internet consumers in China.

Since Chaum(1983) published the first paper on electronic cash, it has caused extensive concern of the Central Banks and experts due to the potential of its anonymity and replacing physical cash (currency and coins). Electronic cash (E-cash) is also known as electronic currency (E-money), which converts the cash value into a series of data encryption which represents the various amount of the cash. Now the research on electronic cash has made some progress. The smart card proposed by David M'Raihi et al.(2001) has the function of memory, calculation and encryption is suitable for the electronic wallet, which can be used in e-cash items^[1]. Popescu and Oros (2007) and Wang et al. (2008) proposed two trustee-based anonymity-revocable e-cash systems using bilinear pairing^{[2][3]}. However, Popescu and Oros' scheme violates anonymity. Eslami and Talebi (2011) proposed an untraceable electronic cash scheme and claimed that their scheme protects the anonymity of customers, detects the identity of double spenders and provides the date attach ability of coins to manage the bank database^[4]. The domestic scholars have also made certain achievements in electronic cash payment protocol, system design technology and so on^{[5][6]}. But for the sake of safety and practicality, real and practical large-scale electronic cash system is rare. Especially the research on electronic cash in China is still at the beginning, lack of attention in this area. We hope to provide some experience through this study in the electronic cash application.

2 The Basic Characteristics of Electronic Cash

The essence of e-cash is the electronic of paper cash, which should has many advantages like paper currency. And meanwhile considering the Internet, the special application platform, a real rational electronic cash application system should have the following characteristics:

(1)Monetary value: E-cash must be the same as the traditional paper cash, and has certification, credit and financial support from the bank.

(2)Network currency role: It has the similar effect as the currency on the Internet, which can still complete the payment function safely and conveniently without the online support from the bank.

(3)Security: The application of corresponding technology and management mechanism can effectively prevent any electronic cash copy, counterfeit, reusable and repudiation behavior. E-cash can also avoid payment account information leakage when using debit card, even resulting in the whole cash in card stolen. Because E-cash is used to small payment, the par value will not be much. Even if stolen, also won't cause much loss. It will help Internet users to receive this payment.

(4) Conditional anonymity: Generally, no one can peep private information of consumers using e-cash and track their buying behavior and buying habits. But in special circumstances, such as the legal requirements, a trusted third party can cancel the anonymity of e-cash. Therefore it would effectively

prevent crime because of complete anonymity of e-cash.

(5) Divisibility: E-cash could be divided into smaller amounts.

(6) Transferability: E-cash can be transferred and circulated in users without the involvement of banks, just like currency.

(7) Storability: E-cash can be safely stored in hard disk of computer, IC card, electronic wallets or special software of electronic cash and so on. And strict security measures are carried out when users store or transfer the e-cash.

(8) Independence: Security of e-cash can't only depend on any hardware environment or a specific operating system, and should use various cryptographic techniques to ensure security of electronic cash on the Internet including transmission process.

3 A Novel Electronic Cash Application Model of Conditional Anonymity Based on Trusted Third Party

In order to achieve and give full play to the above properties of e-cash, a series of process from e-cash production, distribution to use must adopt a new model.

(1) The issue of e-cash. General: e-cash should be produced and issued by the People's Bank of China in accordance with the standard, other commercial banks authorized by the People's Bank of China can conduct related business activities as deposit, withdrawal.

(2) The process of e-cash issuance. In this paper the People's Bank of China assume a trusted third party who can revoke the anonymity of e-cash in some particular cases. The whole process of e-cash issuance is completed by the central bank and its authorized banks. For the convenience of description in this paper, we take the Industrial and Commercial Bank of China (ICBC) as an example to introduce the specific issue process as follows:

1) First the user establishes an account in ICBC and deposits a certain amount of cash, so that one can exchange e-cash from this account.

2) The user could apply for the ID and initial password of e-cash special software to the People's Bank of China by virtue of the capital account in ICBC and the necessary proof of personal identity. The ID must be uniqueness and map with the personal information of the user. Meanwhile the user can download the E-cash Special Software (ECS) from the People's Bank of China or its authorized bank website. Here it refers to the ECS in ICBC (hereinafter referred to as IECS). In this process, the People's Bank of China will record all the related information into the Electronic Cash Database (ECDB), data fields are as follows: ECS ID, personal identity information, the bank, account information in the bank.

3) The user installs IECS on this machine, and changes the initial password. Then adds the personal digital certificate obtained from Certificate Authority (CA) into the IECS. The specific content and format of digital certificate should obey by the international popular ITU-Trec.X.509 standard. At the same time, adds the account of ICBC got in the first step into the IECS.

4) The user now can apply for the exchange of e-cash with the built-in functions in IECS, after ICBC receive this request instruction, it will verify the account whether has adequate money firstly:

① Capital adequacy. ICBC would submit the ECS ID, the amount one intends to exchange and the digital certificate of the user to the People's Bank of China, who will encrypt the e-cash sequence number (mark A) already prepared with the user's public key, then transmits to ICBC. In this process, the People's Bank of China will find the corresponding ECS ID in ECDB, record the change event. Fields are as follows: ECS ID, personal identity information, the bank, account information in the bank, sequence number of the e-cash in the exchange, the amount to exchange.

ICBC digitally signs A together with the corresponding value, mark B. Finally the value of C is encrypted with the user's public key and sent to the user. Meanwhile ICBC deducts corresponding amount in the user's capital account. So the e-cash proposed in this paper is structured as follows: E-cash={e-cash sequence number, signature to the value of this e-cash by the bank, the value of this e-cash}.

② Lack of funds. ICBC rejects the exchange behavior.

5) The user uses IECS to received D transferred by the bank and decrypts A of D to get the e-cash sequence number. Now the union of N (e-cash sequence number), B (signature to the value of this e-cash by the bank) and C (the value of this e-cash) is just the e-cash which has a certain value. The user can save this e-cash in hard disk or IC card or ECS for use.

The above steps constitute the production and distribution process of e-cash. As banks can not back to the user of e-cash just produced, because the banks couldn't get the N.E-cash is with good anonymity.

But when there is a special need, the People’s Bank of China as a trusted third party could withdraw its anonymity. The issuance process of the e-cash in this paper is shown in Figure 1:

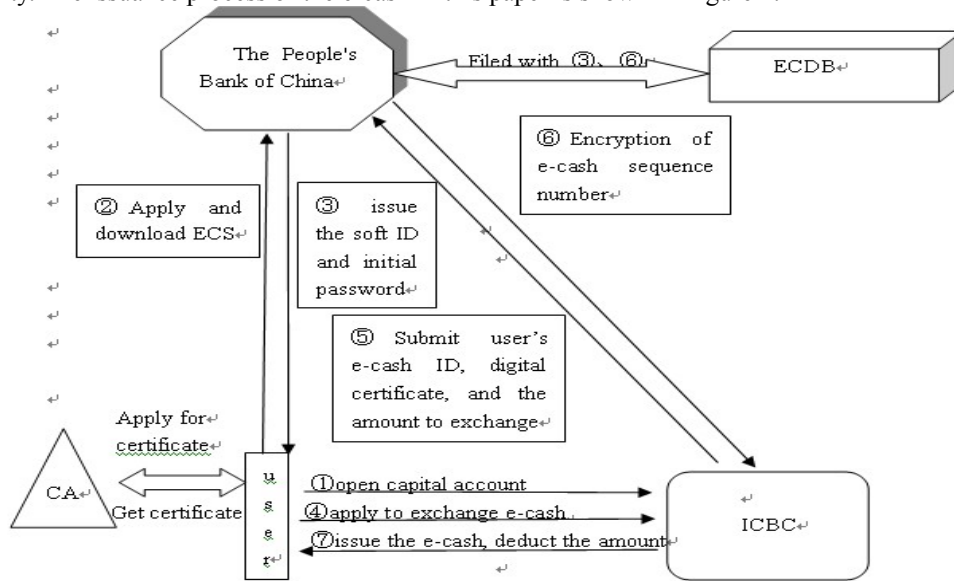


Figure1 Schematic Diagram of E-Cash Issuance

In order to realize the basic characteristics of reasonable e-cash, we still need ECS. Now we briefly explain the main function of the ECS.

4 ECS

(1)Secure connection: ECS firstly establishes a connection before transferring the funds, then starts the communication and transfers the e-cash. Suppose there is an e-cash will transfer from ECS-A into ECS-B, ECS-A would send a connection request to ECS-B. And then use the Diffie-Hellman key exchange protocol to determine the session key, K . Automatic establishes the secret and safe passage with symmetric encryption algorithm.

Suppose q is a prime, a is a primitive root of q ($a < q$). And q and a are written by the People’s Bank of China when generates the ECS. So q and a are public to ECS-A and ECS-B.

ECS-A: randomly select a private key X_A , calculate $Y_A = a^{X_A} \text{ mod } q$, and send Y_A to ECS-B, i.e. $Y_A \rightarrow B$;

ECS-B: randomly select a private key X_B , calculate $Y_B = a^{X_B} \text{ mod } q$, and send Y_B to ECS-A, i.e. $Y_B \rightarrow A$;

ECS-A generates a secret session key $K_A = (Y_B)^{X_A} \text{ mod } q$;

ECS-B generates a secret session key $K_B = (Y_A)^{X_B} \text{ mod } q$;

Can be proved, $K_A = K_B = K$. Because X_A and X_B are confidential and random, so the session key K is safe, and every time is different when connecting.

(2) Apply for e-cash. ECS can be used online for the application of e-cash to the bank. The instruction including e-cash special software ID, digital certificate, the amount to exchange are submitted to the bank in this process.

(3) Combine and generate e-cash. Combine the e-cash sequence number, i.e. N , signature to the value of this e-cash by the bank, i.e. B , the value of this e-cash, i.e. C to generate the union which is e-cash of certain value. This process is done automatically by the ECS and is transparent to the user.

(4)Storage of e-cash. One can store the received E-cash in ECS.

(5)Division of e-cash. The reasonable application model of e-cash can let users carry out accurate payments, reduce the times of withdrawal. It can not only reduce the network traffic, but also can improve the efficiency of the system. The ECS in this paper should support such an application. In order to ensure the e-cash will not be re-used and suffer replay attacks, the division of e-cash is according to

the following procedure: If the user has the value $Q1$ of e-cash, needs to pay $Q2$, and $Q1 > Q2$. Due to the nature of e-cash is a series of electronic encryption sequence number, its value is determined by the bank's signature. So to ensure the e-cash after division still possess the corresponding value of the currency, ICBC's private key should be solidified into IECS with strict encryption algorithm. The division of e-cash is the application in interface layer to the user who will not involve the key information.

Suppose the user has the e-cash $Q1$: {e-cash sequence number, bank signature of $Q1$, $Q1$ }, when the user ask for dividing $Q2$ out of $Q1$ ($Q1 - Q2 = Q3$), according to the algorithm of rule:

① If $Q1 > Q2$, the operation result is : {e-cash sequence number, bank signature of $Q2$, $Q2$ };
 {e-cash sequence number, bank signature of $Q3$, $Q3$ }.

② If $Q1 < Q2$, deny the division and send a warning.

(6) Payment with e-cash. In the payment process when IECS receives the payment instruction, firstly judge the legality of expenditure, i.e. whether e-cash is beyond the capacity to pay. Then split to the required e-cash which is transferred to the receiving party. At the same time, the e-cash that the user had before is subtracted from the amount just paid.

(7) Record and Query. IECS would record each transaction for customers to query regardless of success or failure, including transaction date, transaction status etc. Meanwhile in order to effectively curb the illegal use of e-cash to engage in illegal activities, IECS should have such a special recording function: "Tracking key" of the People's Bank of China is cured in IECS and symmetric encryption algorithm is used to record the expenditure of user's e-cash. Content includes: ECS ID of spending party, ECS ID of receiving party, e-cash sequence number, the amount of the transaction, the transaction date, which only can be decrypted by "Tracking key" of the People's Bank of China. In special circumstances, such as legal requirements, anonymity of e-cash can be cancelled by the People's Bank of China to combat criminal acts powerfully. Suppose the user T_1 exchanges e-cash H from bank with IECS. In circulation process, H circulates from T_1 to T_m in a legal case, i.e. $T_1 \rightarrow T_m$. If the user T_m used e-cash H to engage in illegal activities, such as the purchasing of drugs, which was transferred to T_n . Police arrested T_n and may request the People's Bank of China to cancel the anonymity of e-cash H so to punish T_m .

5 Process of E-Cash Payment

Based on the e-cash application model discussed in this paper, the payment protocol refers four parties: the People's Bank of China, bank, customer, shop. The People's Bank of China and the bank will not participate in transaction process between the customer and shop to ensure the safety. Reasonable e-cash model should emphasis on off-line payment, i.e. without bank real-time intermediary payment processing.

The e-cash application model is based on SSL protocol, specific payment process is as follows: Symbol definition: C: customer; CPK: customer's public key; CSK: customer's private key; S: shop; SPK: the shop's public key; SSK: the shop's private key; BPK: the bank's public key; ORD: order; ORDN: order number; K: session key; E-cash: electronic cash.

(1) C visits the shop's website, chooses own like merchandise and selects the e-cash payment mode;

(2) ECS of C is activated and sends connecting request to the ECS of S after login. Then a temporary safe secret passage is established between C and S;

(3) C will use SPK to encrypt ORD and K assigned randomly by C and send to S. i.e.

$E_{SPK}(ORD, K) \rightarrow S$;

(4) After receiving the information S would use his private key to decrypt, verify the order information (product, type, quantity, price, etc). S has the signature of ORD which is added corresponding ORDN and uses K to encrypt the above signature. i.e.

$D_{SSK}(E_{SPK}(ORD, K)), E_K\{E_{SSK}[\text{Hash}(ORD, ORDN)]\} \rightarrow C$;

(5) C receives the signed order, then pays the encrypted E-cash to S after verification. i.e.

$E_K[E_{CSK}(E - \text{cash})] \rightarrow S$;

(6) After checking the validation (i.e. $D_{BPK}(E - \text{cash})$) and amount of E-cash, S sends payment confirmation to C and prepares for delivery.

The e-cash payment process is shown in Figure 2.

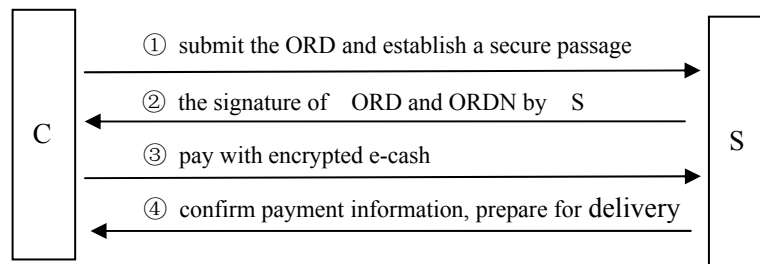


Figure 2 Schematic Diagram of E-Cash Payment Process

6 Evaluation of the E-Cash Application Model

(1) Security analysis of the model: ①The e-cash model in this paper refers many security measures, such as symmetric encryption algorithm, public key encryption algorithm, digital signature, digital certificate and so on to ensure the security of information transmission and transaction; ②ECS as a special software will facilitate the users to use e-cash. Users can not modify, destroy the program. If there is any malicious software crack or aggressive behavior, ECS will immediately start "explode" program, to ensure that the confidential information not to be leaked.

(2) Analysis of nonreusable e-cash: E-cash we have paid will be automatically deducted from the ECS. When performing a division of e-cash, the original large amounts of e-cash automatically is divided into a plurality of small value of e-cash. This is just as in the real life when we have paid by cash which will not belong to us.

(3) Analysis of unforgeability: The value of e-cash is determined by the bank's signature to ensure that any falsification is not viable, because they could not get the bank's private key.

(4) Analysis of conditional anonymity: Under normal circumstances any personal information will not be left over after the user's transaction. But in special conditions user's anonymity will be withdrawn by the People's Bank of China.

(5) Non-repudiation: Both parties use digital signature respectively in the transaction to ensure that both sides are not to deny their behavior. Arbitration can be made when necessary.

(6) Analysis of efficiency: Compared with the existing models of e-cash, e-cash model in this paper fully supports off-line transaction and can guarantee the security of the transaction and the real implementation of the person-to-person. At the same time, the exchange of e-cash does not need to go through the bank, which can circulate freely in the market. So e-cash can simply the transaction process and improve efficiency. It has a strong practical value.

7 Conclusion

Internet payment is the key problem of application in Electronic Commerce. This paper firstly analyzes the characteristics of electronic cash as the network currency. On this basis, we propose a novel electronic cash application model of conditional anonymity based on trusted third party, which refers the making, issuing, the payment process of the electronic cash, as well as the functions of electronic cash software (ECS). Main security technologies as symmetric encryption algorithm, public key encryption algorithm, digital signature, digital certificate are applied in this model. Finally, the feasibility of this electronic cash model is discussed. Compared with the similar schemes, this model has a series of higher security features, as can prevent repeat attacks, non-repudiation, anonymity, unforgeability and can not be traced etc. Our research also would make up the deficiency in application of electronic cash in China. Hope to enrich the payment method when the denizens carry on the Internet payment. But in order to further strengthen the safety and the function of e-cash as network currency, still need to be explored from the following aspects: the settlement of accounts of e-cash in multi-banks, more efficient digital signature and encryption algorithm, enacting and improving the laws and regulations of e-cash etc.

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AHP-Based Approach to Performance Evaluation of College English Elective Courses

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Abstract: The arrangement of courses is playing a leading role in teaching reformation. A tentative study on the teaching performance of English optional courses helps to create a scientific evaluation index system. This paper firstly proposes an 18-element performance evaluation index system for college English elective courses, by inquiring experts as well as students and by using the Delphi method through six steps. Based on the principle and theory of analytic hierarchy process, an AHP-based evaluation model for college English elective courses is constructed via pair-wise comparisons. Finally, the equation of evaluating the curriculum performance is put forward.

Key words: AHP; Performance Evaluation; Index System; College English Elective Courses (CEEC)

1 Introduction

College English is not only a language course that provides basic knowledge about English, but also a capacity enhancement course that helps students to broaden their horizons and learn about different culture in the world. When designing College English courses, therefore, it is necessary to take into full consideration the development of students' cultural capacity and the teaching of knowledge about different cultures in the world^[1]. Colleges and universities in China have formulated a scientific and systematic College English syllabus to guide their teaching innovations, such as graded teaching & learning and offering elective courses for students whose English is better. The system of college English elective courses (hereafter referred to as CEEC) includes dozens of specific courses, which can be divided into three types: the course module in language skills, English courses for practical uses, and courses of language and culture. In addition, the credit system is adopted by most universities. The teaching quality of selective courses greatly varies from one university to another.

It is urgent to improve the system of optional courses in order to smoothly implement College English teaching reform. Moreover it is of great significance to develop a scientific evaluation system, which should be in line with the law and rule of English teaching and the character and objective of college English.

2 Selection of Evaluation Indexes for CEEC

An evaluation index system is essential to assess the teaching quality of English elective courses. The design and selection of indexes should be in accordance with the feature of optional courses, and can be tenable with the development of college English reform. Also the evaluation criteria should be diversified and feasible. See the constructing process of evaluation system as shown in Figure 1.

First, review and analyze the literature on course assessment^[2], as well as academic papers concerning the arrangement of college English elective courses. Then a conclusion can be roughly made that the successful implementation of a curriculum is influenced by multiple factors, including the quality of faculty, teaching management, course arrangement, teaching & learning environment. The above mentioned factors are affected by a group of sub-factors, namely evaluation indexes. A list of more than 30 different sub-variables or

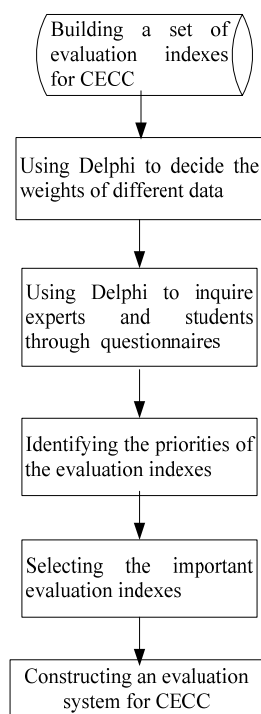


Figure 1 Procedures of Construction the Evaluation Index System for CEEC

a set of evaluation indexes for CEEC is shown at random in the following: teachers' specialized knowledge, teaching hours and credits, teaching methods, teaching contents, forward-looking lectures, difficulty of testing problems, students' attitude towards learning, practical usefulness of the course, relation between teaching and testing, diversified teaching materials (audio, video or pictures), abundant academic resources (books, literatures, Internet lab), comprehensive and formative course assessment, advising and coaching students, relation between classroom teaching and aim of specialized learning, to acquire knowledge in English culture, teachers' ability to express themselves, mental satisfaction in class, to make friends, teachers' academic titles, class size, to cultivate interest in English learning, teachers' personalities, learning atmosphere, to broaden specialized learning, comprehensibility of the textbooks, purposes of learning, to stimulate students' overall development, language used in the textbooks, flexible testing, classroom equipment, diversity of elective courses, ways of learning, to develop ability to use English, a reasonable timetable, varied homework or assignments, teachers' attitudes to their work.

Secondly, interview 11 experts experienced in linguistics or certified as qualified English teachers, apply Delphi method and determine the weight between experts' opinions and students' comments. The decided result is 0.7: 0.3.

Thirdly, the Delphi technique is employed again and the above-mentioned experts are inquired, aiming to quantify their opinions by using a structured questionnaire and the 5-point scale (1, least important; 2, less important; 3, moderately important; 4, more important; 5, most important) on each of the course criterion listed in Table 1. The 273 students taking English elective courses are also invited to do the same questionnaire task as the experts.

Lastly, the results of the Delphi judgment from experts as well as students' in Step 3 are averaged. The weight for experts' averaged scores is 0.7 and the weight for students' scores is 0.3. Calculate the weighted averages. If an index has a value higher than 3, it can be chosen. The others lower than 3 are excluded by the expert panel because they are less important course criteria. List the chosen indexes in order as detailed in Table 1.

Table 1 Evaluation Index System for CEEC

Object	Factors	Sub-factors
Evaluating College English Elective Courses (A)	teaching staff (B1)	teachers' specialized knowledge (C1)
		teaching contents (C2)
		teaching methods (C3)
		diversified teaching materials (C4)
		teachers' attitudes to their work (C5)
	course arrangement (B2)	comprehensibility of the textbooks (C6)
		language used in the textbooks (C7)
		practical usefulness of the course (C8)
		diversity of elective courses (C9)
		a reasonable timetable (C10)
		teaching hours and credits (C11)
	learning environment (B3)	forward-looking lectures (C12)
		abundant academic resources (C13)
		classroom equipment (C14)
	curriculum functions (B4)	learning atmosphere (C15)
		to develop ability to use English (C16)
		to acquire knowledge in English culture (C17)
		to stimulate students' overall development (C18)

3 AHP-Based Evaluation Model Construction and Data Analysis Procedure

3.1 Setting-up Evaluation Model of CEEC

Analytical Hierarchy Process (AHP) is adopted to analyze the constructed evaluation index system of CEEC. The AHP is a methodology for structuring, measurement and synthesis, which was advanced by an American mathematician Thomas L. Saaty in the 1970s. The AHP method represents human thinking process in arithmetic means, and quantifies people’s subjective judgments. It helps the decision-makers to simplify the analytical procedure and maintain consistent thinking process [3]. AHP is utilized when dimensions are independent, and is suited to solving problems involving dependent dimensions; therefore AHP has been widely applied to deal with complicated social problems and issues in the field of economic management. It can be also employed to cope with the evaluation system of CEEC by using mathematic tools. To simplify the model calculation, the following indicators are calculated by using a linear function.

3.1.1 Building Hierarchical Structure Model

On the basis of Table 2, Analytic Hierarchy Process divides the research object into 3 levels. The goal layer of the model (A layer) is evaluating CEEC. The four factors such as teaching staff, course arrangement, learning environment, and curriculum functions can possibly determine the quality of CEEC. They are also the intermediate link and are named the criterion layer of the model (B layer). The effect of each factor in B layer can be reflected by a series of other relevant factors. These sub-factors form the scheme layer of the model (C layer). All the sub-factors in the evaluation system are non-quantitative indicators and do not have comparability, so experts should be consulted to judge the factors in order of importance and mark them. Hence the sub-factors $\{C_1, C_2, \dots, C_{18}\}$ are assigned and their values are based on a unified scale of measurement.

3.1.2 Building the Pair-Wise Comparison Matrix

After building the AHP-based evaluation model, pair-wise comparisons are performed. This step judges the relative importance of any two factors in a certain level, and hence decides the order of importance of each factor at a higher level. This process is the key of the AHP method because it influences the priority of the factors. The assessing result can be observed better if displayed in the form of pair-wise comparison matrix. It assumes that B_k layer relates to C_1, C_2, \dots, C_m of C layer, and $C_i (i = 1, 2, \dots)$ has a ratio ω_{ki} to B_k . The values in the ratio ω_{ki} are then organized in a m pair-wise comparison matrix ω_k , $\omega_k = (\omega_{k1}, \omega_{k2}, \dots, \omega_{kn})$ ($k=1, 2, 3$), and $\sum_{i=1}^m \omega_{ki} = 1$ (m is the number of sub-factors of B_k).

In layer C, the local priorities between C_i is represented by α_{ij} which can be calculated by using the formula $\alpha_{ij} = \frac{\omega_{ki}}{\omega_{kj}}$. Due to the limitation of human beings’ brain capability, the ratio-scale of local priorities is also limited in the AHP method. The scale range 1–9 is assumed to sufficiently represent human beings’ perception. Then the normalized pair-wise comparison matrix P_k can be built as follows to rank the relative importance of factors (n is the order of matrix).

$$P_k = \begin{pmatrix} \alpha_{11}^k & \alpha_{12}^k & \dots & \alpha_{1n}^k \\ \alpha_{21}^k & \alpha_{22}^k & \dots & \alpha_{2n}^k \\ \dots & \dots & \dots & \dots \\ \alpha_{n1}^k & \alpha_{n2}^k & \dots & \alpha_{nn}^k \end{pmatrix} = (\alpha_{ij}^k)_{n \times n}$$

3.1.3 Calculating the Eigen-Value and the Eigenvector

The weight sum of each sub-factor in C layer can be calculated, based on the equation $P_\omega \omega_k = \lambda_{\max} \omega_k$, where λ_{\max} is the maximized eigen-value of matrix P_k , and ω_k is the eigenvector.

Due to the fact that $\omega_k = (\omega_{k1}, \omega_{k2}, \dots, \omega_{kn})$, it can be normalized to $\omega'_k = (\omega'_{k1}, \omega'_{k2}, \dots, \omega'_{kn})$ as the weight vector where

$$\lambda_{\max} = \frac{1}{n} \sum_{i=1}^n \frac{(\alpha\omega_k)_i}{\omega_k} = \frac{1}{n} \sum_{i=1}^n \frac{\sum_{j=1}^n \alpha_{ij}^k \omega_{kj}}{\omega_k}, \quad \omega'_{ki} = \frac{\omega_{ki}}{\sum_{j=1}^n \omega_{kj}}$$

3.1.4 Computing the Weights

In this step, the averages of the factors in each row of the normalized pair-wise comparison matrices are calculated. The result is the priority vector that gives the relative weight of each performance indicators in the criterion layer B. The priority vector has the following form: $\omega_j^{(k)} = [\omega_{1j}^{(k)}, \omega_{2j}^{(k)}, \dots, \omega_{nj}^{(k)}]^T$, where ω_i is the weight of the performance indicator C_i and it is equal to the average of the factors in row i of the normalized pair-wise comparison matrix, as

in $\omega_i = \frac{\sum_{j=1}^n a_{ij}}{n}$. Then by using the weights, we can now estimate the value of criterion B:

$$B_i = \sum_{i=1}^n \omega_i C_i. \text{ This process is repeated for all established criteria (B1, B2... Bn).}$$

The upper hierarchy study estimates the global performance measure (A) as a weighted average of the criteria (B1, B2, B3... Bn). The estimation involves three steps, namely construction of pair-wise comparison matrix, synthesis, and consistency ratio estimation, and it is similar to the lower hierarchy study. We can get the matrix of the weights of each criterion, which

$$\text{is } W_n^1 = \prod_{i=2}^{l-n} W_i^{i-1} = W_n^{n-1} \times W_{n-1}^{n-2} \dots \times W_3^2 \times W_2^1.$$

In short, Evaluation of CEEC (A) is estimated by taking into account the priority vector and the value of each criterion.

In the light of the above derivation processes and the Delphi survey results, the evaluation index of CEEC can be obtained, that is, $\omega_1^{(2)} B1 + \omega_2^{(2)} B2 + \omega_3^{(2)} B3 + \omega_4^{(2)} B4 = 0.3B1 + 0.35B2 + 0.2B3 + 0.15B4$.

3.2 Checking the Consistency Property

This measurement is one of the important factors in priority determination process according to pair-wise comparison. Each human being ideally wants consistent decision. On the contrary, there are many cases in which the decision makers cannot make perfectly consistent decisions. The AHP method can tolerate inconsistency by providing the measurement of assessment inconsistency.

Consistency Index (CI) can be calculated by using the formula $CI = \frac{\lambda_{\max} - n}{n - 1}$. After acquiring CI,

the next step is calculating Consistency Ratio (CR) by using the formula $CR = \frac{CI}{RI}$, where CI is the

consistency index, CR is the consistency ratio, λ_{\max} is the largest eigen-value of the pair-wise comparison matrix, n is the matrix order, and RI is random index. Table 2 shows a set of recommended RI values presented by Saaty [4].

Table 2 Random Consistency Index (RI)

N	1	2	3	4	5	6	7	8	...
RI	0	0	0.52	0.89	1.12	1.26	1.36	1.41	...

If the value of CR is greater than 0.10 for a matrix larger than 4x4, it indicates an inconsistent judgment. Decision makers should revise the original values in the pair-wise comparison matrix. The higher the CR value is, the assessment result becomes more inconsistent.

For the proposed example, we have CR=0.083. Since CR< 0.1, the comparison matrix in the example is consistent. As the comparison matrices for detailed criteria are in accordance with their respective upper level dimension, their eigen-vectors and consistent ratios are obtained.

4 Conclusion

Education system is a complicated one, involving many factors, and it is true of the teaching evaluation system. A scientific and reasonable course evaluation system determines the teaching quality to a greater degree. The purpose of building an evaluation index system of CEEC can encourage the English teachers to update their ideas and concepts, enhance their skills in teaching and research, and thus ensure a satisfactory performance. The proposed index system in this research helps to promote staff training and teaching levels, make the best of teaching resources, and devise a student-oriented curriculum. Under the guidance of such an evaluation system as well as strict management policies, the task of teaching English elective courses can be implemented orderly and smoothly, students may be stimulated to develop their potentials to the greatest extent, and bring their individualized learning skills into full play. Accordingly, the expected goal of offering English elective courses can be successfully achieved.

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Research on City Marketing in Wuhan of China Based on the Citizen's Happiness Index

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Abstract: City development is one of important points in economic society. There also some issues during the course, though. As Wuhan of China to be an example, the paper tries to connect the theories of citizen's happiness index and city marketing, construct the system of citizen's happiness index, consequently survey by a questionnaire, and then calculate citizen's happiness index in Wuhan of China. Finally some conclusions and suggestions are drawn, which include innovative city plans, outstanding city image, good government service, attracting more citizens to join and so on.

Key words: Wuhan of China; City Development; City Marketing; Citizen's Happiness Index

1 Introduction

With the development of its economics, China has played a great role in the world. One of the proofs in economic development is new changing of city construction. City has been not only a political or cultural centre of one area, but also a motor of blooming in economics and society. During the course, city managers are exerting strategies of city marketing in order to attract more city consumers. Meanwhile, "people oriented" is popular in present harmonious society. How to integrate both? It seems to be a real problem. So it is natural that people are more and more focusing what on earth city development has brought to them. Could they acquire more happiness from city development? Have governments considered demands of citizen when making city marketing plans? Does city development include all kinds of factors or just a number about GDP?

As Wuhan of China to be an example, the thesis tries to connect the theories of citizen's happiness index and city marketing, construct the system of citizen's happiness index, consequently survey, calculate and analyze citizen's happiness index, and finally draw some conclusions and suggestions it's the purpose.

2 Literature Review

2.1 About happiness index

Happiness is so abstract that everyone has his own unique understanding. The measurement system of happiness index was the first established by the king of Bhutan which is a small country in southern Asian. He created the concept of Gross National Happiness (GNH) and replaced Gross Domestic Production (GDP) with it. The king has paid more attention to environment protection than economic development and thought government's first target was to realize citizen's happiness^[1]. Selman (1990) set up positive psychology and designed happiness equation^[2]. Layard (2002) found a statistics system of GNH, which was similar to that of GDP calculation system^[3].

2.2 About city marketing

There are American branch and European branch in this area. The American Waitt (1999) researched from the relationship between city ideology and city marketing and he found city marketing depended on city ideology^[4]. Gotham (2002) contributed brand of city marketing and he thought traveling and cultural activities were helpful in order to strength the positive image of city^[5]. The European branch considered both supply and demand, and market. Ashworth (1990) regarded city needs to give more information about local development to consumers, and city could attract consumers by financial support and normative behavior^[6]. Bergotal (1999) compared city marketing as a service system including citizen, enterprises and tourists. Facing fierce competition, city should accept more modern commercial concepts, optimize management organizations and improve efficiency^[7].

There have been some literatures about index of citizen happiness and city marketing. There, however are scarce related to both of them, or to a specific city. These just leave research space for the thesis.

3 Data and Methodology

3.1 Setting up investigation system of citizen's happiness index

When designing citizen’s happiness index, it should be noticed that citizen live in city which constitutes living conditions. Facilities, policies, environments and so on have a great influence to citizen. Living in different city, citizen could feel different happiness degree. Fully considering these, investigation system of citizen’s happiness index is shown as Table 1.

Table 1 Investigation System of Citizen’s Happiness Index

City products	Variables	Investigation index
Visible products	Basic facilities in a city	Energy development and supply facilities
		Water supply and drainage facilities
		Road and traffic
		Post and telecommunication facilities
		Facilities to prevention natural calamities
	City environment	Clear degree of water sources
		Safe degree of food
		House conditions
		Price in market
		Income conditions
		Medical and hygiene
		Education conditions
		Culture and amusement
		Social insurance
	Innovation environment	
	Views in a city	Architecture style
		Views in main roads
		Sign views
		Advertisement outdoors
Invisible products	Government ability	Efficiency of government
		Fairness and honesties
		Policy implementations
		Public and democratic decision-making
		Information degree of government
	Level of public service	Officers’ quality
		Efficiency of public service
		Career morality
		Degree of office automation
		Professional quality

3.2 Measurements to citizen’s happiness index

The purpose of setting up investigation system of citizen’s happiness index is to acquire credible happiness index. Then the next question is how to measure citizen’s happiness index. Here taking measurement to customer attitude in customer satisfaction as a reference, we get measurements to citizen’s happiness index which is shown in Table 2.

Table 2 Evaluation Traits and Marks

Evaluation	Traits description	Marks
Far beyond satisfactory	Satisfactory degree to issues is much higher than expectation	90-100
Beyond satisfactory	Satisfactory degree to issues is higher than expectation	80-89
Satisfactory	Satisfactory degree to issues is the same to expectation	70-79
Not satisfactory	Satisfactory degree to issues is lower than expectation	60-69
Not satisfactory at all	Satisfactory degree to issues is much lower than expectation	0-59

3.3 Data collection and analysis

Data were collected by internet survey and face to face survey after questionnaire had been finished. In order to clear the topic, those who were investigated were limited to constant citizen in Wuhan of China, which is one of the biggest cities in central China. 400 surveys were issued and 337 surveys were returned, among which 309 surveys were effective. All data were managed with SPSS 17.0 software package.

Calculation results are showed as follows. From Table 3, all Cronbach's Alpha Coefficients are above 0.7, which means questionnaire is with higher credibility. From Table 4, all KMO values are above 0.7, which means factor analysis is practicable. Also from Table 4, all Bartlett sphericity tests of P values are lower than 0.001, which means questionnaire is with higher validity. Table 5 shows that keeping all items is reasonable.

Table 3 Cronbach's Alpha Coefficient

Variables	Cronbach's alpha	Cronbach's alpha based on standardized items	Items
Basic facilities in a city	0.750	0.752	5
City environment	0.735	0.748	10
Views in a city	0.731	0.740	4
Government ability	0.716	0.738	6
Level of public service	0.728	0.741	4

Table 4 KMO and Bartlett Test

Variables	KMO value	Approximate χ^2	Sig
Basic facilities in a city	0.712	169.715	0.000
City environment	0.724	168.782	0.000
Views in a city	0.768	119.023	0.000
Government ability	0.735	154.341	0.000
Level of public service	0.754	202.849	0.000

Table 5 Rotated Component Matrix

Variables	items	Factor Loading	P-value	Variables	items	Factor Loading	P-value
Basic facilities in a city	X1	0.660	***	Views in a city	X16	0.602	***
	X2	0.708	***		X17	0.728	***
	X3	0.603	***		X18	0.580	***
	X4	0.655	***		X19	0.652	***
	X5	0.591	***		Government ability	X20	0.753
City environment	X6	0.669	***	X21		0.473	***
	X7	0.633	***	X22		0.597	***
	X8	0.652	***	X23		0.508	***
	X9	0.610	***	X24		0.511	***
	X10	0.590	***	X25	0.629	***	
	X11	0.559	***	Level of public service	X26	0.779	***
	X12	0.703	***		X27	0.677	***
	X13	0.517	***		X28	0.753	***
	X14	0.525	***		X29	0.756	***
	X15	0.532	***	Notice:*** means P<0.001			

4 Results

Through Weighted Average Method, citizen's happiness indexes of 5 variables in Wuhan of China are shown in Table 6. By further calculation, citizen's happiness index of visible products in Wuhan of

China is 82.97 and citizen's happiness index of invisible products in Wuhan of China is 81.37. Finally, citizen's happiness index in Wuhan of China is 82.17, belonging to a beyond satisfactory area.

Table 6 Citizen's Happiness Indexes of 5 Variables in Wuhan of China

Variables	Basic facilities in a city	City environment	Views in a city	Government ability	Level of public service
Happiness index	86.36	79.99	82.57	76.99	85.75

Although citizen's happiness index shows they are satisfied with the city, Wuhan of China is still far to an ideal status in citizen's mind. According to Table 6, basic facilities acquired the highest mark, which means that city construction and rebuilding indeed have brought convenience to citizen in Wuhan of China during the course of city marketing. Evaluations to level of public service and views in Wuhan of China were in the middle. The mark of city environment was below 80, which shows government has paid more attention to economic development, ignoring the principle of "people oriented". The lowest mark was in evaluation to government ability, which shows inner management of government has more space to increase.

5 Conclusions

In conclusion, there is going to be more work to be done by city marketing in Wuhan of China, such as making innovative city plans, setting up outstanding city image, supplying good government service and attracting more citizens to join. In further research, we can also apply the method to other cities.

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The Legislation's Success and Deficiency in the Tort Liability of Traffic Accident Caused by Defective Motor Vehicle

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Abstract: The traffic accident caused by defective motor vehicle is the damage caused by accidental combination of motor vehicle defect and driving behavior, which belongs to several tort. Although it both meet the constitutive requirements of traffic accident liability and product liability, it can not solve effectively the liability of several tort, which is not beneficial for victims' protection. Otherwise, there are some conflicts between current legislation and judicial practice in the liability of several tort. However, the article 51 of the Tort Liability Law has special provision about the tort liability of traffic accident caused by assembling or scrap motor vehicles, that is, the assignor and the assignee should take joint and several liability, which actually bridges traffic accident liability and product liability. Even though the provision has solved the problems above, it can not apply to the tort liability of traffic accident caused by all defective motor vehicle. By analyzing the success and deficiency of the legislation, there is a try to make up the legislation deficiency of the tort liability of traffic accident caused by defective motor vehicle with joint and several liability, taking example from the the article 51 of the Tort Liability Law.

Key words: Defective motor vehicle; Traffic accident liability; Product liability; Joint and several liability

1 Introduction

The article 51 of the Tort Liability Law provides that the assignor and the assignee should take joint and several liability when the traffic accident is caused by assembling or scrap motor vehicle, which was transferred by the assignor to the assignee, such as sale. It is first to make the special provision about the tort liability of traffic accident caused by assembling or scrap motor vehicle in the section of traffic accident liability which should be taken by the motor vehicle keeper based on "the dominance of run" and "the interest of run" theory. However, the assignor takes the liability out of neither the dominance of run or the interest of run, but his behavior about transferring unreasonably dangerous assembling or scrap motor vehicle. According to the article 2 of Scrap Car Recycling Management Approach and the article 2 of Motor vehicle Compulsory Scrapping Standard Regulation, what is called "assembling or scrap motor vehicle" is the defective motor vehicle with unreasonable danger. The traffic accident caused by defective motor vehicle, is the damage caused by accidental combination of motor vehicle defect and driving behavior, which belongs to several tort. It both meets the constitutive requirements of traffic accident liability and product liability, so that, does the joint and several liability bridge the two liability? Even if it is so, the article 51 can not apply to the liability of traffic accident caused by all defective motor vehicle.

To this case, whether the civil law countries or the common law countries, there are both no special regulations about the liability of traffic accident caused by defective motor vehicle from the perspective of several tort, but there are other regulations to protect victim's rights and interests. Such as, in some common law countries, there is the theory of "rational man standard"^[1], which would exempt the traffic accident liability but to confirm the product liability; in some civil law countries, it clearly regulates that the motor vehicle keeper can not exempt liability by a plea of motor vehicle defect. Relatively, there are no these regulations to ensure the rights and interests of the victim in Chinese civil laws. Since the Tort Liability Law has provided its own system of traffic accident liability and product liability, would it be effective to solve the liability of several tort only by a single system of them? Perhaps, would it be available to the liability of several tort based on the provision about several tort theory? Maybe, would it be better to take example of joint and several liability from the the article 51 of the Tort Liability Law?

2 Traffic Accident Liability and Product Liability of Traffic Accident Caused by Defective Motor Vehicle

2.1 The traffic accident liability of traffic accident caused by defective motor vehicle

The Road Traffic Safety Law has provided "traffic accident" is a incident that a running motor

vehicle on the road causes personal injury or property loss, out of a fault or an accident. Obviously, illegal behavior is not necessary to the constitutive requirements of traffic accident liability. As the special tort liability, the constitutive requirements cover several aspects, such as, the accident must be caused by running motor vehicle on the road; there must be some damage; there must be causality between the traffic accident and the damage. The traffic accident caused by defective motor vehicle, is the running motor vehicle with defect on the road causes personal injury or property loss. The cause involves vehicle defect, but there is also inseparable causality between the run of motor vehicle and the damage, because traffic accident could not happen by static motor vehicle. So, the tort of traffic accident caused by defective motor vehicle meets the constitutive requirements of traffic accident liability.

The article 48 of the Tort Liability Law provides, "Where a motor vehicle meets with a traffic accident and causes personal injury or death or any property loss, the liability of indemnity should accord to relevant provision of The Road Traffic Safety Law", which lead to its article 76 about the apply of doctrine of liability fixation and defenses. Firstly, the insurance company shall pay indemnity within the liability limit of motor vehicle third party liability compulsory insurance, the part in excess of the liability limit shall be indemnified in either of the following ways: (1) Where a traffic accident occurs between motor vehicles, it applies fault liability principle, so the faulty party shall bear the liability or both parties in fault shall each bear their proper share of the liability. (2) Where a traffic accident occurs between a motor vehicle and a non-motor vehicle or a pedestrian, it applies non-fault liability principle,^[2] so the motor vehicle shall bear the liability; however, if the non-motor vehicle or the pedestrian is in fault, the motor vehicle's liability may be mitigated; if the motor vehicle is not in fault, the motor vehicle's liability may be less than 10%; if the injury and loss of the traffic accident are intentionally caused by the non-motor vehicle or the pedestrian, the motor vehicle shall exempt liability. About the liability of traffic accident caused by assembling or scrap motor vehicle, the article 51 of the Tort Liability Law has special provision that the assignor and the assignee should bear joint and several liability without distinguishing traffic accident type, under non-fault liability principle and no legal defenses.

After all, it is the defective motor vehicle that causes traffic accident and the damage is the combination consequence of motor vehicle defect and driving behavior which belongs to several tort. In some civil law countries, it clearly regulates that the motor vehicle keeper can not exempt liability by a plea of motor vehicle defect, such as Germany and Japan, so that the victim's rights and interests would be protected well even if the traffic accident is caused by motor vehicle defect. But in some common law countries, such as America and England, there is the theory of "rational man standard" in tort^[3] that the person takes some measures as a rational man in similar situation, even the measures are not wise or some faulty,^[4] which would exempt the keeper of driver's liability. Comparatively, the Tort Liability Law or other legislation in China has not any rules about it, so the motor vehicle keeper can take a plea of causality based on the defect, which will not benefit for victims' indemnity by the litigation of traffic accident liability. Because the defect is not the fault of motor vehicle keeper, if the traffic accident is between motor vehicles, he will take less even no liability; if the traffic accident is between a motor vehicle and a non-motor vehicle or a pedestrian, he will take less than 10% liability.

2.2 The product liability of traffic accident caused by defective motor vehicle

Defective motor vehicle, is wheeled vehicle with unreasonable danger to person and property safety, such as cars, motorcycles, agricultural vehicles and so on, which is moved, dragged, driven on road with power device for carrying person or goods, or doing special engineering operations. Defective motor vehicle includes the defective automobile which is regulated by the Defective Automobile Product Recall Management Regulation, and assembling or scrap motor vehicle which is regulated by the Tort Liability Law. The tort of traffic accident caused by defective motor vehicle happens in the run of motor vehicle, which is not similar with the tort of defective motor vehicle in the static condition, such as spontaneous ignition. During the run of defective motor vehicle on road, the tort of traffic accident is just the tort of defective product. As the motor vehicle is defective, there is the damage of personal injury or property loss, and there is causality between the defect and the damage, so it meet the constitutive requirements of product liability.

It is provided in the article 12 of the Supreme Court's Judicial Interpretation About The Law-application For Road Traffic Accident Damage Cases in Dec. 2012, "when the damage of traffic accident is caused by motor vehicle defect, the court should support the party's claim that the manufacturer or seller would take liability according to the chapter 5 of the Tort Liability Law." From the the article 41 and 42 of the chapter 5, when the damage is caused by defective product, the manufacturer should take strict liability and the seller should take fault liability. But for the victim, he could claim

indemnity from manufacturer as well as seller without considering the seller’s fault,which is different from the seller’s fault liability,but some lawmaker believes that this is only the advance responsibility of the seller.Meanwhile,after each of them taking the liability, the manufacturer has the right to recover it from the faulty seller,or the seller without fault has the right to recover it from the manufacturer.Visibly,the fault of seller is only the foundation that the manufacturer asks for recovery of the compensation,but not the necessity for victim to claim seller’s product liability,so the seller’s liability is still strict liability.What is “the victim”,there are different statements,such as,“the infringed” in the Tort Liability Law,“the victim” in the Product Quality Law and “the Consumer and other victims”in the Protection of Consumer’s Rights and Interests Law,but the connotation of these statements is not different,that is,they are the right subjects, including the driver,the passenger and others who suffer damage in the traffic accident.

As the Product Quality Law is the special law about defective product tort,there are three defenses for the manufacturer in the article 42,such as(1)the product is not put into market;(2)the damaging-defect does not exist,when the product is put into market; (3)the level of science and technology can not discover the defect,when the product is put into market.In the tort of traffic accident caused by defective motor vehicle,the vehicle has been put into market,so the manufacturer usually can exempt liability because of the defect caused by victim’s fault,such as misuse,abuse,overuse,refit or disassembling without any warning and so on.Although it does not provide whether the seller can claim the defenses,thinking about the manufacturer’s liability is the origin of the seller’s liability and the source of the recovery right ,the seller should claim it as the same as the manufacturer.As for the victim’s fault,it is the motor vehicle keeper’s fault in fact,for example,failure to repair the breakdown timely;overuse the mandatory scrap motor vehicle out of durable years or the leading scrap motor vehicle of reaching its maximum mileage;assemble motor vehicles without warning; drive defective motor vehicle with intention.If the manufacturer or seller exempts liability because of these defenses above,the victims will not get indemnity.On the other hand,the tort happens in traffic accident in relation to driving behavior,so the manufacturer or seller could claim less liability on the defense of causality.But in some common law countries,such as America and England ,although there is the theory of "rational man standard" to exempt the traffic accident liability,the tort of defective product takes strict liability,so the driver take no liability but the manufacturer should take the product liability.

2.3 The deficiency of regulation by traffic accident liability or product liability separately

Table 1 Comparison of Traffic Accident Liability and Product Liability of Traffic Accident Caused by Defective Motor Vehicle

		Doctrine of liability fixation	Liability subject	Right subject	Indemnity	Defense and Consequence
Traffic accident liability (A and B)	motor vehicles	Fault liability	Fault party	A B A,B	B,a A,a a	Personal injury Property loss
	A motor vehicle and A non-motor vehicle or a pedestrian	Non-fault liability	A	B,a	Personal injury Property loss (less than 10% liability without fault)	The defect ↓ Relief or Exemption
Product liability		Strict liability	Manufacturer	A,B,a	Personal injury Property loss (except the loss of defective motor vehicle)	Victim’s fault ↓ Relief or Exemption

The traffic accident caused by defective motor vehicle,is the damage of accidental combination of driving behavior and motor vehicle defect,which both meets the constitutive requirements of traffic accident liability and product liability.To presume that “ A” is the defective motor vehicle,“ a”is the passengers,“B”is the non-motor vehicle or pedestrian,based on different liability selection,there will be

different doctrine of liability fixation, liability subject and protection for right subject, as shown in table 1. Each traffic accident liability or product liability can not solve the liability of several tort effectively, which is not beneficial for victims' protection.

In accordance with traffic accident liability, the legislation does not provide that motor vehicle defect can not be the defense, and the defect is not the driver's fault. So, if the traffic accident occurs between motor vehicles, the liability subject (maybe A or B or A, B) can relieve or exempt liability; if the traffic accident occurs between a motor vehicle and a non-motor vehicle or a pedestrian, the liability subject A can claim less than 10% liability. Therefore, the indemnity is restricted to the personal injury and property loss caused by driving behavior, excluding the part caused by motor vehicle defect, which will not be got in the traffic accident liability.

In accordance with product liability, if the defect is caused by improper use of A, such as misuse, abuse, overuse, refit or disassembling without warning and so on, the manufacturer and seller can exempt liability, so that B and a will not get the indemnities; if the traffic accident is caused partly by improper driving, the manufacturer and seller can claim relief liability by causality plea, so that B (only it is non-motor vehicle) and a will not get the indemnities caused by improper driving in the product liability.

3 Joint and Several Liability: The Coalition of Traffic Accident Liability and Product Liability

3.1 The legislation about the joint and several liability of traffic accident caused by defective motor vehicle

As mentioned, defective motor vehicles include defect automobiles under the mandatory recall and assembling or scrap motor vehicles. The article 51 of the Tort Liability Law has special provision about the tort liability of traffic accident caused by assembling or scrap motor vehicle, that is, the assignor and assignee should take joint and several liability, but it only apply to the situations of transfer, which is unclear but including sale. Some scholar thinks, it is to let alone the damage of traffic accident that the assignor and the assignee deliberately take illegal way to transfer the assembling or scrap motor vehicle which is banned by law, so they have joint fault in the traffic accident damage, which are joint tort.^[5] There are enough reasons to believe that the assignor and the assignee know about the transferring vehicle is assembling or scrap motor vehicle, because they should do the registration of ownership transfer after sale but the banned vehicle cannot be done this registration; if they neither check out relevant certificates nor do transfer registration, they will be presumed deliberate. But these reasons to identify the subjective state is only based on the sale, in which the assignor and the assignee are jointly faulty and are of subjective joint tort. In addition, it is impossible to identify the subjective state of the assignee, so the assignor and assignee are of several tort without joint fault. Thus, the tort of traffic accident caused by assembling or scrap motor vehicle in the article 51 includes both subjective joint tort and several tort without joint fault. However, the tort of traffic accident caused by other defective motor vehicle is usually several tort without joint fault, because this vehicle is deemed as the legal one and the manufacturer, seller, consumer or others are impossible to know about the defect jointly.

With regard to several tort liability, the Tort Liability Law has a system of provisions. In the article 8, joint tort is just defined as subjective joint tort based on the subjective theory, which lead to joint and several liability. The article 11 and 12 regulate the several tort without joint fault separately, if each tort is enough to cause all damage, it will lead to joint and several liability; if each tort is not enough to cause all damage, it will lead to proportionate liability. So, the tort liability of traffic accident caused by assembling or scrap motor vehicle in sale is joint and several liability according to article 8; the tort liability of traffic accident caused by other defective motor vehicle is proportionate liability according to article 12 but not article 11, because each of the motor vehicle defect and driving behavior is not enough to cause all traffic accident damage.

The joint and several liability of traffic accident caused by assembling or scrap motor vehicle, can not be regulated by the general provisions of joint and several liability in article 8 and 11 simultaneously, instead in conflict with the proportionate liability in article 12. Therefore it is the consequence of special legislation provision, based on policy considerations and protection of the victim.

3.2 The judicial practice about the joint and several liability of traffic accident caused by defective motor vehicle

Before the Tort Liability Law, the liability of several tort is regulated by the Supreme Court's Judicial Interpretation About Law-application For Personal Injury Cases in Dec. 2003 (the Interpretation

for short). The Interpretation defines joint tort in article 3 that two or more person commit a tort with joint intention or joint negligence causing damage, or without joint intention or joint negligence, but the same damage is caused by the direct combination of several torts, which will lead to joint and several liability. Obviously, the joint tort includes subjective joint tort and part of several tort without joint fault. As for the several tort without joint fault, if the same damage is caused by the direct combination of several torts, it will lead to joint and several liability, which is called objective joint tort; if by the indirect combination of several torts, it will lead to proportionate liability. What is called “direct combination”, a legislator thinks, several torts are combined with each other occasionally but closely as a joint tortious act, which brings the victim damage jointly, so that the causation and the damaging part of each act can not be distinguished.

In the judicial practice, the traffic accident caused by defective motor vehicle is the damage caused by direct combination of motor vehicle defect and driving behavior, which is a whole and common causation to the traffic accident damage. After all, the traffic accident does not happen when the defective motor vehicle is not running on road, and it is unrelated to product tort when the traffic accident is caused by motor vehicle without defect. So it belongs to objective joint tort, which lead to joint and several liability. In the traffic accident caused by assembling or scrap motor vehicle by sale, even if the tort of assignor and the assignee is subjective joint tort, they also take joint and several liability. Therefore, it is enough to regulate the tort liability of traffic accident caused by defective motor vehicle with joint and several liability according to the Interpretation, whether the tortfeasors have joint fault or not.

3.3 The success and deficiency to bridge traffic accident liability and product liability with joint and several liability

Based on the several tort theory, there are contradictions of the liability of of traffic accident caused by defective motor vehicle between the legislation and the judicial practice, which is easy to cause the confusion of law application. According to the legislation, the liability is either joint and several liability or proportionate liability, and the proportionate liability is still based on the each system of traffic accident liability or product liability; according to the judicial practice, the liability is joint and several liability. As shown in table 2.

Table 2 Comparison of the Provision of Several Sort in Legislation and Judicial Practice

	Several sort and Liability form			the tort liability of traffic accident caused by defective motor vehicle	
				Assembling or scrap motor vehicle	Other defective motor vehicle
Legislation	With joint fault	Several tort	Joint and several liability	article 51 of the Tort Liability Law	Several sort without joint fault
	Without joint fault	Each tort is enough to cause all damage		Proportionate liability	↓
Each tort is not enough to cause all damage		Joint and several liability	Proportionate liability		
Judicial Practice	With joint fault		Several tort	Joint and several liability	Subjective joint tort
	Without joint fault	Direct combination			
		Indirect combination	Joint and several liability	Joint and several liability	

However, the joint and several liability in the article 51 of the Tort Liability Law makes a good example to eliminate the contradictions above. As what mentioned before, the article 51 is the consequence of special legislation provision, which just bridge the traffic accident liability and product liability. Although it is set in the chapter “Motor Vehicle Traffic Accident Liability”, the assignor is not the motor vehicle keeper who is usually the owner or driver and should take traffic accident liability based on the “dominant of run” and “the interests of run” theory^[6]. The accountability of the assignor is to provide defective motor vehicle which causes traffic accident damage. Because of the product defect causing damage, the manufacturer and seller should take product liability. As for the overuse of the mandatory scrap motor vehicle out of durable years or the leading scrap motor vehicle of reaching its maximum mileage, the manufacturer and seller can exempt liability, but the owner of motor vehicle transfer it to others to drive or assemble and the behavior of transfer and assembling is equivalent to manufacture and sale of defective motor vehicle. In this sense, these person should take product liability who are the assignor compared to the assignee, so the liability of the assignor in fact is the product

liability. The joint and several liability bridges the traffic accident liability and product liability where the doctrine of liability fixation is non-fault liability principle without defenses, the liability subject includes product liability subject and traffic accident liability subject, the right subject involves the victims except the assignor and the assignee in the traffic accident, the indemnity contains personal injury and property loss. The special provision solves the liability of several tort effectively, which makes up the deficiency of regulation by traffic accident liability or product liability separately and is beneficial for victims' protection. But, it can not apply to the tort liability of traffic accident caused by all defective motor vehicle.

4 Conclusion

About the tort liability of traffic accident caused by defective motor vehicle, it can not solve the several tort liability effectively by traffic accident liability or product liability separately, and there are contradictions between the legislation and the judicial practice based on the several tort theory, both of which violate the purpose of the victims' protection of the Tort Liability Law. However, the article 51 of the Tort Liability Law has solved these questions above. Both of traffic accident caused by assembling or scrap motor vehicle and by other defective motor vehicles, are the damage caused by accidental combination of motor vehicle defect and driving behavior, which belongs to several tort. So it is possible to take example of joint and several liability from the article 51.

4.1 From assembling or scrap motor vehicle to defective motor vehicle

Defective motor vehicles, besides assembling or scrap motor vehicles, include defective automobiles which are regulated by the Defective Automobile Product Recall Management Regulation, all of them with unreasonable danger to person and property safety. At the beginning of 2013, the Defective Automobile Product Recall Management Regulation has been implemented, which regulates defective automobiles by the way of administrative regulation. Like assembling or scrap motor vehicles, there is also a reality need to regulate these defective automobiles. Besides, the traffic accident caused by defective automobile, is also the damage caused by accidental combination of motor vehicle defect and driving behavior, which belongs to several tort, so there is the theory basis to regulate it with shared liability. Meanwhile, considering the protection of victims, the legislation should settle the system predicament that each of traffic accident liability and product liability can not solve the liability of several tort. Therefore, it is necessary and available to regulate the tort liability of traffic accident caused by all defective motor vehicles with joint and several liability by special legislation provision, based on several tort and the protection of victims, which is also good for playing a role of private law in social control of defective motor vehicles.

4.2 From multiple doctrine of liability fixation to non-fault liability principle

As before, the joint and several liability actually bridges traffic accident liability and product liability, but the key is to deal with the multiple doctrine of liability fixation in their respective system. The joint and several liability in article 51 of the Tort Liability Law takes non-fault liability principle, which is out of the assignor transferring dangerous and defective assembling or scrap motor vehicle with intention, and the assignee enjoying the dominant of run and the interest of run of assembling or scrap motor vehicle. This is similar to the tort of traffic accident caused by other defective motor vehicles. The product liability subject should take strict liability out of producing and providing defective product, which has nothing to do with the knowing about product defect; the traffic accident liability subject should take liability out of enjoying the dominant of run and the interest of run of the motor vehicle, whether it is the subject's fault or just an accident. So it does not violate the multiple doctrine of liability fixation in the system of traffic accident liability or product liability to take non-fault liability principle.

4.3 From self liability subject to joint and several liability subject

In the tort liability of traffic accident caused by defective motor vehicle, there are both traffic accident liability and product liability, that is, there are both traffic accident liability subject and product liability subject. Although the joint and several liability subject of traffic accident caused by assembling or scrap motor vehicle are the assignor and the assignee, they actually are product liability subject and traffic accident liability subject, because the assignor is the person who produces or provides defective motor vehicle and the assignee is the person who is usually the owner or driver of defective motor vehicle. In the system of traffic accident liability or product liability, both of the subjects are responsible for themselves, but the assignor and the assignee skillfully turn self liability subject to joint and several liability subject. Similarly, it is available to apply to the liability subject of traffic accident caused by

other defective motor vehicles. After all, to the consumer, the manufacturer and the seller are the assignor; the consumer as the assignee usually is the owner and the driver of motor vehicle.

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The Comprehensive Evaluation on the Development Level of Regional Logistics

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Abstract: The development level of regional logistics is an important indicator of the development level of economic. Evaluating the regional modern logistics development level scientifically is of practical significance for making scientific decisions and improving the environment for modern economy. This paper selects 19 factors from 5 dimensions including socio-economic level, production and consumption distribution level, transport level, human resources level and information development level. Firstly, with the help of MATLAB7.11, it uses the gray correlation analysis method to exclude lower correlation factors; Secondly, make a quantitative evaluation of 31 provinces (cities) in China on the regional logistics development with the help of SPSS19.0, combining the principal component analysis and the cluster analysis method; Then it divides the regions into four categories according to the regional logistics development. Finally, it makes qualitative conclusions on the evaluation results, and puts forward some suggestions on the coordinated development of regional logistics.

Key words: Regional logistics; Grey correlation analysis; Principal component analysis; Cluster analysis

1 Introduction

Modern market competition has gone beyond the competition between enterprises, since the French scholar Gottmann put forward the concept of "metropolitan economic zone" in 1957, along with the accelerated pace of economic globalization, market competition has risen to regional competition, and even the national competition, which was different from the counterbalance between the enterprises and supply chains in the past, "regional logistics" concept also would be born. As an indispensable part of the regional economy, the development level of logistics is not only the carrier of parting regional development elements, but also an important content of regional industrial activities, playing an important role in guaranteeing the achievement of department labor division, area labor division and being bridges of economic ties. If we can scientifically evaluate the development level of modern regional logistics, thus make scientific decisions and improve the environment for the modern economy development, it will be significantly important for the regional logistics competitiveness and will promote the whole development of regional economic development.

2 Literature Review

Many Chinese scholars studied the development of regional logistics from different aspects such as content, service performance, structure optimization and evaluation of regional logistics. Now, this paper will review the studies mainly in the aspects of the evaluation factors system and evaluation method of development level of logistics.

The current studies on evaluation factor system of logistics development are shown as follows: The annual status report(2002)^[1] provided by U.S. the Cass Information system Inc Prologis Logistics is the most representative in the business logistics field of evaluation, the main indicators are: business logistics system cost and its share of GDP, freight index and so on. Action Agenda Steering Committee, issued the "Agenda for Action" (2002)^[2], respectively from the assessment of the importance of the logistics industry, sector structure of transportation and logistics industry and so on. Dai Weiwei (2004)^[3] selected 17 factors ,such as the GDP, the proportion of tertiary industry in GDP, population density freight volume, total retail sales of social consumer goods and so on.

The evaluation method of logistics development: Wang Du (2005)^[4] used the analytic hierarchy process, determined the index weights by investigations and used fuzzy comprehensive evaluation method on Tianjin's development level of logistics; Wang Zhenfeng (2006)^[5] and so on used the non-linear principal component analysis to analyze the logistics development of Henan, and made a comprehensive strength evaluation of logistics development in different regions of Henan. Dong Haiying (2010)^[6] used principal component analysis to make a comprehensive evaluation on logistics

development in Sichuan Province.

Regional logistics development itself is a difficult concept to define; there are always subjective factors in determining the weights while using fuzzy comprehensive evaluation method, AHP and so on. Therefore, for the evaluation of regional logistics development level, to a certain extent, we should avoid subjectivity, and making objective comprehensive evaluation according to available scientific of statistical data is very necessary.

3 Construction of the Factors System Based on Grey Correlation Analysis

3.1 Principle of selecting factors

Comprehensiveness: The evaluation factors should be taken full account of various factors from macro and micro, internal and external. Objectiveness: Factors should be objectively reflected, and the sources of data should be true, reliable, and accurate. Scientific nature: Each factor should have a strict scientific meaning. Comparability: From horizontal and vertical comparison, the meaning, statistical time and space of the selected factors should be comparable.

3.2 Research objects and data sources

In this paper, the logistics situations of 31 provinces (or cities) in China are taken as the research objects. The data in this paper are the relevant data from the China Economic Information Network database from 2004 to 2011, and the data are processed by SPSS19.0 and MATLAB7.11.

3.3 Evaluation system

3.3.1 Primary election factors

This paper argues that the factors affecting the level of regional logistics development are from the following five aspects, Firstly, socio-economic level, which is a comprehensive reflection of socio-economic base, including GDP (X1,hundred million yuan), Real GDP per capita (X2,yuan), urban household per capita disposable income (X3,yuan), rural residents per capita annual income (X4,yuan).Secondly, production and consumption circulation level, includes agricultural output (X5, hundred million yuan), construction output (X6, hundred million yuan), industrial output (X7, hundred million yuan), the total retail sales of social consumer goods (X12, hundred million yuan), which reflect the needs of regional logistics development situation and the scale of demand. Thirdly, transport level, reflecting the material basis of the provincial logistics development, includes total cargo turnover (X10, ton-km), total freight traffic (X11, ten thousand tons), highway mileage (X15, km), the railway operating mileage (X16, km), transportation, storage and postal added value (X19, hundred million yuan). Fourthly, human resources level which reflects the human resources of logistics development, includes general, college graduates (X13, million), transportation, storage and postal services private enterprises and individuals year-end number of employees (X14, million).Fifthly, information development level, reflecting the logistics information development level, includes the number of mobile phone users (X8, million), telecommunications services (X9, hundred million yuan), the number of Internet users (X17, million), telephone penetration (X18, the number of telephones per hundred persons have).

3.3.1 The established factors system based on grey correlation analysis

The authors consider using gray correlation analysis method firstly, and calculate the gray correlation degrees between each factor and X19, excluding the factors with a lower index.

This paper takes the whole China as a symbol and selects the data of 19 factors from 2004 to 2011, and the data should be normalized. Firstly, the grey correlation is

$$\xi_i(k) = \frac{\min_i \min_k |L_0(k) - L_i(k)| + \rho \max_i \max_k |L_0(k) - L_i(k)|}{|L_0(k) - L_i(k)| + \rho \max_i \max_k |L_0(k) - L_i(k)|} \quad (1)$$

And then calculate the gray absolute degree: the gray absolute degree between evaluation sequence and the reference sequence is:

$$r_i = \frac{1}{n} \sum_{k=1}^n \xi_i(k) \quad (2)$$

Compare the gray absolute degree, sort in descending order .The gray correlation sorting results are shown in Table 1.

Table 1 shows that the cargo turnover(X10) has the biggest correlation value with transportation, storage and postal added value(X19), indicating that the scale of freight transport accounts for a large proportion of regional logistics development level. Select the factors with the correlation greater than

0.85, while the railway operating mileage(X16), general, college graduates(X13), telecommunications services(X9) and highway mileage(X15) these four factors that gray correlation is smaller than 0.85 can not be considered, and to select the other 14 factors as a factor system.

Table 1 The Gray Correlation Sorting Results

Factor No.	Factor Name	The Gray Correlation	Sorting Results
X10	total cargo turnover	0.9433	1
X3	urban household per capita disposable income	0.9421	2
X2	Real GDP per capita	0.9416	3
X1	GDP	0.9370	4
X18	telephone penetration	0.9297	5
X8	the number of mobile phone users	0.9212	6
X7	industrial output	0.9186	7
X12	the total retail sales of social consumer goods	0.9089	8
X11	total freight traffic	0.9088	9
X4	rural residents per capita annual income	0.8980	10
X14	transportation, storage and postal services private enterprises and individuals year-end number of employees	0.8919	11
X5	agricultural output	0.8839	12
X6	construction output	0.8755	13
X17	the number of Internet users	0.8570	14
X16	the railway operating mileage	0.8430	15
X13	general, college graduates	0.8075	16
X9	telecommunications services	0.7988	17
X15	highway mileage	0.6665	18

4 The Evaluation of Development Level of Regional Logistics Based on Principal Component Analysis and Cluster Analysis

In response to the factor system, as the factors are too many (14), so making a comprehensive evaluation is more complicated. The main idea of principal component analysis is dimensionality reduction, using the less comprehensive evaluation factors to replace the original factors, and the comprehensive factors retains most of the original information, and unrelated to each other, enabling complex problems simple.

4.1 The use of principal component analysis with SPSS

4.1.1 Results test

Using SPSS for KMO and Bartlett test on sample data, KMO is $0.802 > 0.5$, Bartlett test value Sig. = .000, which means that the correlation between variables is not significant, so the symbol can be used principal component analysis.

4.1.2 Principal components using principal component analysis

The explained variance is shown in Table 2, it can be seen from the table, in the premise of the cumulative contribution rate $89.749\% \geq 85\%$, three principal components are extracted, they are F1, F2, F3, and their contribution rate descending are 48.208%, 31.231% and 10.039%.

Table 2 The Explained Variance

Components	Initial Eigen values			Extract and load squared			Rotate squares and loading		
	Total	Variance %	Cumulative contribution rate	Total	Variance %	Cumulative contribution rate	Total	Variance %	Cumulative contribution rate
1	8.408	60.055	60.055	8.408	60.055	60.055	6.749	48.208	48.208
2	3.349	23.919	83.974	3.349	23.919	83.974	4.372	31.231	79.440
3	.771	5.505	89.479	.771	5.505	89.479	1.406	10.039	89.479

Firstly, create the original factor loading matrix with the three main factors extracted components

F1, F2 and F3, and then simplify its structure, and get the varimax orthogonal rotation matrix, as is shown in Table 3 below:

Table 3 Rotated Component Matrix

Factor	Components		
	1	2	3
the number of mobile phone users	.966	.135	.074
number of Internet users	.950	.191	.041
GDP	.940	.278	.169
the total retail sales of social consumer goods	.939	.291	.135
industrial output	.907	.255	.216
agricultural output	.791	-.367	.308
total freight traffic	.776	-.114	.516
construction output	.711	.463	.085
transportation, storage and postal services private enterprises and individuals	.630	.208	.433
year-end number of employees	.630	.208	.433
telephone penetration	.089	.946	-.079
rural residents per capita annual income	.187	.929	.204
Real GDP per capita	.106	.928	.215
urban household per capita disposable income	.237	.928	.135
total cargo turnover	.298	.453	.798

The results show that the first factor mainly in the network infrastructure has a larger load can be named as science and technology factor; the second factor mainly in the economic level has a greater load, can be named as economic factor; the third factor mainly in transshipment have a greater load, can be named cargo flow factor.

4.1.3 Comprehensive factor scores

The expression formula of the three main components show as follows:

$$Z_1 = 0.167X'_1 - 0.077X'_2 - 0.021X'_3 - 0.054X'_4 + 0.115X'_5 + 0.129X'_6 + 0.146X'_7 + 0.208X'_8 - 0.187X'_{10} + 0.038X'_{11} + 0.177X'_{12} + 0.014X'_{14} + 0.212X'_{17} + 0.007X'_{18}$$

$$Z_2 = 0.016X'_1 + 0.222X'_2 + 0.226X'_3 + 0.220X'_4 - 0.170X'_5 + 0.087X'_6 + 0.006X'_7 - 0.012X'_8 + 0.013X'_{10} - 0.126X'_{11} + 0.024X'_{12} - 0.022X'_{14} + 0.008X'_{17} + 0.263X'_{18}$$

$$Z_3 = -0.115X'_1 + 0.112X'_2 - 0.023X'_3 + 0.075X'_4 + 0.115X'_5 + 0.176X'_6 - 0.047X'_7 - 0.220X'_8 + 0.810X'_{10} + 0.398X'_{11} - 0.157X'_{12} + 0.303X'_{14} - 0.261X'_{17} - 0.237X'_{18}$$

The consolidated factor score formula is:

$$Z = 0.48Z_1 + 0.31Z_2 + 0.10Z_3$$

0.48,0.31,0.10 are the variance contribution rate of three principal components, calculate three principal component scores and composite score for each region, and do prevail composite score in descending order to get the table in Table4.

Table 4 Three Principal Components Scores and Composite Score for Each Region

Regions	Z1	Z2	Z3	Z
Guangdong	2.83767	0.75579	-1.60944	1.44
Jiangsu	2.20792	0.91874	-0.48893	1.3
Zhejiang	1.08929	1.74436	-0.43032	1.02
Shandong	1.95137	-0.37272	1.82918	1
Shanghai	-1.11226	2.63851	2.47148	0.53
Beijing	-0.41365	2.69729	-1.66286	0.47
Liaoning	0.2354	0.30771	1.91568	0.4
Henan	0.95966	-1.07021	1.14342	0.24
Hebei	0.61383	-0.59967	1.02668	0.21
Fujian	0.06862	0.73113	-0.95151	0.16

Hubei	0.53215	-0.40858	-0.1447	0.11
Sichuan	0.79344	-0.78239	-0.39089	0.1
Tianjin	-1.2592	1.68948	0.92229	0.01
Hunan	0.42446	-0.74228	0.09595	-0.02
Anhui	-0.03614	-0.83732	1.4712	-0.13
Inner Mongolia	-0.5461	0.16505	0.69484	-0.14
Shaanxi	-0.13001	-0.36895	-0.40029	-0.22
Heilongjiang	-0.20471	-0.48297	-0.16407	-0.26
Jilin	-0.42048	-0.07617	-0.50408	-0.28
Shanxi	-0.28797	-0.40345	-0.22039	-0.29
Chongqing	-0.4511	-0.19152	-0.21484	-0.3
Guangxi	-0.21086	-0.83233	0.43904	-0.32
Jiangxi	-0.34007	-0.61724	0.25832	-0.33
Yunnan	-0.28671	-0.76268	-0.58209	-0.43
Xinjiang	-0.5469	-0.45201	-0.5356	-0.46
Hainan	-1.03073	-0.11481	-0.53479	-0.58
Guizhou	-0.55793	-0.8277	-0.63883	-0.59
Gansu	-0.65267	-0.79924	-0.51226	-0.61
Ningxia	-1.06559	-0.13849	-0.61274	-0.62
Qinghai	-1.05575	-0.25341	-0.86721	-0.67
Tibet	-1.10499	-0.51393	-0.80225	-0.77

4.2 Cluster analysis

This paper uses cluster analysis according to the composite factor scores, clustering method uses the connection method between the two groups, distance measure uses Euclidean distance. The results are shown in Figure 1.

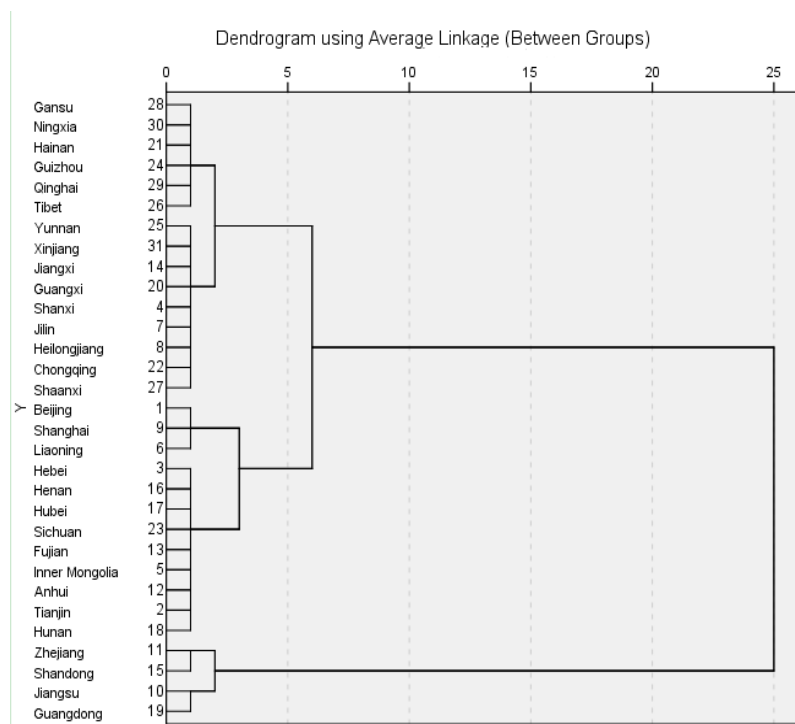


Figure 1 The Result of Cluster Analysis

From the composite score and cluster analysis results, the regional logistics development level in 2011 can be divided into four categories, as are shown in Table 5.

Table 5 The classification of regional logistics development level

Category	Logistics level description	Regions
One	Better	Guangdong, Jiangsu, Zhejiang, Shandong
Two	Good	Shanghai, Liaoning, Beijing
Three	medium	Henan, Hebei, Fujian, Hunan, Hubei, Sichuan, Tianjin, Inner Mongolia, Anhui
Four	inferior	Gansu, Ningxia, Hainan, Guizhou, Guangxi, Qinghai, Xizang, Jiangxi, Shaanxi, Shanxi, Xinjiang, Jilin, Chongqing, Yunan, Heilongjiang

From the composite score and clustering results, a good level of development of regional logistics areas are mainly concentrated in the eastern coastal and inland along the side, while the development level of logistics of the western part in China is much lower, not only the location and the region related, but also related to their development level of regional economic, that is to say regional logistics demand and supply are well balanced. The areas with low development level of regional logistics should study market and the macro environment, and promote regional logistics industry to flourish.

5 Conclusion

This paper builds evaluation index system of regional logistics development from socio-economic, production and consumption distribution, transportation development, human resources and information development, and establishes evaluation model on development level of regional logistics based on gray correlation analysis, principal component analysis and cluster analysis, which is clear principle, simple calculation. Using this model makes a comprehensive evaluation on the development level of logistics of 31 provinces(cities) in China, in the meanwhile, the conclusion is objective, accurate and more convincing. The comprehensive evaluation result can provide an important reference for formulating correctly, scientifically, competitively regional logistics development strategies.

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Research on the Social Service System of Modern Distance Education

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Abstract: In this paper, a comprehensive literature analysis, comparative analysis and other methods are used to deeply research the social service system of distance education. Firstly, this paper comparatively analyzes the traditional education and distance education, and concludes that the distance education is a new education way which is mainly reflected in the relatively isolated state between teachers and students, or a student and another student; Secondly, it briefly introduces the research status at present, basic concept, characteristics, composition and necessity of the social service system of distance education; Thirdly, it makes a detailed analysis of network education institution in the social service system and the management of social service system of distance education, it focuses on 4 kinds of set modes and 2 kinds of operation mechanism of the 68 colleges, and 3 virtual platforms: organization and management platform, resource integration platform and quality testing platform; Finally, it puts forward some problems of distance education socialization service system for deep exploration.

Key words: Distance education; Service system; Setting

With the development of science and technology, the global information level has also been gradually improving. In the popularity of the network age, distance education has begun to enter the eyeball of the broad masses, and enjoyed a rousing reception. Distance education is a new education mode, which has changed the traditional face-to-face education mode to a separated teaching mode. It mainly depends on the computer network, digital media as the media. The most essential difference between distance education and traditional education lies in: the position between teachers and students or students and students. For the former, they are in relatively separated state, while for the latter, they are in the face-to-face state.

1 A Survey of the Social Service System of Modern Distance Education

1.1 research status of the social service system of modern distance education at present

The early development of network teaching is to achieve the purpose of remote teaching. At the end of twentieth Century, the support campus network teaching management system began to come out. Along with the coming of twenty-first Century, distance education becomes more and more popular, at the same time, the foreign species of distance education management system is becoming brisker day by day. For example, E—Learning、 Web CT、 Black Board Learning System are very popular in the world.

In recent years, the development of teaching management system of network has also been one of the most important topic for the domestic scholars who are engaged in technology and educational research. At present, the domestic development has entered the practical stage, and there are some mature network teaching platform, such as Anbo network teaching platform, the sky network teaching system, Qinghua network school and Peking University Network Teaching platform.

At the same time, the Ministry of education also began to pay attention to the pilot work of distance education, and there are 68 colleges that are qualified to accept the pilot. the pilot work is very smoothly, but inevitably many problems are exposed. The social service system of distance education is the inevitable result of the development and promotion of modern distance education, a bridge which transmit high quality education resources, an important means to optimize the teaching management, student services. At moment, there are three modern social service system which has been approved by the Ministry of education, they are the openg remote education center, Hiroshige education, Zhijin Education.

1.2 The basic concepts and characteristics of the social service system of distance education

The social service system of distance education is a system whose purpose is to better meet the needs for learners, means is the modern educational technology. The establishment of this system can better promote distance education, improve school teaching support service level for distance education pilot colleges, provide a good platform for the students to study efficiently. Distance education

socialization service system has the following basic characteristics: (1)independence; (2)the professional organization; (3)functional dependency;(4) the high efficiency of operation.

1.3 The formation of the modern distance education socialization service system

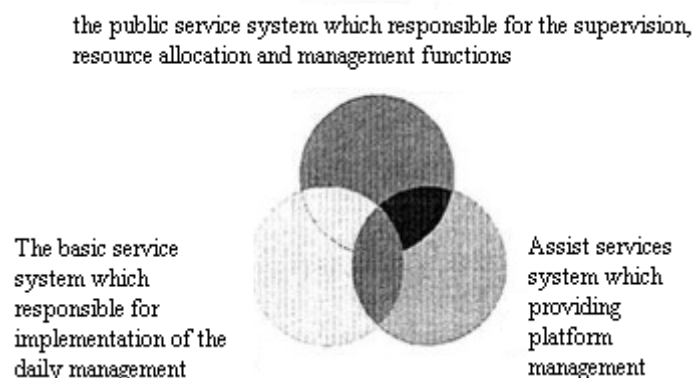


Figure 1 Social Service System of Distance Education.

The three parts are mutually independent, but promote and complement each other. To promote social service system of modern distance education is gradually perfect, the three systems are indispensable.

1.4 the necessity of the creation of the modern distance education socialization service system

In the driving of the development and progress of distance education, social service system is very necessary. Practice has proved that: the development of the social service system of distance education is not only the call of distance education industry, but also the request of adapt the change of the external environment of the distance education system.

1.4.1 The development of the social service system of distance education is the call of distance education industry

(1) improving the rate of cyber source can be achieved by optimization the resource allocation of distance education. In the socialist market economic system, in order to reduce the wastage of resources, improve economic efficiency, we must rationally allocate and optimize the existing resources of distance education. While the social service system can appropriately provides a good platform for the operation of the market to configure and optimize resources. Therefore, continuous development and growth of the social service system of distance education, can provide more possibilities for realizing the sharing of resources.

(2) the diversification of education can be achieved through the development of the market space of distance education socialization service system. The development of the social service system is like the development of a airlines, airlines are not intended for one or two aircraft service, but for all aircraft services in the port. Similarly, the social service system of distance education development is not intended for one or several universities service, but for all school that join the network service. But it is worthy to notice that courses each academy offers for students are not the same, In general, each academy is completely independent, and possesses its owns characteristics. Therefore, the responsibility of the social service system is that recruiting more distance education institution to add to this system, and provide all kinds of services for all institutions and students in the system. Only constantly expanding the market space of the social service system, can add more content for distance education, promote the diversification of remote education, achieve maximum economic and social benefits for remote education.

1.4.2 The development of the social service system of distance education is the request of adapt the change of the external environment of the distance education system.

(1) Fitting in policy environment. In order to promote the network education management more standardized, more healthy, and orderly; the government often make many major policies. However, the existing operational mechanism has been unable to sustain the quality of the service and management for network in 67 College Campus Learning Center, it is because these schools which include universities, adult colleges and TV University and other units, are very complex, that will leads to the lack of a unified system of social services. Therefore, in order to effectively control the quality of

modern distance education, to achieve the national demand level, establishing a unified social service system of distance education is necessary.

(2) Adapting to the market environment. Firstly, compared with other types of education, distance education in China requires to improve the quantity of the students. In general, the overall quantity of the students basically keeps in a steady state. As the most important part in higher education, colleges and universities will occupy a high proportion of students market; at the same time, the occupation education that the state encourages will also split a part of students market share. Secondly, after China's entry into the WTO, online education market in China also began to expand, because of the impact of foreign distance education industry, which no doubt will provide opportunities for domestic distance education industry, and also bring serious challenges. In the dual pressure of traditional campus education in China and the relatively developed foreign education, only distance education in China expands the scale of teaching, occupies a greater market share, can it get a space in the market which is full of fierce competition. In all, the development of distance education and social service system in China, is the important guarantee for improving the situation that viciously competes in the Chinese internal remote education system, the effective way that promotes the maximization of resource sharing and sets up China's own brand for distance education.

2 Analysis of the Settings of the Mechanism of Distance Education in the Social Service System

At present, the 68 colleges of the mechanism has 4 kinds of setting mode (as shown in Figure 2): (1) Network Education, Adult Education, training are all separated, the proportion is 7%; (2) Network Education, Adult Education, training are all centralized, the proportion is 56%; (3) Network Education is separated, Adult Education, and training are centralized, the proportion is 32%; (4) Network Education, Adult Education are centralized, training apart is separated, accounts for 5% of the proportion of the total. From the current situation and essence of network education, we can summed up the four set for two kinds of settings and operation situation, the way (1) and (3) attributed to separate settings and operation situation, way (2) and (4) attributed to continuing education institutions education integration settings and operation situation.

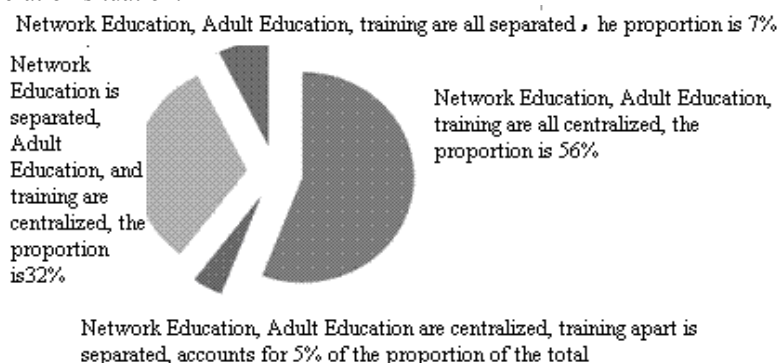


Figure 2 Four Sets and Proportion of 68 Pilot Colleges and Universities

2.1 Continuing education institutions education integration settings and operation situation.

From the concept of continuing education, centralized management mechanism which is the important part of mode (2), has many functions, such as management, running and so on. in addition to a few pilot institutions which establish ministry of education, continuing education or education development center as a management mechanism, the vast majority of the pilot colleges and universities establish the new school of continuing education or distance school of continuing education as a centralized management mechanism. Integration mode: gradually remove the original structure or dilute the brand. This kind of integration is relatively complete, but for different teaching institutions, in the way of integration is slightly different.

(1)while independently developed adult education, network education and training by sponsoring entity, the the functions department must be responsible for the continuing education of the school. the mode is mostly utilized by the famous university whose continuing education and advanced training development are very mature, such as Peking University. The settings of continuing education department of Peking University is shown in figure 3.

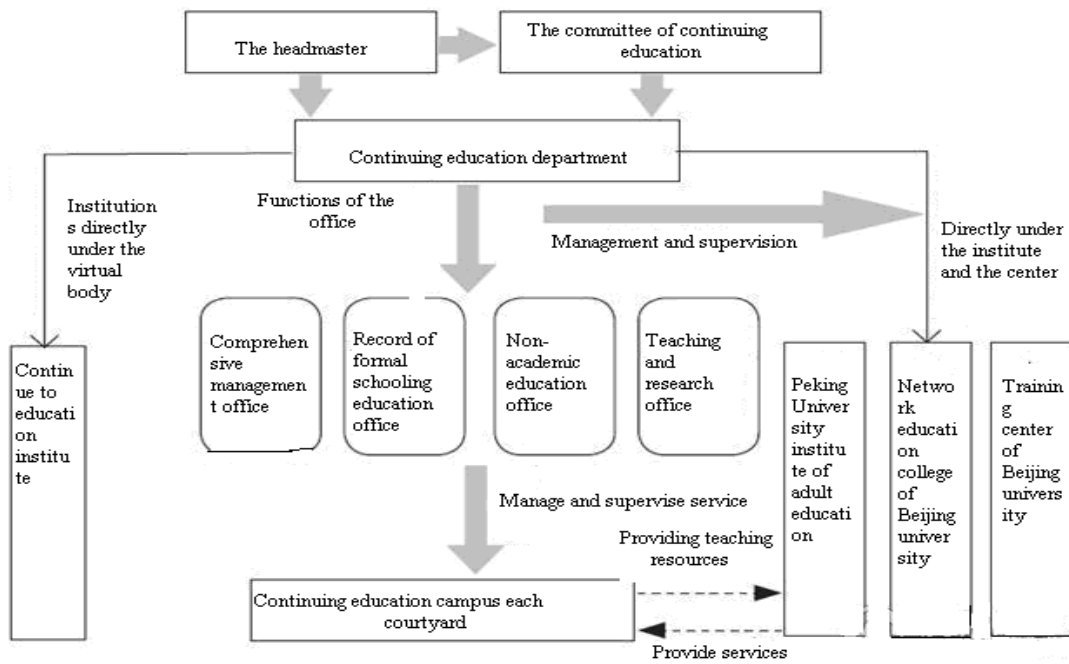


Figure 3 The Sets of Continuing Education Department of Peking University

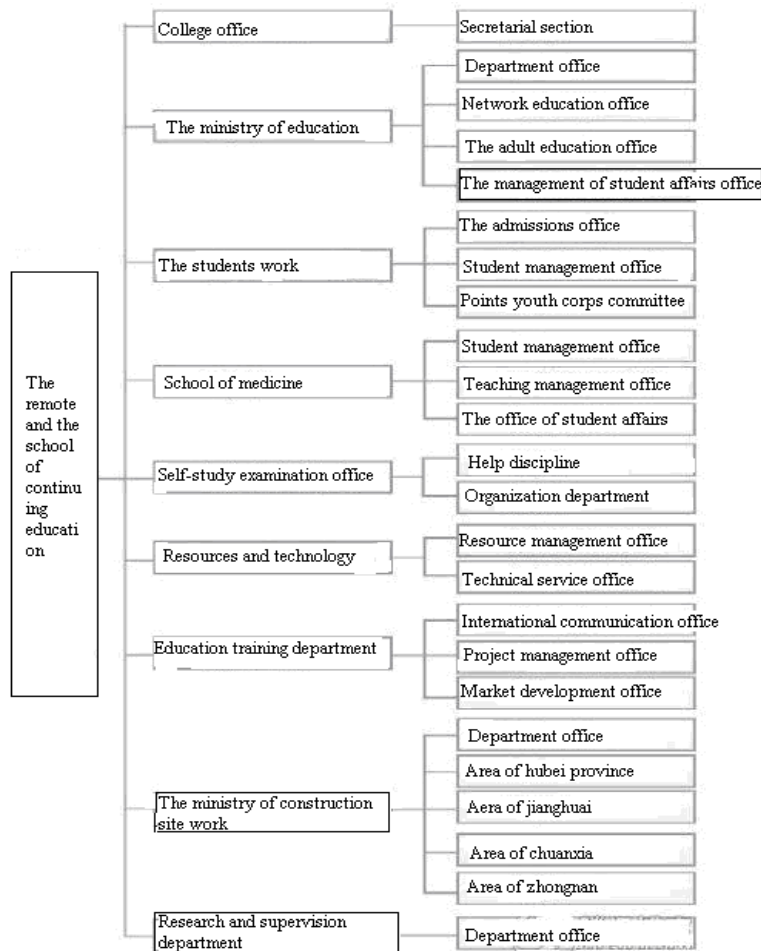


Figure 4 The Settings of Distance Continuing Education College of the Science and Technology University of Huazhong

(2)The settled department is fully opened, and set up according to the function, not according to the teaching form. Necessary department are these: the admissions department, the administration department, the resources and technology department, the student affairs department, the financial department and the office etc.. This mode is mainly used by college which is not only the management organization, but also sponsoring entity, and possesses multiple functions,such as the Science and Technology University of Huazhon. the settings of distance continuing education college of the Science and Technology University of Huazhon is shown in figure 4.

(3) in order to increase the competitiveness of the internal mechanism, to reduce the resistance when the merger the institutions, some college of education set up some operation department which is irrelevant and public support services department according to their own school form, such as the settings of continue education and teacher training department of Beijing Normal University(as shown in figure 5).

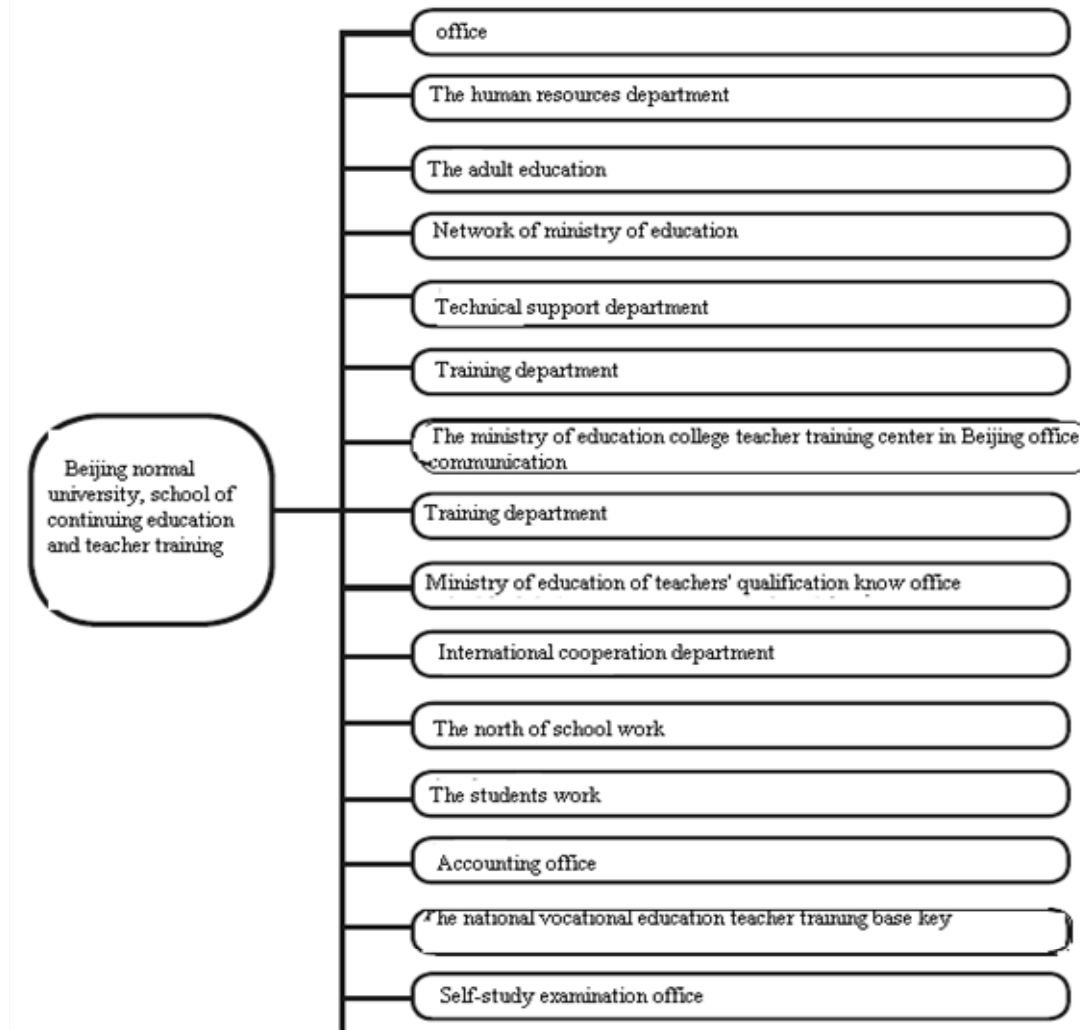


Figure 5 The Settings of Continue Education and Teacher Training Department of Beijing Normal University

2.2 Separate settings and operation situation

The set is mainly used in the network teaching, some college education and continuing education resource integration has not yet been implemented. This kind of academy is one of the best economic benefit departs, it is the main income-generating sector of the school and it owns good prospects for the development . The network institute possesses much power, such as the power of design and management of the teaching plan, organization, the power of independent management for all people, money in the academy, etc. Therefore, the network education institutions need set up more departments. For example, it sets up 10 distance education department in Zhengzhou University(as shown in Figure 6) .

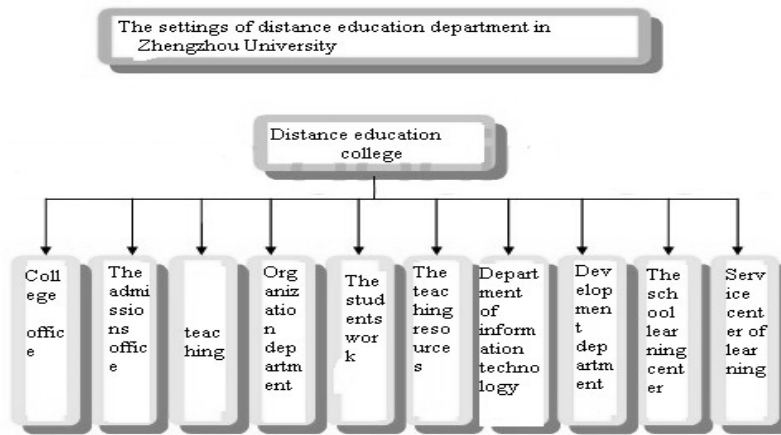


Figure 6 The Settings of Distance Education Department in Zhengzhou University

Generally speaking, some pilot college network education should make more efforts for the integration and centralized. The reason for this situation may have the following three: (1)the disorder that caused by the mode and operation mechanism; (2) there exists great differences in the aspect of resource integration and centralized because of the financial and personnel interests; (3) the original design institute may bring different degree of difficulty for the integration and centralized management. But whether from promote the sharing of resources or from the view of management, integration and management is an important content of constructing social service system of distance education.

3 Analysis the Management of the Social Service System Of Distance Education

Management of the social service system of distance education mainly adopts the management mode of vertical platform. Platform management mode’s goal is to provide and monitor the teaching and management support services; the core is to guarantee the quality of teaching; the guiding theory are modern education and management theory; forms are three virtual platform, organizations is the radio and television university organization system; behavior object is individual and collective behavior that is closely linked with the interests of distance education; the collaborative system is three plats- six programs - seven links. In general, the basic framework of modern distance education socialization service system management mode mainly includes the following three basic platform.

3.1The organization management platform

In this platform, the Central Radio and TV University forms complementary relationship with the open education service system, the provincial administration center as the central service system commissioned units, is mainly responsible for the management, supervision and inspection of the distance education project operation as well as the specific business behavior of the provincial learning center. Therefore, as for organization management platform area, the provincial administration center is very important, it is essential for the national distance education socialization service system, its exist is in relation to the construction of remote education socialization service system with Chinese characteristics. The framework of organization management platform is shown in figure 7:

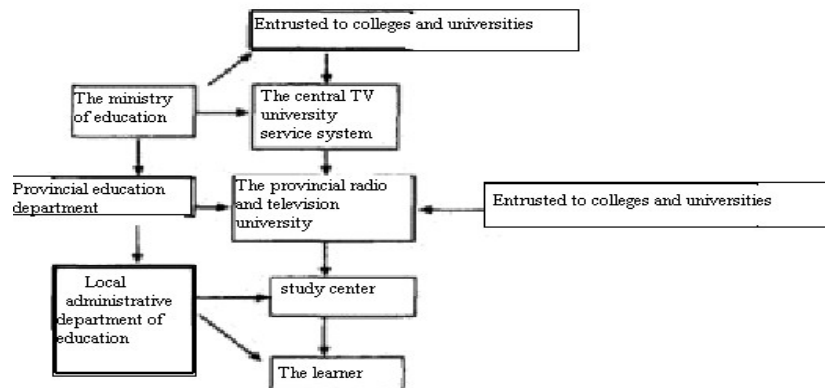


Figure 7 The Framework Diagram of Organization Management Platform

3.2 Resource integration platform

Resource integration mainly includes two aspects: curriculum resources and network resources integration. In this platform, distance education learning center is the learning center of the whole province socialization service, not just a pilot colleges and universities learning center; provincial RTVU can maximize their proper function, stimulate and promote the development of the whole service system. the framework diagram of the resource integration platform is shown in figure 8.

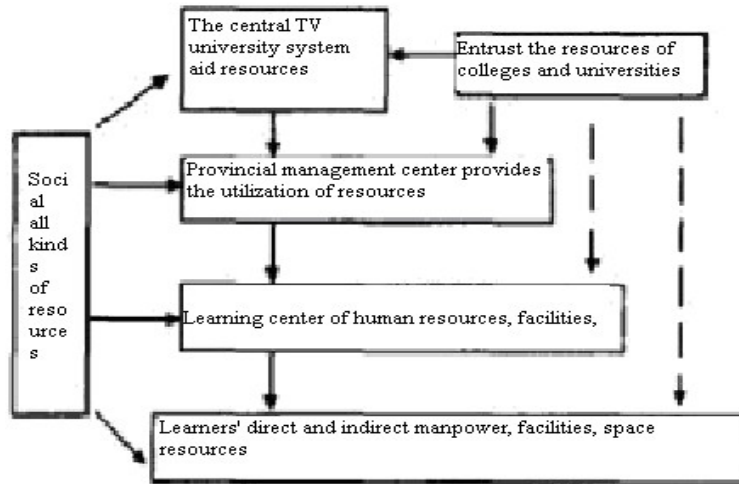


Figure 8 The Framework Diagram of the Resource Integration Platform

3.3 Quality testing platform

This platform mainly is to evaluate the operation quality of the social service system of distance education. As for evaluating the operation quality of distance education socialization service system, from the essence, it is to evaluate the value of distance education. From the principle of educational evaluation, educational evaluation types mainly include the following: student evaluation, curriculum evaluation, school evaluation, group evaluation, project evaluation, personnel evaluation. Therefore, to reach the standard requirements, evaluation of distance education value should also be carried with from the following three aspects: the learner, the service system and the teaching resources..The framework diagram of the quality testing platform is as shown in figure 9.

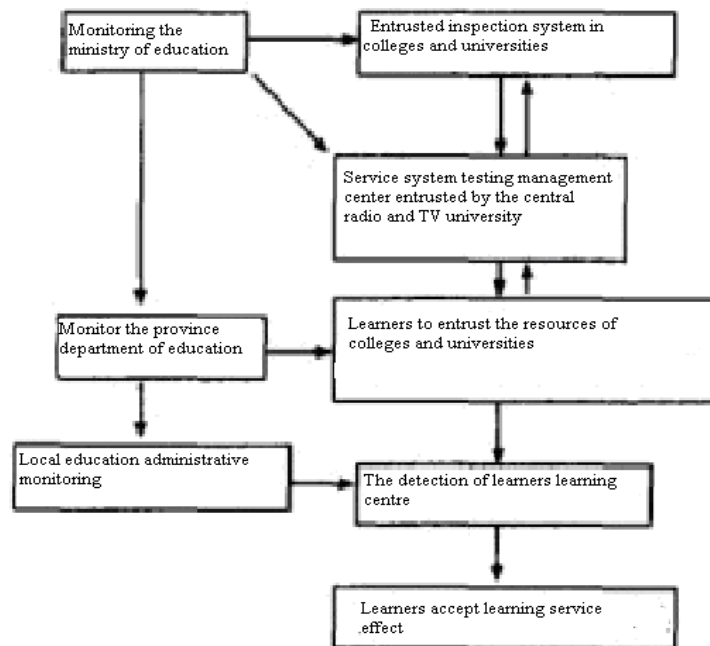


Figure 9 The Framework Diagram of the Quality Testing Platform

4 Several Problems of Deep Discussion for the Social Service System of Distance Education

4.1 The theoretical system of remote education socialization service system has not been established

Research on distance education socialization service system mainly includes the theory and reality. These two aspects are mutually independent, but are inseparable. Specifically, it is the bridge between China's distance education theory and operation level of distance education to construct the social service system. Lacking of reasonable construction methods will seriously affect the construction of distance education socialization service system. Practice has proved: the study on the social service system of distance education in our country has gone deep into the level of practical research, but the depth level needs to be improved.

4.2 The content that study on the social service system of distance education needs to be enriched and improved

It needs develop from the theory and application aspects to study the social service system of distance education. On the theoretical side, we should deeply study the relation between the development of RTVU System, or open education and social service system of distance education. On the application level, we should put the influence of the socialist market economic system on social management system of remote education into the category of the study, based on in-depth analysis of the influence, proposing the appropriate policy of playing a positive role, and eliminating or reducing the negative impact.

4.3 The lack of further discussion of related research of distance education socialization service system lack

In fact, the social service system of distance education involves many deep-seated contradictions and relations. Therefore, the majority of scholars should overcome the past all sorts of thinking, understand the significance of this system in essence within the opened vision, and put into action, contributing our own force for the comprehensive construction of social service system of distance education. For example, if the distance education market can't work normally, the problem we should further discuss are those: how to manage and monitor the socialized service system, how to achieve the service and guarantee the quality of service by relying on the chain management means, or how to improve the quality and efficiency of service through the rational allocation of resources.

4.4 Distance education socialization service comparisons need to be carried out

At present, research on distance education socialization service in China only stay in the domestic education sector. To learn advanced service concept and successful management experience from other countries or industry, and promote the sustained and healthy development of distance education in our country, it is necessary that make a comparison for our existing distance education socialization service system and foreign distance social education system or other industry service system. In fact, only in this way, can we not isolated study, find the gap, so as to put forward reasonable strategies to optimize service system.

5 Conclusion

Distance education is a new education mode, the "new" is mainly reflected in that they are relatively isolated between teachers and students, or students and students. With the driving of the progress and promote of distance education, it is very necessary to develop social service system of distance education. The construction of Chinese social service system of modern distance education is still in the experimental stage, and still exists a lot of problems. But it is inevitable. Within the in-depth development of the pilot, the distance education socialization service system will become more and more perfect and will constantly develop distance education in the direction of health

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Study on Performance Evaluation of University Teachers Based on P-O Fit

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Abstract: University teachers' level and motivation not only determines the quality of the training level in certain degree, but also has important implications on the development of university itself. Beginning with the analysis of performance evaluation theory, the paper studies the status and problems of university teachers' performance evaluation. Then it puts forward some suggestions to improve the performance evaluation system of university teachers. There will be a certain practical significance for the development of universities and personnel training.

Key words: Performance evaluation; University teachers; P-O fit

1 Introduction

Since reform and opening, China's market economic system has improved steadily, the influence of universities is also increasing in the whole society. But if the universities want to maintain their vitality and to achieve sustainable development, their managers should focus on improving the university management level and the overall efficiency, mobilize the creativity and enthusiasm of the staffs, and optimizing the management team and university teachers. Teachers are the subjects of higher education, and their level and motivation not only determines the quality of the training level in certain degree, but also has important implications on the development of university itself. Then it come to be more and more important to evaluate the university teachers performance.

2 Performance Evaluation for University Teachers

2.1 Performance Evaluation

Both domestic and foreign scholars have given their different definitions to performance evaluation. Ya Fu pointed out in his book "Performance Management" that performance evaluation is one of the core contents in modern human resource management system, it reflects the daily work of employees objectively and fairly through a series of evaluation indicators, aims to set a link between employees' daily work performance and their gains, and thus to mobilize the employees' maximize potential and to achieve a two-way development of both individuals and organizations. Performance evaluation can fully reflect the actual situation of a staff, and it's an important basis for their promotion and demotion, salary bonuses and benefits, training programs, career planning and recruitment planning, so it is essential to establish an effective performance evaluation index both for the organization and the staffs^[1].

Junqing Wu's view in his book "Performance Evaluation Theory and Methods: In the practice of scientific research institutions" is "performance evaluation refers to the process of identification, observation, measurement and development of human performance in organizations and it is an important management tool, it is connected with the four main functions of management, planning, organizing, directing and controlling, it's an important basis for the reward, promotion, training and dismissal in an organization, and especially the criterion in validity research of personnel selection^[2]."

Scholar Shuming Zhao pointed out in "Performance Management and Evaluation" that "Performance Evaluation refers to the process of measuring the behavior and results of the staff or the team, it is a process of using the past made performance evaluation system to compare and evaluate the employees' working performance within the evaluation cycle, and ultimately feed their performance evaluation results back to them^[3]."

Therefore, performance evaluation is an important part of enterprise management, and its effective implementation is good for the management and development of corporate human resource. In the context of university reforming era, the performance evaluation of teachers had to shift from a single assessment of the teaching quality to the direction of encouraging teaching and educating. Such shift can play a great guiding role in improving the quality of teaching and the level of scientific research, and also it is able to enhance the scientific research level of China's universities foundationally.

2.2 Performance Evaluation for University Teachers

University is a special organization which is different from enterprises, its nonprofit nature

determines its particularity in the introduction of performance management. In recent years, performance management has gotten into governments and other non-profit organizations such as school. The implementation of performance management in universities can improve the management level and the overall efficiency, mobilize the creativity and enthusiasm of staffs and optimizing the management team and university teachers, and have a great significance for the achievement of the universities' overall objective. The traditional management system for teachers can no longer meet the requirements of faculty development, how to digest and absorb the performance management for enterprise and use it in university is the chief thing that the administrators need to consider and resolve.

In his thesis "Research on Performance of College Teachers' Evaluation Index System", scholar Hefeng Pang noted that "Performance evaluation, is a one of the core concepts in management system of modern human resource, it's an important basis for the staffs' promotion and demotion, salary bonus and benefits, training programs, career planning and recruitment planning, otherwise it can link the employees' work and their income rationally and effectively. Meanwhile, in the process of performance evaluation, the evaluation indicators and evaluation criteria can also guide and control the work of the staffs. Performance evaluation is a realistic and face to face evaluation, although the process of revision and implementation is difficult, the implementation is a real need for organization and its employees^[4]."

Just as there are no two exact same leaves in the world, even performance evaluation has been widely used in enterprises, but when it's applying on universities, it has its own peculiarities because the difference in several basic elements of the evaluation, such as the evaluation subject, object, methods, and standards. Therefore, the introduction of performance evaluation should take teachers as a breakthrough.

Theodore H. Curry put forward three assumptions for performance evaluation of universities, including the teacher's independence and self-dominant, the teachers' expectations in the evaluation and the fairness in the evaluation process. Based on the above assumptions, Theodore H. Curry noted that the performance evaluation for university teachers can be divided into six parts. First, clear objectives, vision and values of the university; Second, fair workload and establishment of performance expectations and standards; third, teachers' professional growth plan based on the annual review; fourth, annual activity reports of teachers' self-summary and self-evaluation; fifth, the establishment of peer review committee which evaluate teacher performance; sixth, the written reports of the feedback process and the evaluation.

Teachers' performance evaluation is an important step in personnel management for universities, and also a key step for the modern management of colleges. when assessing the teachers' performance, we should not only evaluate the merits of their current status of work, but also be able to analysis, decide and solve the existed problems in reality, thus to achieve a virtuous cycle of personnel management.

2.3 Status and Problems of University Teachers' Evaluation

The status quo of teachers' performance evaluation in university is that their evaluation methods are too simple, and are basically the "index-quantify" mode and can be generally divided into three levels, including assessment advice for the university, for the college and for the department. This evaluation method is feasible and emphasizes on data quantification^[5]. Nevertheless, our performance evaluation for university teachers still has many problems, and there is a certain gap between the expected results and its implementation. First, due to the pursuit of a comprehensive index, the performance evaluation cannot make the focal points stand out, and it's over fined; Second, excessive pursuit of result data quantification does not exactly match the actual working conditions of teachers; Third, the performance evaluation system is single and cannot accurately reflect the professional characteristics of different specialized teachers^[6]. It's obvious that this method cannot well reflect the true performance output of university teachers.

2.3.1 Evaluation Objective problem

The performance evaluation for university teachers should not only aim at evaluating the working conditions of teachers, but also concerning the process of their work combined with the university's culture and its overall objectives. China's current performance evaluation system for teachers in universities focus too much on the results, while ignoring the process of monitoring, which can easily lead to university teachers mentally value quality over quantity, and this attitude is negative to the academic atmosphere as well as the country's education. On the other hand, teachers are often being seen as isolated individuals in the performance evaluation, therefore ignored the overall efficiency of the school as a whole.

2.3.2 Evaluation Indicators problem

The indicators of performance evaluation system for teachers are generally divided into qualitative

and quantitative, the majority of universities often perform the evaluation with a large number of quantitative indicators. In the actual work of university teachers, there are a considerable number of indexes that cannot be accurately measured by numeric. This has resulted in the over pursuit of quantitative data and cannot match with the teachers' actual work situation in current performance evaluation system for teachers. Although quantitative data can reflect the results of the evaluation clearly and directly, the authenticity behind the data remains to be considered.

2.3.3 Evaluation Period setting problem

China's current performance evaluation cycle is typically one year. This one-year evaluation period can improve the motivation of university teachers in some extent, and it plays a positive role in promoting the teachers to complete their teaching task. However, a considerable number of academic researches often take several years to truly complete, so the research has a deferred nature. The one-year evaluation period can easily lead to university teachers seek for quick success and instant benefits in academic and pursue short-term returns rather than long-term investment.

3 The Concept of P-O Fit

P-O Fit is short for Person-Organization Fit. Generalized Person-Organization Fit refers to "the consistent degree between the individual's traits, beliefs, values and the organization culture, policy requirements, norms and values" (Brdtz, Ash&Dreher, 1989). This concept comes from psychology, and gained long-term attention by scholars. At present, the international researches on P-O Fit generally use P-O Fit as the independent variable, while use the organizational commitment, organizational citizenship behavior, employee performance, job selection decisions, turnover intention, job satisfaction and organizational identification as the dependent variables, and to study its variation trends.

In 1991, Vancouver & Schmitt pointed out, after visiting principals and classrooms in more than 300 secondary schools, that if a common goal is formed between the superiors and subordinates as well as among the members, then it will play an active role in job satisfaction and organizational commitment, also in improving employees' performance level.

Bretz (1993) and Judge (1996) consider P-O Fit as an indicator to measure career success. Through research they found that P-O Fit affects the employee's career advancement and salary in certain extent. It can be seen that P-O Fit is closely related to the employees' performance.

2002, Kristorfetal pointed out in his study that in addition to Person-Organization Fit, person-job fit and person-team fit could also affect job satisfaction independently and significantly. At the same time, employees will assign different weights to the three fits based on their working experience, and the three fits in turn affects the employees' working attitude.

In 2005, SongqingZhu and WeizhengChen raised four types of fits between employees' value and organizational value, and these types take the value realization degree of the organization and the value of employees as two dimensions. Through research they found that the employees' satisfaction is upmost when the two dimensions are at a high level, meanwhile the employees' performance output increased in response, and the overall objective of the organization will be more easily achieved.

A combination of the above findings and the reality in schools prove that teachers-college fit affects performance output of university teachers. Therefore, in addition to evaluation of rewards and punishments, the teachers' development target should also be reflected in the performance evaluation in the process of introducing performance management in the universities, we also need to fit the target between the individuals and the university, therefore to improve the performance management evaluation system and balance the status quo of excessive pursue for data quantification in the existing evaluation system.

4 Views on Performance Evaluation of University Teachers Based on P-O Fit

4.1 Evaluation should reflect the unity of overall development objectives both for teachers and the school

Performance evaluation for university teachers should reflect the unity in overall development objectives both for teachers and the school, and combine the needs of individual teachers and the university, and to achieve the P-O fit. Such performance evaluation system can stimulate the enthusiasm of individual teachers and achieve the overall development of the school. Teachers participate in the performance evaluation, allowing them to better understand the school's development goals, and accordingly achieve the integration of goals between individual teachers and the school, and thus achieve the mutual improvement between teachers and universities.

4.2 Evaluation should reflect the dominant position of teachers

Teachers are the evaluated objects in traditional evaluation system, and it is difficult to bring out the teachers' initiative. The teachers' dominant position should be emphasized in the performance management and they should be given more power, the active participation of teachers would be helpful to the achievement of self-management and self-motivation, and make the management performance evaluation system to play its greatest role.

4.3 Evaluation should reflect the fusion of reward and punishment evaluation and development evaluation

Reward and punishment evaluation and development evaluation are not entirely opposed. British experience showed that the two evaluations have their own advantages and disadvantages, they should learn from each other, integrate mutually, and find their meeting point. When making a management performance evaluation system, it is necessary to set development as the chief goal and set punishment and reward as a method, it is one-sided to focus only on one of them.

4.4 Pay attention to the use of the evaluation results in the evaluation process

Current evaluations for university teacher are mostly reward and punishment evaluation mode. This evaluation results should be improved in two aspects. The first one is oriented by the "teacher development", that is to highlight the teacher's development in a motivation way and lessen incentives in the current evaluation system, the second is to consolidate the university spirit of "free academic, professors rule", reshaping the atmosphere of academic and respect for teachers.

Thus it can be seen that a rational and scientific performance evaluation system for university teachers can objectively and accurately evaluate the performance of university teachers, which have an outstanding academic significance and show off significance to modern management of universities both in the theory side and practical side. A rational and scientific performance evaluation system for university teachers can optimize the allocation of the university's human resource, and can improve the school's overall efficiency and achieve its overall goals from the overall situation by encouraging university teachers.

5 Conclusions

As an important part of performance evaluation management for university, the evaluation of teachers should meet the goal of promoting the development of universities by encouraging university teachers' enthusiasm and creativity. University administrators should make a good use of performance evaluation to achieve the overall management of the teachers' work. Current performance evaluation systems in our universities have an excessive pursue for quantitative data, and ignored the teacher's personal development and the school's overall development. Based on which, this paper start the discussion from the perspective of P-O fit, pointed out some management issues that should pay attention to in performance management of university teachers. Use performance evaluation to find the shortage in teachers' work, and make improvement plans that suited to each professional teachers according to their different characteristics, thus to meet the teachers' individual needs and achieve the overall development of the school. The combination of reward and punishment evaluation would, to a certain extent, eliminate the situation of which the teachers are passive and inactive in the evaluation process, university teachers in the evaluation process passive situation, and can mobilize the creativity and enthusiasm of teachers to achieve the overall objectives of the university.

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An Empirical Analysis on Impacts of College Students' Internship on Their Innovating and Business-Starting Incentive

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Abstract: Based on sample data of questionnaires in universities of Jiangxi Province, the paper applies descriptive statistics to analyze 13 factors of 4 types of college students' internship on their innovating and business-starting incentive, and then tests it with quantitative model. The results shows that students' personality type, characters of internship posts, training practical ability, earning living expense and other internship motivations are major factors affecting college students' innovating and business-start incentive. Finally, the paper puts forward practical policies and suggestions to push forward campus innovation and business start.

Key Words: Internship; Innovation and Business-start; Empirical Analysis; Probit Model

1 Introduction

Universities' internship is students' practicing base of innovation and business start. It is catalyzer, training field or simulation laboratory of students' independent business-start and thus is of significance for universities' business-start education and students' independent business-start. Therefore, research on impacts of students' internship on their innovating and business starting is of both theoretical and practical significance. This paper is intended to study students' innovating and business starting incentive by descriptive statistics and quantitative model, hoping to provide a theoretical base for the country to make efficient and effective policies.

2 Data and Descriptive Statistics

2.1 Fundamental Conditions of Samples

From Feb. 2012 to May 2012, 11 universities in Jiangxi Province including Nanchang University and Jiangxi Agricultural University are selected to undertake questionnaire investigation of random sampling. The questionnaire is designed to investigate 4 respects such as internship characters, college students' innovation and business start character, personalities and students' knowing of the country's and university's policies about students' internship. Until the middle of May, 2012, through investigator's face to face interview with students, 328 effective questionnaires were finished and used for research.

2.2 Selection of Factors

According to Luo Xiaofang, Cui Ningning and others' related research achievements and qualitative experience, the paper selects 13 factors of 4 types to study students' innovating and business starting incentive. They are (1) Internal factor: personalities including gender, party membership and personality type; (2) External factor: internship nature including internship place and internship character; (3) Internal factor: internship motivation character including training practising ability, earning living expense, spending spare time, mass following, increasing social experiences and laying a base for future business, and (4) Internal factor: knowing the country's and university's policies about students' internship.

2.3 Analysis of Discriptive Statistics

Table 1 lists results of analysis of discriptive statistics.

Table 1 Iscriptive Statistics of Factors of Internship Affecting Students' Innovation and Bsiness-Start (%)

Factors		Students' Innovating and Business-starting Incentive (n=157)				
		Very unwilling (n=6)	Unwilling (n=8)	Average (n=31)	Willing (n=83)	Very willing (n=29)
Gender	Female	33.3	50.0	51.6	38.6	34.5
	Male	66.7	50.0	48.4	61.4	65.5
Communist Party Membership	No	66.7	75.0	77.4	75.9	93.1
	yes	33.3	25.0	22.6	24.1	6.9
Personality Type	Conservative	0.0	37.5	25.8	16.9	0.0

	neutral	100.0	50.0	71.0	75.9	79.3
	Adventurous,	0.0	0.0	3.2	7.2	20.7
Internship Place	On campus	50.0	62.5	61.3	42.2	58.6
	Out of Campus	50.0	37.5	38.7	57.8	41.4
Internship Character	Temporary Post	100.0	50.0	54.8	49.4	31.0
	Fixed post	0.0	50.0	45.2	50.6	69.0
Training Practical Ability	Very Disagreeing	33.3	12.5	6.5	4.8	3.4
	Disagreeing	16.7	0.0	3.2	6.0	0.0
	Average	16.7	12.5	12.9	9.6	0.0
	Agreeing	33.3	50.0	58.1	53.0	37.9
	Very Agreeing	0.0	25.0	19.4	26.5	58.6
Earning Living Expense	Very Disagreeing	16.7	0.0	0.0	1.2	13.8
	Disagreeing	0.0	0.0	0.0	12.0	17.2
	Average	16.7	25.0	35.5	30.1	17.2
	Agreeing	50.0	62.5	51.6	42.2	51.7
	Very Agreeing	16.7	12.5	12.9	14.5	0.0
Spending Spare Time	Very Disagreeing	0.0	12.5	0.0	2.4	24.1
	Disagreeing	50.0	0.0	22.6	34.9	31.0
	Average	50.0	37.5	48.4	38.6	27.6
	Agreeing	0.0	25.0	25.8	24.1	17.2
	Very Agreeing	0.0	25.0	3.2	0.0	0.0
mass-following	Very Disagreeing	0.0	0.0	12.9	9.6	31.0
	Disagreeing	0.0	37.5	16.1	41.0	34.5
	Average	33.3	25.0	58.1	28.9	20.7
	Agreeing	50.0	25.0	12.9	16.9	13.8
	Very Agreeing	16.7	12.5	0.0	3.6	0.0
Increasing Social Experiences	Very Disagreeing	0.0	0.0	3.2	1.2	3.4
	Disagreeing	0.0	0.0	6.5	0.0	6.9
	Average	0.0	25.0	19.4	10.8	0.0
	Agreeing	66.7	50.0	54.8	67.5	31.0
	Very Agreeing	33.3	25.0	16.1	20.5	58.6
Laying a Foundation for Future Business	Very Disagreeing	16.7	0.0	6.5	1.2	6.9
	Disagreeing	50.0	12.5	12.9	3.6	6.9
	Average	0.0	25.0	22.6	25.3	37.9
	Agreeing	16.7	37.5	45.2	47.0	48.3
	Very Agreeing	16.7	25.0	12.9	34.9	48.3
Knowing National Policy of innovation and Business-start	Very Disagreeing	66.7	25.0	16.1	10.8	13.8
	Disagreeing	33.3	50.0	48.4	55.4	44.8
	Average	0.0	25.0	35.5	27.7	24.1
	Agreeing	0.0	0.0	0.0	6.0	6.9
	Very Agreeing	0.0	0.0	0.0	0.0	10.3
Knowing Univerasity's Policy of innovation and Business-start	Very Disagreeing	16.7	12.5	25.8	8.4	24.1
	Disagreeing	33.3	50.0	41.9	56.6	37.9
	Average	50.0	25.0	25.8	25.3	27.6
	Agreeing	0.0	12.5	6.5	9.6	3.4
	Very Agreeing	0.0	0.0	0.0	0.0	6.9

3 Construction of Model

3.1 Definition of Variables

On the basis of analysis of descriptive statistics, to prove factors' impacts, a quantitative model is necessary to be constructed. Before model construction, the research subject – college students' innovating and business starting incentive and its 13 factors must be defined as follows in Table 2.

Table 2 Definition and Prediction of Related Variables

Variables	Symbol	Definition of Variables	Prediction
Innovating and Business-starting	Y	Very unwilling=0; Unwilling=1; Average=2; Willing=3; Very Willing=4	
Gender	X ₁	Female=0;Male=1	+
Communist Party Membership	X ₂	No=0;Yes=1	-
Personality Type	X ₃	Conservative=0;Neutral=1;Adventurous=2	+
Internship Place	X ₄	On Campus=0;Out of Campus=1	+
Internship Character	X ₅	Temporary Post=0; Fixed post=1	+
Training Practical Ability	X ₆	Very Disagreeing=0; Disagreeing=1; Average=2; Agreeing=3; Very Agreeing=4	+
Earning Living Expense	X ₇	Very Disagreeing=0; Disagreeing=1; Average=2; Agreeing=3; Very Agreeing=4	-
Spending Spare Time	X ₈	Very Disagreeing=0; Disagreeing=1; Average=2; Agreeing=3; Very Agreeing=4	-
mass-following	X ₉	Very Disagreeing=0; Disagreeing=1; Average=2; Agreeing=3; Very Agreeing=4	-
Increasing Social Experiences	X ₁₀	Very Disagreeing=0; Disagreeing=1; Average=2; Agreeing=3; Very Agreeing=4	+
Laying a Foundation for Future Business	X ₁₁	Very Disagreeing=0; Disagreeing=1; Average=2; Agreeing=3; Very Agreeing=4	+
Knowing National Policy of innovation and Business-start	X ₁₂	Very Unknowing=0; Unknowing=1;Average=2; Knowing=3; Very Knowing=4	+
Knowing Univerasity's Policy of innovation and Business-start	X ₁₃	Very Unknowing=0; Unknowing=1;Average=2; Knowing=3; Very Knowing=4	+

3.2 Construction of Model

The explained variable is Students' Innovating and Business-starting Incentive. According to related definition, a rank-based model may be adopted for research. First, a linear model of potential variable y_i^* with explaining variable X_i as follows:

$$y_i^* = \mathbf{x}_i \boldsymbol{\beta} + \mu_i$$

Where potential variable y_i^* is considered as “benefit” of college students' innovation and business start; explaining variable X_i are factors affecting students' innovating and business starting incentive; $\boldsymbol{\beta}$ is the predicted coefficient of factor model. If knowing the observed value of students' innovating and business starting incentive y_i (i=0, 1, 2, 3, 4), then the observed value y_i is defined according to potential variable y_i^* by the following rule:

$$y_i = \begin{cases} 0, & \text{if } y_i^* \leq \gamma_1 \\ 1, & \text{if } \gamma_1 < y_i^* \leq \gamma_2 \\ \vdots & \vdots \\ 4, & \text{if } y_i^* > \gamma_4 \end{cases}$$

To make observed variable y_i match up with potential variable y_i^* , suppose if $y_i^* < y_j^*$, then $y_i < y_j$. Suppose cumulative distribution function F of u_i is logistic distribution, then the probability of observed value y_i is decided as follows:

$$\Pr (y_i = 0 | \mathbf{x}_i, \boldsymbol{\beta}, \gamma) = F(\gamma_1 - \mathbf{x}_i \boldsymbol{\beta}) = \frac{1}{1 + e^{\mathbf{x}_i \boldsymbol{\beta} - \gamma_1}}$$

$$\Pr (y_i = 1 | \mathbf{x}_i, \boldsymbol{\beta}, \gamma) = F(\gamma_2 - \mathbf{x}_i \boldsymbol{\beta}) - F(\gamma_1 - \mathbf{x}_i \boldsymbol{\beta}) = \frac{1}{1 + e^{\mathbf{x}_i \boldsymbol{\beta} - \gamma_2}} - \frac{1}{1 + e^{\mathbf{x}_i \boldsymbol{\beta} - \gamma_1}} \quad \dots \dots$$

$$\Pr (y_i = 4 | \mathbf{x}_i, \boldsymbol{\beta}, \gamma) = 1 - F(\gamma_4 - \mathbf{x}_i \boldsymbol{\beta}) = 1 - \frac{1}{1 + e^{\mathbf{x}_i \boldsymbol{\beta} - \gamma_4}}$$

4 Results of Model

According to Stata 11.0, results of Empirical Model are as listed in Table 3.

Note:***, ** and * respectively show that z is notable at level of 1, 5 and 10.

Table 3 Results of Empirical Model

Variables	Symbol	Coef.	Std. Err.	z	P>z
Innovating and Business-starting	X ₁	0.125	0.354	0.35	0.725
Gender	X ₂	-0.400	0.423	-0.94	0.345
Communist Party Membership	X ₃	1.161***	0.358	3.25	0.001
Personality Type	X ₄	0.080	0.332	0.24	0.809
Internship Place	X ₅	0.718**	0.349	2.06	0.040
Internship Character	X ₆	0.446**	0.185	2.41	0.016
Training Practical Ability	X ₇	-0.709***	0.203	-3.5	0.000
Earning Living Expense	X ₈	-0.408**	0.190	-2.14	0.032
Spending Spare Time	X ₉	-0.334*	0.178	-1.88	0.061
mass-following	X ₁₀	-0.074	0.251	-0.29	0.769
Increasing Social Experiences	X ₁₁	0.674***	0.213	3.16	0.002
Laying a Foundation for Future Business	X ₁₂	0.517**	0.240	2.15	0.031
Knowing National Policy of innovation and Business-start	X ₁₃	-0.231	0.211	-1.1	0.273
LR chi2(13) =82.4	/cut ₁	-2.688	1.063	—	—
Prob > chi2=0.0000	/cut ₂	-1.468	0.998	—	—
Log likelihood =-154.373	/cut ₃	0.355	0.986	—	—
Pseudo R ² =0.2107	/cut ₄	3.816	1.044	—	—

From results of Table 3, the prediction of the model is good as as whole, while R2=0.2107 which issomewhat small but still reasonable for research on impacts of internship on students’ innovating and business starting incentive. As for notability of factors, of personalities, only personality type is notable; of internship character, only internship post character is notable; of internship motivation, training practising ability, earning living expense, spending spare time, mass following and laying a base for future business are all natable; of knowing the country’s and university’s related policies, knowing of the country’s policy is natable.

5 Conclusion

According to the above research, policy recommnedations are made as follows: (1) increase fixed posts of internship; (2) cultivate students’ initiative to participate in internship and lead them to innovate and start business; (3) upgrade work- study education to improve students’ quality; and (4) enhance propaganda of campus innovation and business start to heighten campus innovation and business start consciousness.

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Research on the Relationship Between FDI and Labour Income in China

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Abstract: Based on the previous researches, this paper clarifies the influential mechanism of FDI on the income of labors. From the aspects of overall trend and regional differences trend, we conclude some information about the current status of China's income of labors. The proportion of the income of labors to GDP has gone through a process of declining after increasing during the period of 1993 to 2010. From three different perspectives, which are convergence, absolute difference and relative difference, we find that there exist significant differences of the share of the labors income in different areas. Establishing an econometric model based on the panel data of eastern area, central area, and west area from 1993 to 2010, we find that FDI has a significant role in promoting the share of labors income reduction.

Key words: FDI; Labour income; Reform and opening of China; Panel data regression

1 Introduction

Since the reforming and opening up, China's increasing openness, FDI level has been an objective of development, on the other hand, since the 1990s there has been a gradual decline in workers income phenomenon, in fact, a declining share of labour remuneration may cause a series of serious economic and social problems. The shares of labor income issues have been widespread concern in the current society.

Chinese government needs to, relying on the concerted efforts of all the Chinese people and based on economic and social development, step up efforts to develop institutions that are vital to ensuring social fairness and justice; establish in due course a system for guaranteeing fairness in society featuring, among other things, equal rights, equal opportunities and fair rules for all; and foster a fair social environment and ensure people's equal right to participation in governance and to development.

2 Literature Reviewing

After the 1980s, many scholars found that labour income share of some developed countries are decreasing (Blanchard, 1997; Harrison, 2002; Guscina, 2006). Bruno and Paul (2008) used 1980-2000 data of 94 developing countries; empirically finding that capital-output ratio of the labor share of income effect is positive but not significant. Bentolina and Saint-Paul (2003) found that, the capital-output ratio of the labor income share is significantly negative impact in OECD countries. And the elasticity of substitution is equal to 1.06. Rodrik (1997) was convinced that the accelerating trend of economic globalization and trade openness gives more capital than labor mobility, increased mobility of capital to gain more profit opportunities outside, the owners of capital corresponding bargaining power of workers improve workers wages is maintained at a low level, so that the labor income share continued to decline. Harisson (2002) estimated that between 1993 and 1996 in developing countries experienced at least 0.3% average decline in the labor share of income, while FDI flows from developed countries to developing countries on a scale of at least \$ 20 billion, and its ensuing two empirical analysis of economic phenomena is certainly a negative correlation exists between the theoretical expectations, and that globalization is hidden in the labor income share of FDI to developing countries, the negative effects of the deep-seated reasons behind. Decreuse and Maarek (2007) that the share of FDI on the impact of labor income has a "technical rented effect" and "wage competition effect" two aspects.

Domestic scholars' study shows that the impact of FDI on labor income is significantly negative. Luo Changyuan (2009), Li Lei (2012) found that FDI is not the main factor of the improvement of labour income share. And the increasing share of workers income is not conducive to attracting foreign investment. Bai Chong-En (2008) used 1998-2005 data of industrial enterprises above designated size to calculate the elements of China's industrial sector allocation. He thinks that factor income share of industrial sector mainly due to changes in the product market monopoly and state sector increased reform of the labour market caused by changes in the environment.

3 The Status of the Labour Income in China

3.1 The Analysis of the Labour Income Share of the Overall Trend

As can be seen from Table 1, from 1993 to 2010 period, China's share of income from workers compensation law domestic product (GDP) growth experienced decreased significantly after the first procedure. In 1993 the ratio was 0.506688, and 1998 overall upward trend may be due to non-wage income of wage reform makes wages gradually being included, while agricultural price increase. But since 1998, the remuneration of employees' income approach GDP ratio continued to decline began, to 2007 only 0.397397.

Table 1 The Labour Income and the GDP During 1993 to 2010 in China

year	Labour income	GDP	ratio
1993	17332.81	34208.07	0.506688
1994	23217.82	45395.69	0.511454
1995	30453.77	57632.78	0.528411
1996	36622.20	68584.30	0.533974
1997	40628.24	76956.61	0.527937
1998	43988.95	82780.25	0.531394
1999	45926.43	87671.13	0.523849
2000	49948.20	97209.37	0.513821
2001	54934.80	106766.26	0.514533
2002	60099.40	118020.69	0.509228
2003	67260.69	135539.14	0.496246
2004	71254.50	166875.50	0.426992
2005	81888.02	197789.03	0.414017
2006	93822.83	231053.34	0.406066
2007	109532.27	275624.62	0.397397
2008	123542.20	324523.60	0.380688
2009	170299.71	365303.69	0.466187
2010	183541.20	421253.60	0.435702

Resources: China Statistical Yearbook

3.2 The Analysis of the Differences of the Labour Income in Different Areas

Table 2 shows the results of the σ convergence analysis, the absolute difference analysis, and analysis of the relative differences. As can be seen, before 2001, there did not exist σ convergence. While since 2001, there exists the σ convergence and the differences in workers income decreases. The absolute difference analysis showed that the absolute difference in remuneration of workers in the expanding; the relative difference analysis showed the relative differences in workers income first increases and then decreases to 2001 for the sector. To some extent, workers income is the difference between observed trends in the absolute gap increases, the relative gap decreases.

Table 2 The Differences of the Labour Income in Different Areas

year	σ index	Range	Standard deviation	Relative to the average deviation	Max/min	CV
1995	0.1196	1546.7564	778.6354	0.1042	1.3391	0.1474
1996	0.1265	1828.0385	914.8403	0.1042	1.3616	0.1527
1997	0.1397	2166.0897	1085.1182	0.1177	1.4080	0.1708
1998	0.1525	2699.1410	1361.8842	0.1342	1.4509	0.1884
1999	0.1606	3180.7179	1607.2007	0.1421	1.4797	0.1987
2000	0.1718	3794.5128	1904.6769	0.1468	1.5229	0.2103
2001	0.1733	4404.1538	2202.9597	0.1407	1.5262	0.2077
2002	0.1682	4846.0641	2430.5399	0.1391	1.5042	0.2001
2003	0.1642	5385.9615	2693.4056	0.1330	1.4934	0.1975
2004	0.1573	5915.1795	2957.7121	0.1275	1.4693	0.1902
2005	0.1438	6216.0897	3148.2682	0.1283	1.4189	0.1783
2006	0.1362	6621.4872	3352.9288	0.1215	1.3931	0.1689
2007	0.1219	7099.6282	3553.5962	0.1018	1.3480	0.1490
2008	0.1232	8542.2821	4282.3256	0.1046	1.3520	0.1510
2009	0.1132	8552.6538	4295.7088	0.0975	1.3188	0.1392
2010	0.1071	9195.0641	4668.1972	0.0961	1.2965	0.1328

4 Empirical Analysis

We establish the panel data model as follows to analyze the relationships between the FDI and the labour income empirically.

$$income_{it} = \alpha_{it} + \beta_{it} FDI_{it} + \gamma_{it} Z_{it} + \varepsilon_{it}$$

Z is the control variable, which contains the economic growth and the education level. And the Hausman test shows that we should use the fixed effect model to solve this model. And after calculating the value of F1 and F2, we are convinced that we should use the Varying Coefficient Model.

$$F_1 = \frac{(S_2 - S_1) / [(N-1)k]}{S_1 / (NT - N(k+1))} \sim F[(N-1)k, N(T-k-1)]$$

$$F_2 = \frac{(S_3 - S_1) / [(N-1)(k+1)]}{S_1 / (NT - N(k+1))} \sim F[(N-1)(k+1), N(T-k-1)]$$

Table 1 The Results of the Empirical Analysis

Variable	Coefficient	Std.Error	t-statistic	Prob
C	2.3868	0.3132	7.6210	0.0000
EAST-EDU	0.1272	0.0282	4.5077	0.0001
MID-EDU	0.1995	0.0286	6.9866	0.0000
WEST-EDU	0.1924	0.0502	3.8361	0.0005
EAST-ECO	1.1719	0.0919	12.7453	0.0000
MID-ECO	0.7444	0.1112	6.6586	0.0000
WEST-ECO	1.1431	0.1750	6.5323	0.0000
EAST-FDI	-0.5077	0.0996	-5.0974	0.0000
MID-FDI	0.0380	0.1056	0.3600	0.7209
WEST-FDI	-0.5040	0.1623	-3.1064	0.0037

The results show that, the coefficient of the MID-FDI-MID doesn't pass the t-test, while the other variables' coefficients are significant. As we focused on the impact of the FDI on labour income, we can draw a conclusion that in the eastern and western regions FDI has a significant negative role in the labour income and the effect values are -0.507722 and -0.504033, which means the FDI can accelerated the labour income gap in these areas.

5 Conclusions

We can draw some conclusions as follows based on the analysis above.

(a) The absolute gap of the income distribution in the three regions increased year by year. The relative gap trend the inverted U curve. And the σ convergence analysis shows that the income gap between regions 1995-2001 satisfied σ convergence. While during the 2001-2010, the income gap has σ convergence trend.

(b) FDI has a significant role in declining the share of the labour income. And also the difference of the economic growth and the education level in different areas expand the income gap.

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Study on Honesty-Credit Evaluation System of College Students in China

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Abstract: The paper is based on the obvious performance of college students lacking credibility, such as cheating in the examinations, credit default and lack of honesty-credit in life and employment during the selection of the various acts, which already severely influence the public impression on college. So it has become imperative how we evaluate the situation of college students and keep timely feedback and correct discreditable behavior. Above all, the paper is about to build integrity evaluation and integrity files as well as the punishment for losses of the discipline as one of the college students' credit evaluation system to enhance the effectiveness of Honesty Education.

Key words: University student; Honesty-Credit; Evaluation system; Construction

1 Introduction

Honesty, the basic contents of the civic and moral education is the traditional virtue which is rooted in the history of human being. Honesty has an immeasurable impact on the development of the society, in the integrity of the social and economic value of the new economic era. However, the credit crunch is prevalent in many areas of social life in recent years, and also continues to affect and erode the soul of the college students, hindering the formation of good moral character of the college students. Therefore, how to evaluate students' credit timely feedback and put right the students' acts of dishonesty have become imperative.

Many overseas developed countries have attached great importance to the integrity education of college students. Taking the United States, Germany, United Kingdom, and Japan for example, they have accumulated a great amount of successful experience we can learn from, such as the German Moral Education of multi-disciplinary, multi-level integrity of College Students, and the education of integrity in Japan almost throughout all their life. And they almost make all use of the mass media and religion in Honesty Education.

In China, honesty education has been concerned by the theory and practice of community; many scholars claim to take measures for the construction of social credit environment, the integrity of the legal system, education, moral education and teachers' moral qualities of integrity. Quoting the available research, it can be concluded that theorists are more concern about studying the integrity issues, while fewer experts keep their eyes open on studying the integrity of the evaluation.

In this paper, the reconstruction of integrity is to great extent guaranteed with cogent system and favorable conditions instead of merely individual morality. Profoundly speaking, the honesty-credit evaluation system of college students, consisting of established credit system and corresponding awards and penalty is playing a key role. Along with dogmatic education, the worthwhile evaluation system should be constructed, integrating integrity evaluation, credit files and discipline, which is beneficial for uniting integrity with self-discipline and heteronomy.

First of all, it strengthens effectiveness of integrity education. The content and form of current college education are less than systematic and always expound knowledge mechanically, which is said to be in lack of persuasion. On the other hand, the fresh evaluation system, centralized on integrity infuses the education objectivities into students' daily behaviors, finally strengthening its effectiveness because of the honest atmosphere and the explicit theme of education.

Secondly, it restrains behavior of college students. In daily life, owing to the defective yard stick of integrity assessment, the majority of students are apt to indulge themselves totally regardless of those behavior rules. For this reason, through the regulations on study or work is the construction of the newly established system able to help students recognize their words and actions, then pick up what the society advocates and forsake the bad habits, more importantly, only by this can they cultivate good habits and improve comprehensive quality.

In the end, it ensures scientificness of the evaluation. In the implementation of this modified system, the qualitative and quantitative methods will be adopted to quantify students' behavior and then qualify their scores. This process will ensure students' integrity degree to be objective and accurate and

the result is the authentic reflection of their integrity. In the terms of authorities, this system is of great significance to let them informed of students' specific performance and then they will be offered particular assistance.

2 Organization and Implementation of the Honesty-credit Evaluation System

The evaluation system contains the integrity commitment of university students in school, together with the honesty files and integrity evaluation, which is the comprehensive evaluation and assessment system of college students' personal credit. How to implement it can be referred to the comprehensive evaluation of the college student. Firstly, the leading agency designated by Student's Affairs Department is in charge of formulating the integrity evaluation of the whole school system in order to perfect the management and process supervision. Secondly, faculties are supposed to establish working groups to take specifically charge of the implementation of the department's work.

2.1 Establish and perfect college students' credit files

The most important part of college students' credit evaluation system is college students' credit files. Based on their credit situation, students' personal credit file can know well of the integrity of the state of the students promptly so that they can make recording mechanism more perfect and effective. If so, the contents of the college students' credit file records can become the basis for evaluation of the integrity evaluation system.

College students' credit files include: individual letter of commitment, students basic information (including name, birthplace, state of health, family background, etc.), integrity of information in Learning (including academic performance, homework completion, the examination), integrity of information in Economic (including the repayment of student loans, credit card repayment, etc.), integrity of information in Employment (including whether students on employment offer a variety of real information). Students must sign on in the letter of commitment as soon as they get the file, fostering the establishment of the concept of integrity.

2.2 Establish the feasible integrity evaluation system

Based on the credit file, we can classify the state of the integrity of students into different levels and set up quantitative assessment of operational standards and establish credibility evaluation system. At the beginning of each school year, students can get their credit file. After filling out their basic personal information and signing in the letter of commitment, they will get the integrity of 100 basis points.

2.2.1 The evaluation index

According to the result of an investigation of Wuhan University of Technology in China, it can be concluded that the basic indicators for the evaluation of the integrity of elements are learning, economic, the integrity of life, employment; then clarify the integrity evaluation system at all levels of indicators and set different levels of standards in order to reference position on each indicator; Finally, choose the way of the integrity evaluation by students' self-evaluation, peer assessment, teacher appraisal. In this way, we can assess the integrity of the situation of students in the past and present, and record the results in the students' personal credit file. The specific operation is shown below:

Table 1

The evaluation index	Score standard	score	aimed score	self-evaluation	peer assessment	teacher appraisal
1.Learning information integrity (20')	1.1 learning attitude diligent	A10 B8 C5 D3	10			
	1.2 complete job and papers independently, no cheating	A5 B3 C2 D0	5			
	1.3 compliance with the examination rules, no entrainment	A5 B3 C2 D0	5			
2.Economic integrity (30')	1.1 honesty economic situation of the family, no false information,	A10 B8 C5 D3	10			
	1.2 strict compliance with the provisions of national student loans and repay on time	A10 B8 C5 D3	10			
	1.3 timely payment of the tuition and fees, no malicious default	A10 B8 C5 D3	10			

3.Life integrity (20')	1.1 keep their promise when socializing with people	A5 B3 C2 D0	5			
	1.2 abide by social morality, be helpful, returning lost money	A5 B3 C2 D0	5			
	1.3 truthfully inform others the physical health	A10 B8 C5 D3	10			
4.Employment integrity (30')	1.1 truthfully fill out the resume, no fraud	A10 B8 C5 D3	10			
	1.2 conscientiously fulfill the employment contract, no unprovoked breach of contract	A10 B8 C5 D3	10			
	1.3 legitimate and proper behavior in the competition	A10 B8 C5 D3	10			

Note: The grading standards for documentary assessment score, combined with the actual performance of students (including grade A, grade B, grade C, grade D).

A means doing well about the requirements described in the scoring criteria;

B means reaching the requirements described in the scoring criteria, except some aspect;

C means basically reaching the requirements described in the scoring criteria;

D means not reaching the basic requirements in the scoring criteria in many ways.

2.2.2 Evaluation methods

On the premise that the above requirements are observed, more practical evaluation rules are able to be laid down according to the respective circumstances of each class even the school, scoring them based on their actual performances. Self-evaluation refers that students evaluate themselves truthfully; peer assessment means class evaluation group score each student about the varied index. The peer assessment result=(the sum of the class evaluation group scores—the top score—the lowest score)÷ (the number of the group) , then the final evaluation score=10% of the self-evaluation score + 60% of the peer assessment score + 30% of the teacher appraisal.

2.2.3 Evaluation grades

The scores will be graded like this:

Table 2

Scores	Grade	Evaluation quality
Above 85 points	A	High integrity、credible
75 points to 84 points	B	Relatively high integrity and credibility
65 points to 74 points	C	Not high integrity, credible generally
Below 65 points	D	Low integrity, incredible

3 Perfecting the Mechanism of Supervision and Punishment and Ensuring the Implementation of the Evaluation

(1) Students are prone to be honest owing to the huge cost to be dishonest, which will be guided by reward and penalty. Only by high price of bad faith can their fluke mind be eliminated completely, resulting in their keeping promises and being honest and for building up self-disciplinary habit. The disciplinary inspection departments of related universities are supposed to be equipped with scientific regulations of supervision used to restrict students' behaviors, shaping their integrity. Annual regular inspections confirm the evaluation to students' integrity and morality from certain functional departments; meanwhile, the feedback of teachers and students can be gathered simultaneously. Combining the moralization and punishment, the university authorities should improve the punishment mechanism, enforcing the regulations unswervingly as soon as someone is cheating and violating the credit regulations. Only by this way can they be saved in time and abide by the moral bottom line, avoiding the greater loss they may cause to the nation, the society or even themselves. As for the school conditions, the integrity status will be banded together with comprehensive assessment, scholarship, exemption graduates, excellent students, party members and student loan. Those whoever persists in keeping credibility and promise on any occasions will be praised instantaneously. Students with grade B should be offered moral encouragement, while those outstanding ones with grade A could

be offered material rewards or any other ways such as a preferentially authoritative recommendation. among which students with grade D are in limit to be awarded as excellent students and beyond their reach to the student loan, while students with grade A are in possessive priority. On the other hand, the credit files are delivered to employers after graduation, extending their credit record to the society that will be the second identity card.

(2) The professional evaluation groups are advocated. Integrity assessment is a specific but tedious process, so it can be a full-time or a part-time work. The counselors are the full-time staff; at the same time, those teachers in the related administrative departments are the part-time staff, such as those working in finance section and the students' affair office and the librarians, who will be responsible for the regular evaluation.

(3) Accordingly, the index should be adjusted so that the methods can be improved in practice. The process of the evaluation system and index is open and dynamic, stable as well. Additionally, the operation of this system is supposed to be supervised, especially by all the students. During the process of application, the evaluation system is bound to be ameliorated on the basis of development of the society and the university, where the e-record and information websites are accessible to update the evaluation results, then making their comprehensive scores public at the right time is helpful to feed back the students' materials. More significantly, the lower scored students must be studied about their thoughts in mind by the specially-assigned teachers. In all, the genuine effective system is the one adapted to the realities all the time.

(4) In cultivating better integrity quality, the moral education is playing an essential role. Generally speaking, the evaluation system is not scientific enough to substitute the moral education that is likely to optimize this established system, ultimately achieving the expected effect. The cognition and their sense of social duties are accessible for guiding them to set up the beliefs of integrity.

4 Conclusions

To crystallize the integrity education, a long-term and arduous cause with urgency is necessary for all people to participate, for morality is essential for everyone. In this case, morality and law work together should stick up for the order and restrain the misconduct, leaving a kind of favorable surroundings for education and forming a virtuous pattern. It's of great importance to establish scientific and effective evaluation system, associating the school education with the self-education, and management, and further enhancing the effectiveness of the integrity education, which is said to lay a strong foundation of building a harmonious socialist society.

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Significance Study of Resources Influence on Innovative Talents Cultivation in Henan Higher Education: Based on the Methodology of Principal Component Analysis

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Abstract: The cultivation of innovative talents is a complex system project and plays a significant role in objective evaluation of higher education's creativity which is regarded as the combination of scientific advance and talents cultivation. From the perspective of resources and based on the concerned statistics in the year of 2004 to 2008 in Henan Province, this article has established an evaluation system and carried out a significance analysis of the influence with the methodology of Principal Component Analysis. Results indicate that the overhead of science and technology activities ($\times 10^4$ Yuan RMB) and the total assets value of the campus hardware (billion Yuan RMB) will have the most distinctive significance influence on innovative talents cultivation in higher education; In view of the classification of second indexes, the key elements will be Science and Technology Projects, Scientific and Technological Achievements, the Acceptance and Authorization Quantity of Three Patents, High Technology Intellectual Property Right and Science and Technology Organizations.

Key words: Resources; Innovative talents; Principal Component; Significance

1 Introduction

The cultivation of innovative talents is a complex system project which aims to realize the overall processed omnibearing and continuous talents cultivation mechanism in the way of renewing cultivation notions, updating cultivation modes and reforming education quality evaluation and talents evaluation system. In view of social structure, the government is the key among the factors such as government, society and trade unions concerned; in view of innovation fields, besides science and technology, social sciences are in the urgent need of innovative talents as well. However, to manufacture innovative talents requires a good context for their survival and development, a powerful system and mechanism assurance, an eco-chain for innovation education resources and effective eco-chain link ups between education, trade unions and society.

Colleges and universities are the joints of advanced technology and talents cultivation, whose technology innovation potential should be assessed objectively before the optimum support and promotion of "three spirals" including resources, surrounding and mechanism have been acquired in the process of higher education talents cultivation. Thus it'll be greatly important for policy making and high level innovative talents cultivating that the university's innovation potential is accurately appraise, the scientific, systematic and comprehensive evaluation index system established, the essence and rules of innovative activities mastered and the factors promoting technology innovation academic titles systemically generalized.

From the perspective of resources and based on the concerned statistics in the year of 2004 to 2008 in Henan Province, this article has established an evaluation system and carried out a significance analysis of the influence with the methodology of Principal Component Analysis.

2 Establishment of the Evaluation System

2.1 Establishing Principles

The resource-based evaluation system is a complex one made up of various interactive factors. In order to achieve an overall and practical reflection of the essence and constitution of resources-talents cultivation evaluation, the establishment of the index system should be in accordance with the following principles.

1) Scientific. Being scientific also means accuracy and comprehensiveness. The form and content of the index items will be able to indicate the connotation of the index and the data should be accurate, which will reflect by the large the features of the subject or the whole cultivation process influenced by resources.

2) Systematic. Each item of the indexes should have its own connotation and denotation. They form

an organic unit with no overlapping but logically related, thus to realize a systematic resource-innovative talents cultivation process.

3) Comparable. The comparability between different years has to be reckoned with, meanwhile, all the data have to be strictly screened and standardized to convert the incomparable indexes into comparable ones.

4) Feasible. It's still an exploration for the evaluation of innovative talents cultivation under the perspective of resources and presently there is not much references concerned available. Therefore, data chosen should be available and feasible in quantization.

5) Successive. The promotion of creativity itself is a course of dynamic development and continuous improvement which will objectively reflect the situation, potential and trend. Thus when selecting indexes, it would be desirable to combine the static indexes with the dynamic ones so that the static indexes could be used to reflect the resource configuration status of Henan Province while the dynamic ones to predict the prospects.

2.2 Constitution of Index System

The Resources-based Comprehensive Evaluation System for Higher Education Innovative Talents Cultivation in Henan Province is constituted under the principles mentioned above, with three first-class indexes including human resources, facility resources and scientific research resources. Under the first-class indexes there are 15 second-class indexes, for example, the teaching staff, and there will be 51 more detailed indexes subordinating to the second-class ones to make the third level.

Table 1 Resources-Based Comprehensive Evaluation System for Higher Education Innovative Talents Cultivation in Henan Province

First-class Index	Second-class Index	Third-class Index	Year 2004	Year 2005	Year 2006	Year 2007	Year 2008
Human Resources	Teaching Staff	Full-time Teachers ($\times 10^4$ people)	4.18	4.63	5.29	5.88	6.49
		Enrolled Students ($\times 10^4$ people)	70.28	85.19	97.14	109.52	125.02
		Teacher-Student Ratio	16.2:1	17.5:1	17.4:1	17.7:1	18.26:1
		Teachers with Master Degree or above	11030	14318	17664	21279	25901
		Teachers with Associate Senior or Senior Title	13553	14953	16859	19144	21485
		Provincial and above Key Discipline	145	145	145	145	268
	Undergraduates Creativity	Postgraduates Enrolled	5408	6561	7375	7957	8507
		Graduated College Students ($\times 10^4$ people)	13.43	16.52	20.21	26.72	30.25
		Graduates with Master Degrees	2036	2587	3722	5429	6643
		Undergraduates' Challenge Cup Prizes	489	549	600	640	226
	Scientific Researching Staff	Scientific Activity Participants	144360	158075	177226	192173	209793
		Scientists and Engineers with Senior Titles	81707	95783	108580	122223	132939
		R & D Personnel to Full-time Personnel (person year)	3825	50887.6	58716.2	1169	72830
		Scientists and Engineers Involved (person year)	29624	39008.3	46767.3	64888	56316
		Full-time Personnel (person year)	27873	40012	47109	50547	59172
Facility Resources	Lab Conditions	Openlab for Provincial Key Discipline	15	15	15	25	25
	Campus Hardware	Campus Land ($\times 10^4$ m ²)	6331.37	6770.17	7182.61	7914.11	8774.85
		Averaged Teaching and Administration Space for Students (m ²)	16	14.6	14.8	15.14	15.04
		Total Assets Value (Billion Yuan)	195.94	238.04	291.06	344.5	370.18
		Teaching and Scientific Research Instruments and Equipment Value	40.63	46.26	53.66	62.05	70.68
		Books ($\times 10^4$ volume)	5520.02	5995.33	7095.14	8093.61	9099.18
Scientific Research Resources	Science and Technology Research Institution	Science and Technology Research Institutions	1423	1498	1432	1531	1727
		Institution Staff	58211	65416	69876	78460	84683
		Projects undertaken	12105	16069	18904	24395	27349
		Institution's Research Funding ($\times 10^4$ Yuan RMB)	476916	615041.1	813675.3	1090815	1278011
	Expenditure for Science and Technology Activities	Total Research Expenditure ($\times 10^4$ Yuan RMB)	1148293	1329098	1888708	156336	2646249
		Scientific Capital Construction fee ($\times 10^4$ Yuan RMB)	206562	179520	310911	348057	240262
		Overhead ($\times 10^4$ Yuan RMB)	941732	1074199	1475412	2208114	2262514

	Assets Purchase Expenditure ($\times 10^4$ Yuan RMB)	470239	476915	683151	262959	844334
Science and Technology Projects	Projects	12105	16069	18904	24395	27349
	Project Practical Expenditure ($\times 10^4$ Yuan RMB)	694120	879857	1272475	1672864	2019899
Science and Technology Achievements	Patent Accepted	2342	2604	3761	4866	6480
	Patent Authorized	1396	1611	1969	2692	3396
Essays	Total Number of Essays Published	13243	18919	24843	30245	37859
	Essays Compiled by the Three Principal Indexes	744	1314	1952	2564	3185
	Essays Published in Academic Journals Abroad	466	864	1493	2157	2964
Scientific Works	Scientific Research Essays Published	29915	36783	44922	47880	48531
	Scientific Works Published (Type)	7169	2071	2363	2696	2610
University Academic Exchanges	International Academic Conferences Hosted	112	36	70	82	95
	Ac Participants of International Academic Exchanges (person-time)	2003	1321	1445	1668	1972
	Essays Read off in International Conferences	1457	1057	1161	1354	1689
Acceptance and Authorization Quantity of Three Patents	Application Quantity	6318	8981	11538	14916	19090
	Authorization Quantity	3318	3748	5242	6998	9133
High Technology Intellectual Property Right	Newly Developed Products (piece)	388	579	590	729	756
	New Product Developing Funding ($\times 10^4$ Yuan RMB)	28076	56473	83125	148331	235648
	Output Value of New Products ($\times 10^4$ Yuan RMB)	605262	96993	1040623	1301225	1635840
	Profits of New Products ($\times 10^4$ Yuan RMB)	594734	951785	982841	1226557	1587236
Regional Science and Technology Requirements	High-tech Enterprises	576	577	659	570	628
	Gross Output of High-tech Industries ($\times 10^4$ Yuan RMB)	2892131	3611119	5021149	6438000	7951203
	Value Added by High-tech Industries ($\times 10^4$ Yuan RMB)	836595	1031508	1429894	1952000	2538102
	Transaction Value in Regional Technology Market ($\times 10^4$ Yuan RMB)	2775874	3285766	4643111	5902000	7210890

3 Significance Analysis

Principal Component Analysis is a methodology of mathematics transition which converts a related group of given variables into unrelated group in the way of linear transformation. These new variables will be arranged in the declining variance order. With a constant total variance in the mathematics transition, the first variable is given the maximum variance, which is defined as the first principal component. The second variable's variance is next to the first one's but remains unrelated to the first one, which is defined as the second principal component. In this way, when there are number of I variables, there will be number of I principal components.

According to the sig values of resources-innovative talents cultivation, the paper works out the most influential factor set for policy making which will fully utilize resources in innovative talents cultivation.

3.1 Mathematics Model for Principal Component Analysis

The principal component analysis is the method to analyze subject by finding out its principal component. It is a kind of transition in which the new variables are the converted linear combination of the original variables.

Given samples $n=15$, with each sample observing indexes $p=4$: X_1, X_2, \dots, X_p , a primitive data matrix is achieved:

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1p} \\ x_{21} & x_{22} & \cdots & x_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ x_{n1} & x_{n2} & \cdots & x_{np} \end{bmatrix} = (X_1, X_2, \dots, X_p)$$

Thereinto:

$$X_i = \begin{bmatrix} x_{1i} \\ x_{2i} \\ \vdots \\ x_{mi} \end{bmatrix} \quad i = 1, 2, \dots, p$$

The linear combination of number of p index vectors for X in the data matrixes, which could be abbreviated as:

$$F_i = a_{1i}X_1 + a_{2i}X_2 + \dots + a_{pi}X_p, \quad i = 1, 2, \dots, p$$

The following conditions are imposed to exert a restriction:

$$a_{1i}^2 + a_{2i}^2 + \dots + a_{pi}^2 = 1, \quad i, j = 1, 2, \dots, p$$

The comprehensive index vectors F_1, F_2, \dots, F_p satisfying the conditions mentioned are the principal components. The information amount supplied by the number of p components from the total information amounts of original indexes is declining. The information amount from each principal component is measured by variance and the principal components variance contribution rate will be the corresponding eigenvalue λ_i in the former index concerned matrix. Each principal component's combined coefficient $a_i = (a_{1i}, a_{2i}, \dots, a_{pi})$ is the corresponding eigenvalue λ_i , seneigenvalue

$$t_i \text{ variance contribution rate } \alpha = \frac{\lambda_i}{\sum_{j=1}^p \lambda_j}. \text{ The bigger the value of } \alpha_i \text{ is, the more sufficient}$$

valuable information will be supplied by the principal component in policy making.

3.2 Calculation of the Principal Components

(1) Calculation of sample data's covariance matrix $s = (s_{ij})_{p \times p}$ with

$$s_{ij} = \frac{1}{n-1} \sum_{k=1}^n (x_{ki} - \bar{x}_i)(x_{kj} - \bar{x}_j), \quad i, j = 1, 2, \dots, p$$

(2) Calculation of engenvalue S $\lambda_1 \geq \lambda_2 \geq \dots \geq \lambda_p > 0$ in covariance matrix and its corresponding orthogonalization unit engenvector:

$$a_1 = \begin{bmatrix} a_{11} \\ a_{21} \\ \vdots \\ a_{p1} \end{bmatrix}, \quad a_2 = \begin{bmatrix} a_{12} \\ a_{22} \\ \vdots \\ a_{p2} \end{bmatrix}, \quad a_p = \begin{bmatrix} a_{1p} \\ a_{2p} \\ \vdots \\ a_{pp} \end{bmatrix}$$

Therefore, the No. i principal component of X will be: $F_i = a_i X, i = 1, 2, \dots, p$.

The determination principles of coefficient a_{ij} :

F_i and $F_j (i \neq j; i, j = 1, 2, \dots, p)$ are unrelated;

F_1 is the one with the largest variance in all linear combination of X_1, X_2, \dots, X_p ;

F_2 is the one with the largest variance in all linear combination of X_1, X_2, \dots, X_p unrelated to F_1 ; F_p is the one with the largest variance in all linear combination of X_1, X_2, \dots, X_p unrelated to F_1, F_2, \dots, F_{p-1} .

(3) A number of r principal components will be chosen among all the determined number of p principal components to realize the ultimate appraise analysis. Variance contribution rate α_i is used to

describe the information amount reflected by the principal component F_i . The determination of r is that the accumulated contribution rate $G(r) = \sum_{j=1}^r \lambda_j / \sum_{j=1}^p \lambda_j$ is big enough (above 85%).

3.3 Equalization of Data

With dimensionless method, it becomes possible to remove the influence between the primitive data and reflect the variation information.

When the original data are given as $X = (X_{ij})_{n \times p}$ with $y_{ij} = \frac{x_{ij}}{x_j}$, $i = 1, 2, \dots, n; j = 1, 2, \dots, p$.

Thereinto: $\bar{x}_j = \frac{1}{n} \sum_{k=1}^n x_{kj}$, $j = 1, 2, \dots, p$, to achieve the normalized matrix $Y = (y_{ij})_{n \times p}$

Suppose the covariance matrix of $Y = (Y_1, Y_2, \dots, Y_p)$ is $U = (u_{ij})_{p \times p}$, when each vector's mean of Y takes the value 1, it will be:

$$u_{ij} = \frac{1}{n-1} \sum_{k=1}^n (y_{ki} - \bar{y}_i)(y_{kj} - \bar{y}_j) = \frac{1}{n-1} \sum_{k=1}^n (y_{ki} - 1)(y_{kj} - 1)$$

$$= \frac{1}{n-1} \sum_{k=1}^n \left(\frac{x_{ki}}{\bar{x}_i} - 1\right) \left(\frac{x_{kj}}{\bar{x}_j} - 1\right) = \frac{1}{n-1} \sum_{k=1}^n \frac{(x_{ki} - \bar{x}_i)(x_{kj} - \bar{x}_j)}{\bar{x}_i \cdot \bar{x}_j} = \frac{S_{ij}}{\bar{x}_i \cdot \bar{x}_j}$$

Among them, u_{ij} is the raw data of covariance, $i, j = 1, 2, \dots, p$ is special

for $u_{ii} = \frac{S_{ii}}{(\bar{x}_i)^2} = \left(\frac{\sqrt{S_{ii}}}{\bar{x}_i}\right)^2$, which means the covariance matrix diagonal of the normalized data is the square of variation coefficient between indexes.

Given r_{ij}^* is the correlation coefficient between indexes of the normalized data, thus we can conclude:

$$r_{ij}^* = \frac{u_{ij}}{\sqrt{u_{ii}} \sqrt{u_{jj}}} = \frac{\frac{S_{ij}}{\bar{x}_i \cdot \bar{x}_j}}{\sqrt{\frac{S_{ii}}{(\bar{x}_i)^2}} \sqrt{\frac{S_{jj}}{(\bar{x}_j)^2}}} = \frac{S_{ij}}{\sqrt{S_{ii}} \sqrt{S_{jj}}} = r_{ij}$$

Thereinto, r_{ij} is the correlation coefficient between primitive indexes, that is, normalization will not change the correlation coefficient between indexes.

3.4 Solutions

Extract and normalize the data needed to acquire the concerned coefficient matrix. Calculate the variance contribution rates to determine the numbers of principal components, as what have been shown in Table 2, 3 and 4.

Table 2 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	39.515	77.480	77.480	39.515	77.480	77.480	37.446	73.424	73.424
2	5.461	10.708	88.188	5.461	10.708	88.188	6.505	12.755	86.179
3	4.380	8.588	96.775	4.380	8.588	96.775	5.404	10.596	96.775
4	1.645	3.225	100.000						
5-51	.000	.000	100.000						

Table 3 Rotated Component Matrix

Second-class Index	Third-class Index	Component			Mean of Second-class Index
		1	2	3	
Teaching Staff	Full-time Teachers (×104 people)	.978	.203	-.005	.889
	Enrolled Students (×104 people)	.968	.242	-.067	
	Teacher-Student Ratio	.844	.310	-.393	
	Teachers with Master Degree or above	.968	.251	-.006	
	Teachers with Associate Senior or Senior Title	.975	.220	.039	
	Provincial and above Key Discipline	.599	.706	.332	
Undergraduates Creativity	Postgraduates Enrolled	.960	.174	-.210	.658
	Graduated College Students (×10 ⁴ people)	.990	.134	.040	
	Graduates with Master Degrees	.981	.167	.100	
	Undergraduates' Challenge Cup Prizes	-.298	-.789	-.477	
Scientific Researching Staff	Scientific Activity Participants	.975	.215	-.027	.816
	Scientists and Engineers with Senior Titles	.981	.171	-.083	
	R & D Personnel to Full-time Personnel (person year)	.227	.875	-.423	
	Scientists and Engineers Involved (person year)	.962	-.228	-.150	
	Full-time Personnel (person year)	.934	.278	-.221	
Lab Conditions	Openlab for Provincial Key Discipline	.929	-.107	.273	
Campus Hardware	Campus Land(×10 ⁴ m ²)	.959	.266	.073	.717
	Averaged Teaching and Administration Space for Students (m ²)	-.317	-.244	.910	
	Total Assets Value (Billion Yuan RMB)	.990	.108	-.068	
	Teaching and Scientific Research Instruments and Equipment Value	.976	.217	.024	
	Books (×10 ⁴ volume)	.977	.200	.057	
Science and Technology Research	Science and Technology Research Institutions	.761	.487	.184	.929
	Institution Staff	.981	.182	-.039	
	Projects Undertaken	.989	.140	-.033	
	Institution's Research Funding (×10 ⁴ Yuan RMB)	.987	.158	.040	
Expenditure for Science and Technology Activities	Total Research Expenditure (×10 ⁴ Yuan RMB)	.113	.978	.024	.812
	Scientific Capital Construction fee (×10 ⁴ Yuan RMB)	.628	-.520	-.119	
	Overhead (×10 ⁴ Yuan RMB)	.996	-.025	.085	
	Assets Purchase Expenditure (×10 ⁴ Yuan RMB)	.188	.943	.048	
Science and Technology Projects	Projects	.989	.140	-.033	.985
	Project Practical Expenditure (×10 ⁴ Yuan RMB)	.981	.182	.053	
Science and Technology Achievements	Patent Accepted	.950	.274	.151	.954
	Patents Authorized	.958	.236	.149	
University Science and Technology Essays	Total Number of Essays Published	.966	.256	-.026	.971
	Essays Compiled by the Three Principal Indexes	.978	.204	-.040	
	Essays Published in Academic Journals Abroad	.968	.243	.054	
Scientific Works	Scientific Research Essays Published	.941	.061	-.269	.186
	Scientific Works Published (Type))	-.569	-.160	.802	

University Academic Exchanges	International Academic Conferences Hosted	.119	-.027	.946	.258
	Participants of International Academic Exchanges (person-time)	.175	.145	.974	
	Essays Read off in International Conferences	.481	.289	.826	
Acceptance and Authorization Quantity of Three Patents	Application Quantity	.965	.258	.022	.961
	Authorization Quantity	.956	.252	.149	
High Technology Intellectual Property Right	Newly Developed Products	.949	.079	-.266	.919
	New Product Developing Funding ($\times 10^4$ Yuan RMB)	.935	.308	.144	
	Output Value of New Products ($\times 10^4$ Yuan RMB)	.866	.112	.345	
	Profits of New Products ($\times 10^4$ Yuan RMB)	.927	.328	-.081	
Regional Science and Technology Requirements	High-tech Enterprises	.240	.612	-.236	.788
	Gross Output of High-tech Industries ($\times 10^4$ Yuan RMB)	.974	.217	.060	
	Value Added by High-tech Industries ($\times 10^4$ Yuan RMB)	.963	.243	.115	
	Transaction Value in Regional Technology Market ($\times 10^4$ Yuan RMB)	.974	.207	.078	

Table 4 Rotated Component Matrix

Second-class Index	Third-class Index	Component		
		1	2	3
Expenditure for Science and Technology Activities	Overhead ($\times 10^4$ Yuan RMB)	0.996	-0.025	0.085
Campus Hardware	Total Assets Value (Billion Yuan RMB)	0.99	0.108	-0.068
Undergraduates Creativity	Graduated College Students ($\times 10^4$ people)	0.99	0.134	0.04
Science and Technology Projects	Projects	0.989	0.14	-0.033
...

4 Conclusion

(1) For factor load is the correlated coefficient of a variable and a common factor, a variable will have closer relationship with a factor with bigger absolute value, that is to say, the variable will be better represented. According to the variance analysis result of Table 2, Factor 1's variance is 39.515, more significant than Factor 2's 5.461 and Factor 3's 4.38. Therefore, Factor 1 is the most significant in the influence on innovative talents cultivation in higher education.

(2) According to the factor score coefficient matrix in Table 4, the element which has the most significant relation with Factor 2 is the Overhead ($\times 10^4$ Yuan RMB) in Expenditure for Science and Technology Activities, Total Assets Value (Billion Yuan RMB) in Campus Hardware. The statistics from our national Science and Technology Ministry indicate that the proportion of R&D funds in American basic research expenses is 19.1% in the year 2003 while Chinese 5.4% in the year 2005 and Henan Province less than 5% in the year 2008. Meanwhile, every year in America almost half of the research funds has been obtained by colleges and universities and the proportion of basic research in overall higher education research cost is always higher than two thirds while in China, higher education research funds is only 9.89% of the national R&D funds in the year 2005 and only 18.6% of the 2004 year's national R&D overhead is for basic research. In the last case, less than 10% went to colleges and universities in Henan Province. Taking the year 2005 as an example, the average personal science and technology funds in Henan Province is only one seventh of that of Hubei Province, even Jiangxi Province which is ranged the second to the last is 65% higher than our province. Science and technology fund is like blood to technology innovation, and inadequate science and technology funding investment has become the main factor influencing the improvement of technology innovation in Henan higher education. Therefore, government should be fully aware that funding investment is the material

guarantee to improve innovation in higher education. Also the government should further reinforce its investment in higher education's research funding, highlight the leading position of government and gradually build up the mechanism of annual increasing technology investment in higher education. Based on their own orientation and reality, colleges and universities should plan their own research funding investment proportions in the annual budget to make sure of the annual increase of science and technology funds. In the meanwhile, through active cooperation between colleges and enterprises, colleges and universities will uptake the investment and sponsor from enterprises and society to enlarge overhead resources.

In addition, in the item of Equipments and Facilities, the total assets value of Henan colleges and universities have increased from 195.04 billion Yuan RMB to 370.18 billion Yuan RMB, almost doubled within 5 years but is still slower than the national increasing speed. In the process, as the important support of science and technology innovation, lab needs not only more investment for advanced instruments and equipments, but also high-quality technology talents to enhance its comprehensive strength in scientific study.

(3) In view of the classification of second-class indexes, Science and Technology Projects, Science and Technology Achievements, Acceptance and Authorization Quantity of Three Patents, High-tech Intellectual Property Right, Science and Technology Research Institution are the crucial resources influencing the innovative talents cultivation.

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Instruction of English Musical Film and TV Drama Appreciation Based on CBI Theory

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Abstract: CBI (content-based instruction) is the theory according to which foreign language teaching is adjunct to the teaching of a subject or a subject matter, aiming to combine course content and language learning. It emphasizes learning language via using it rather than simply learning it as a subject, and therefore CBI is considered the most effective approach in foreign language teaching. It has four main instruction models: theme-based approach, sheltered content course, adjunct courses, and language for special purposes. English Musical Film and TV Drama Appreciation is an elective course for non-English major postgraduates. This article introduces CBI theory and how it is applied to the instruction of English Musical Film and TV Drama Appreciation, discusses the guiding significance the former has for the latter, and analyzes how the instruction can get good effects, hoping to draw the attention of more English teachers to this field so that they can do more extensive and intensive research of the application of CBI theory in foreign language teaching.

Key words: CBI theory; English Musical Film and TV Drama Appreciation; Foreign language teaching

1 Introduction

College English Curriculum Requirements published in 2004 points out that the objective of college English teaching is to cultivate students' comprehensive ability to use English, especially English listening and speaking ability to enable them to have effective communication in oral and written English in the future work and social activities (Shi Ying, 2005). The new College English Curriculum Requirements published in 2007 further points out that colleges and universities should set the college English teaching syllabus according to the specific situation, and form the individualized college English curriculum system (Gao Hongmei, 2012). The author of this article is an English teacher for non-English major postgraduates. Postgraduate education is the highest education in educational structure, aiming to train the talents with high quality and creativity for the modernization construction of China. The objective of postgraduate English teaching is to effectively improve students' comprehensive ability to use English (listening, speaking, reading, writing and translating) from a high starting point. In recent years, some elective courses have been offered for postgraduates in the author's university to meet the needs of postgraduate English curriculum reform (for non-English majors). English Musical Film and TV Drama Appreciation is one of the elective courses and the author is the lecturer. Since the new College English Curriculum Requirements was published, the elective course, English Movie (TV Drama) Appreciation has been widely offered in colleges and universities, which to some extent has motivated the students in English learning and improved their comprehensive ability to use English. This article introduces CBI theory and how it is applied to the instruction of English Musical Film and TV Drama Appreciation, and analyzes how the instruction can get good effects, hoping to draw the attention of more English teachers to this field so that they can do more extensive and intensive research of the application of CBI theory in foreign language teaching.

2 CBI Theory

2.1 What is CBI ?

CBI (content-based instruction) is the theory according to which foreign language teaching is adjunct to the teaching of a subject or a subject matter, aiming to combine course content and language learning. It emphasizes learning language via using it rather than simply learning it as a subject, and therefore CBI is considered the most effective approach in foreign language teaching.

CBI theory originated from the immersion programme conducted by St. Lambert in Montreal, Canada in the 1960s. In the following decades, CBI attracted extensive attention and was applied to various fields such as immersion language teaching, bilingual teaching and foreign language teaching in developed countries. Nowadays this theory has been more and more widely applied to EFL teaching all over the world. Language is a means of human communication; therefore language learning is different from the knowledge acquisition of a specific subject. Language competence is more habitually acquired

than intentionally learned. CBI theory is considered a more natural way to develop language competence, for it resembles the way in which learners learn their mother tongue. In CBI, the students concentrate on the knowledge structure acquisition of a certain subject or the discussion on a certain theme; the knowledge structure or theme can be anything they are interested in, ranging from the precise subject knowledge to the news report, topic even music, movie, TV play, novel, singing star, film star, etc they like. The students use English to acquire knowledge and discuss themes, but not learn English for the sake of English learning. In this way, they eventually improve the comprehensive English competence. Once the students are motivated, the teacher is able to conduct smooth foreign language teaching, so CBI attracts students very much (Shi Ying, 2005).

2.2 The theoretic basis of CBI

CBI theory is mainly based on the second language acquisition theory and the cognitive learning theory, both of which emphasize providing the second language learners or foreign language learners with multiple opportunities of real and contextual interaction and challenging interaction with language materials in a communicative and academic atmosphere. According to Krashen's language input theory, the condition for the most successful second language acquisition is that the second language acquisition environment is similar to the first language acquisition environment. When foreign language teaching focuses on language meaning but not language form, when language input is equal to or higher than the learners' language level, and when there is enough opportunity for the learners to use the target language meaningfully without anxiety, the second language acquisition is most effectively achieved (Dai Qingning, 2004). The core idea of the second language acquisition theory is that language learning should emphasize meaningful content learning; the cognitive learning theory lays emphasis on the relation between language teaching and the learners' life experience as well as acquired knowledge so that the learners could be motivated and on their own build knowledge meaning in language study (Gu Feirong, 2009).

2.3 Three elements (characteristics) of CBI theory (Dai Qingning, 2004; Gu Feirong, 2009)

2.3.1 Subject knowledge is the core

The CBI classroom teaching should be centered on a certain theme or subject but not be organized according to the traditional language forms, functions, contexts or language skills. The students acquire language communicative ability by learning a specific subject or theme.

2.3.2 Using real language materials

The learning materials of CBI such as texts, videotapes, audiotapes and other audio-visual materials should be those used by the native speakers. The instruction activities should pay attention to understanding and imparting meaningful information as well as accomplishing real tasks in real target language. The students acquire new information with the use of the acquired subject knowledge and contextual understanding.

2.3.3 The instruction contents and activities should meet the needs of the students

The instruction contents and activities should fit the language level, cognitive competence and need for affection of the students, and be suitable for their professional needs and individual interests.

2.4. Common models of CBI theory (Dai Qingning, 2004; Cai Weijun, 2012)

CBI is a teaching idea than a specific teaching method which has no unified model. On the basis of different teaching objectives, there are four common CBI models: theme-based approach, sheltered-content courses, adjunct courses and language for special purposes.

2.4.1 Theme-based approach

The teaching objective and key point of theme-based approach is language teaching. The instruction is centered on a certain specific theme or related topics of a certain specific theme. The teaching materials are all kinds of original themes and topics of the target language; in addition, those themes and topics should meet the needs of the students and arouse their interests so that they can be motivated to take part in various thematic activities. The goal of language teaching is achieved by students' using the language in the activities. Theme-based approach aims to acquire new information by means of language and at the same time improve language level. It is suitable for the second language / foreign language learners or lovers of all levels.

2.4.2 Sheltered-content courses

Sheltered-content courses lay particular emphasis on more subject knowledge teaching than language teaching: the students naturally acquire language skills through grasping subject knowledge. Language is considered the means by which professional knowledge is acquired. The specialized course teaching is carried out in the target language; the students are able to mainly master the

professional knowledge and skills, and at the same time improve the target language level. The teaching materials should be selected from all kinds of specialized courses in the target language with the difficulty in line with students' language level and professional receptivity. What's more, this CBI model is relatively demanding to teachers, who need both be familiar with the specific subject knowledge and proficient in the target language: they should be able to give an understandable lecture in perfect target language through various means to make the students understand and grasp the subject knowledge. The students must be intermediate or upper intermediate language learners.

2.4.3 Adjunct courses

Adjunct courses mean that specialized courses and language courses are offered at the same time with equal class hours. The professional teacher is in charge of subject knowledge teaching and the language teacher conducts foreign language teaching. Language courses are adjunct to specialized courses and the students are required to grasp professional knowledge with the help of language knowledge. In this CBI model, the subject teacher and language teacher should work in close cooperation and the latter needs to be familiar with professional knowledge. The students must be intermediate or upper intermediate second / foreign language learners.

2.4.4 Language for special purposes

The instruction content of this CBI model is closely related to a certain industry or profession and is often applied to various professional or group training. The teaching materials are selected from practical work or related subject fields. This CBI model can be taken charge of by either professional or language teachers.

Table 1 Common Models of CBI Theory

Name	Goal	Teacher	Learner's Language Level
Theme-based Approach	Language teaching	Language teacher	All levels
Sheltered-content Courses	Subject knowledge teaching	Professional teacher	Intermediate or upper intermediate
Adjunct Courses	Language teaching and subject knowledge Teaching	Professional teacher and language teacher	Intermediate or upper intermediate
Language for Special Purposes	Professional knowledge teaching	Professional teacher or language teacher	All levels

3 Instruction of English Musical Film and TV Drama Appreciation Based on CBI Theory

3.1 Three elements of CBI theory in the instruction of English Musical Film and TV Drama Appreciation

English Film (and TV Drama) Appreciation has been widely offered as an elective course in universities and colleges. There are various genres of English films and TV dramas, such as science fiction, action, romance, thriller, horror, disaster, fantasy, spy, musical, etc. The instruction of English Musical Film and TV Drama Appreciation focuses on the genre of musical; meanwhile, as an English elective course for non-English major postgraduates in the second semester, its emphasis is apparently not merely English language learning and practice but learning about the musical film and how to appreciate it. Generally speaking, English Film (and TV Drama) Appreciation is a course which can attract and motivate students. To most students the visual and audio enjoyment and impact brought by films and TV dramas is far greater than that of pure language, not to mention that the students are all lovers of films and TV dramas. Besides this course is also involved with the topics of music, singing, dancing, and singing star, which the students are more familiar and fascinated with. Therefore this elective course meets the need of the students' interests and feelings. What's more, the teaching materials and language are both English so that the students are able to finish real tasks in real target language, and acquire new information based on acquired knowledge. This is meaningful learning.

The instruction of English Musical Film and TV Drama Appreciation includes four parts. Part one is the general introduction of the musical film: what is the musical film, the brief history of it and the master works. In Wikipedia, "The musical film is a film genre in which songs sung by the characters are interwoven into the narrative, sometimes accompanied by dancing. The songs usually advance the plot or develop the film's characters, though in some cases they serve merely as breaks in the storyline,

often as elaborate ‘production numbers’. The musical film was a natural development of the stage musical after the emergence of sound film technology.” The standard definition helps the students to learn about what the musical film is. Most of the master works (only with brief introduction) are classic original English musical films in different periods, and among them, four most popular musical clips are played to students to deepen their impression of the musical film. It is very necessary for the students to have a general idea of the musical film, for nowadays the musical film is not the most popular film genre. Part two deals with film music, including the main functions of film music as well as the relation between film music and frames. As for the latter, some technical terms are introduced such as “synchronism”, “counterpoint” and so on. Although most students are music lovers, they seldom pay attention to and think about the functions of film music, and know little about the relation between film music and frames. The instruction of this part, through the combination of theories and examples, enables the students to acquire the new meaningful information. Part tree is the appreciation of a musical film *The Phantom of the Opera* (2004). The students, guided by the teacher, first learn about the basic information, story and storyline of the film, then have music appreciation (with selected songs), and finally discuss the main characters and film theme. Part four is the appreciation of an American musical sitcom *Glee*. Similarly, the students learn about the basic information, story and main characters of it, think about the cultural reflection (the theme), and have music appreciation (with selected songs). Generally speaking, the instruction of English Musical Film and TV Drama Appreciation focuses on music appreciation.

Table 2 Outline of the Course

General Introduction To Musical Film	Definition
	History
	Master Works
Film Music	Functions of Music in a Film
	Music and Frames in a Film
<i>The Phantom Of The Opera</i>	Basic Information
	Story
	Storyline
	Music Appreciation (with selected songs)
	Discussion on Main Characters and Film Theme
<i>Glee</i>	Basic Information
	Story
	Main Characters
	Cultural Reflection
	Music Appreciation (with selected songs)

3.2 Theme-Based Approach and Sheltered-Content Courses of CBI Theory in the Instruction of English Musical Film and TV Drama Appreciation

Some articles which discuss CBI theory and the instruction of English Film Appreciation hold that the latter is only based on theme-based approach of the former (Shi Ying, 2005; Gao Hongmei, 2012). However, the author of this article believes that the instruction of English Musical Film and TV Drama Appreciation is the combination of both theme-based approach and sheltered-content courses of CBI theory. Theme-based approach focuses on language teaching, while sheltered-content courses lay emphasis on subject knowledge teaching. In the author’s view, this course should achieve both goals, namely make the students practice and improve comprehensive ability to use English and grasp the subject knowledge of film, TV drama, and music so as to improve literary and art quality.

3.2.1 Theme-based approach and the instruction of English Musical Film and TV Drama Appreciation

As mentioned above, though English Musical Film and TV Drama Appreciation is an elective course, it is part of non-English major postgraduates’ English curriculum, aiming to enable the students to have meaningful language learning and practice through the activities related to the themes or topics of film and music, which attract and motivate them. The objective of college English teaching is “to cultivate students’ comprehensive ability to use English, especially English listening and speaking

ability”, and “to improve students’ comprehensive cultural quality in order to meet the needs of China’s social development and international communication”. The course of English Film and TV Drama Appreciation is an effective approach to improve the students’ comprehensive English ability (listening, speaking, reading and writing). English films and TV dramas provide an opportunity for the students to thoroughly feel and use English: the real scenes (real contexts) and the English used by native speakers can improve the students’ English listening and speaking ability; meanwhile, the historical and cultural background as well as local customs can also help them understand the cultural elements in the language, thus promoting language learning. As the musical film highlights the performance of singing and dancing, and musical achievement, it usually has a simple storyline and theme. Music and dancing, as independent art forms, serve as more appealing and touching means than language to express the characters’ thoughts and feelings. The lines (lyrics) in *The Phantom of the Opera* are formal, standard, graceful, lyrical, and also understandable to the students. The students who take this course are almost upper intermediate English learners and some students can even memorize the lines (lyrics) which impress them most. In class, the students retell the story, review the storyline, analyze the main characters, and discuss the theme of the film. Those oral activities help them practice and improve English thinking and speaking ability in the real language environment. *Glee*, a modern American musical sitcom, is quite different from *The Phantom of the Opera* in creation background and artistic style. Comparatively, American TV dramas are more familiar and attractive to the students who mainly learn the language used in daily life and idiomatic expressions from the TV dramas. What’s more, the cultural reflection in TV drama appreciation is important to broadening the students’ horizon in language learning.

3.2.2 Sheltered-content courses and the instruction of English Musical Film and TV Drama Appreciation

Through English musical film and TV drama appreciation, the students should not only practice and improve English, but also acquire the subject knowledge of film, TV drama and music in order to cultivate their musical quality and artistic taste. Most students are lovers of films, TV dramas and music, but they seldom pay attention to and know little about the musical film, film music, film language, etc. and even do not know how to appreciate films and music. The course of English Musical Film and TV Drama Appreciation provides the students with the professional knowledge of musical, musical film and music appreciation. Since the students are non-art majors, they are only required to have a general idea and understanding of the relevant knowledge without deeper thinking and exploration. Thus the difficulty of this course fits the students’ receptivity in art and their language level. In the lecture, music appreciation (with selected songs) plays a major part. For each song (piece of music), the students are required to understand the related plot, the characteristics of melody and rhyme as well as their change (sometimes combined with the scene change), how the music and singing develop the story, create atmosphere and express the characters’ feelings, etc. Besides the teacher’s lecture, the students are expected and encouraged to think. They watch the film (TV drama) to learn about the story and the characters, listen to the music (song), feel the thoughts and emotions of the character in it, and think about why certain thought and emotion of the character are expressed in the music (song) (this has something to do with the character’s personality and film theme). *Glee* features large amounts of cover versions of songs in pop music history. In music appreciation, apart from the above tasks, the teacher introduces different pop music styles to the students, guides them to compare the cover versions and the original versions, and encourages them to think about the influence of cover version (a very popular art form today) on pop music development trend.

4 How the Instruction of English Musical Film and TV Drama Appreciation Can Get Good Effects

English Musical Film and TV Drama Appreciation is a more specialized course compared with English Film and TV Drama Appreciation. How the instruction of it can get good effects depends on both the teacher and the students. Sheltered-content courses of CBI theory require the teacher to be not only familiar with the specific subject knowledge but also proficient in the target language: they should be able to give an understandable lecture in perfect target language through various means. In the instruction of English Musical Film and TV Drama Appreciation, being proficient in the target language (English) is not difficult for the teacher; however, being familiar with and mastering the professional knowledge of the musical film, film music, etc. is what the teacher should work hard for. Being a film and music lover is not enough for the teacher, who also needs to spare time and efforts to acquire the related professional knowledge, collect and select the materials involved, and finally summarize,

methodize and systemize the useful information. Only in this way can he / she be qualified to give the lecture and achieve the teaching objective. Thus the teacher should constantly improve the comprehensive cultural quality and theoretical level in order to be experienced and skillful in classroom instruction.

It has been mentioned above that even though film, TV drama and music are the topics most students are familiar with and interested in, as the musical film is not the most popular film genre today and most songs in the musical films are far less well-known to people than the pop songs, not to mention that the students are all the generation after 90s, they have little idea and impression of the classic works decades ago, and few of them know how to appreciate films and music. According to schema theory, the large amount of knowledge people acquire and master is not stored disorderly in the human brain, but is linked to each other to form a certain knowledge unit centered on a subject, which is schema. The learner does not passively receive information, but actively links the new information with the acquired knowledge and experience in schema. Therefore to some extent, at the beginning the musical film and TV drama appreciation is something unfamiliar to most students and does not meet the needs of their feelings. So the learners, especially the learners of high level, such as postgraduates should attach importance to the accumulation of comprehensive cultural knowledge and improvement of literary and art quality (this is what the students of science most lack) in order to get better effects in this course.

5 Conclusion

Studies in recent years have proved that the course of English Film and TV Drama Appreciation helps to motivate the students in English learning and improve their comprehensive ability to use English. English musical film and TV drama appreciation based on CBI theory gives consideration to both language teaching and subject knowledge acquisition to enable the students to not only practice and improve English, but also acquire the professional knowledge of film, TV drama and music, and thus cultivate the mind and improve their literary and art quality. This also promotes the learning of foreign language and culture. As a newly-offered elective course for non-English major postgraduates, the instruction of English Musical Film and TV Drama Appreciation undoubtedly needs improving. In order to get good instruction effects, both the teacher and students need to enhance comprehensive cultural knowledge and personal art quality. CBI theory emphasizes that the students finish real tasks in the target language in instruction; the teacher motivates the students with meaningful and challenging tasks in language learning. The teacher needs to have overall planning for the whole instruction and reasonable arrangement of the teaching process so as to achieve the smooth and effective classroom instruction, and ensure the students to improve target language level at the same time they grasp professional knowledge. CBI theory has broadened the thinking of foreign language teaching in the new period; this article discusses the guiding significance it has for the instruction of English Musical Film and TV Drama Appreciation, hoping to draw the attention of more English teachers to this field so that they can do more extensive and intensive research of the application of CBI theory in foreign language teaching.

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Study on the Influencing Factors of the Regional Industrial Upgrading Based on the Perspective of the Global Production Network

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Abstract: The formation and development of the Global Production Network is affected by various factors. Network governance models, policy systems, external environment and enterprise characteristics are the four main factors which have a great impact on the upgrading of the Global Production Network. This paper focuses on analyzing the influencing mechanism and performance of the above factors on the regional industrial upgrading, which aims at providing guidance for the local industrial upgrading and structural optimization.

Key words: Global production network; Regional industrial upgrading; Influence

1 Introduction

At present, the global production network system of labor division constantly becomes perfect, and production capability of developing countries and enterprises involved in the network is increasingly improved, and the enterprises' development have pushed the industrial upgrading, which improves their status in the global network system. However, to further their development, the following works should also be done: on the one hand, make a comprehensive analysis on various factors influencing enterprise competence and industrial upgrading; on the other hand, classify these factors and then learn and use these factors selectively, really promoting industrial structure upgrading and structural optimization. After reviewing the generating reasons of global production network and its determinants, we found that policy systems, network governance model, enterprise features and external environment are the key impact factors of regional industrial upgrading.

2 Network Governance Model on Network Industrial Upgrading

The concept of transaction cost was first put forward by Coase and then inherited and developed by scholars of institutional economics. Transaction cost was originally used to analyze the market and enterprise's resource allocation, and later was used to explore the trading mode and its substitution relation within enterprise and market. In the words of Hart, market trading organization is suitable for the trades with low asset specificity and low transaction frequency, which is based on contract and property rights and characterized by price mechanism in the core; the internalization trading patterns is appropriate for those trades with high asset specificity and high transaction frequency, which is also called internal governance mode. Certainly, there are many other trading modes between the above two extremes except these two compound modes, market and enterprise.

2.1 Governance structure features of global production network

The emergence of global production network enriched the intermediate state of trading mode with the following characteristics:

Firstly, in the global production network, the relationship between leading manufacturers and processors is based on mutual benefit, maximizing their self-interest with complementary labor division. And then a formal or informal contract is come into being based on the interdependent relationship, thus conducting different stages of labor division of the same product. The new-type organization model, global production network, can provide stable relational contract, and the uncertainty of bilateral trade is small on basis of mutual benefit, thus avoiding fraudulent conduct brought by opportunism and reducing unnecessary transaction cost, and at the same time, it can lower costs generated by principal-agent relation. Therefore, the mode of global production network, based on trust, pays more attention to long-term interest, creating an open contract that can give up short-term opportunism behavior. Global production network model not only swallows the advantages of traditional dual governance mode, but also avoid all kinds of unnecessary transaction cost, improving organization management efficiency and production capability, thus enhancing enterprise's international competitiveness.

Secondly, for what global production model conducts is labor-division production, we should pay more attention to external governance and co-governance. In the traditional insider system, what

enterprise conducts is internal resource allocation, so internal resource allocation efficiency is taken as the core of operation management. However, under the global production network model, enterprises are not only concern about the allocation of their own resources, but also pay more attention to bring external resource, technology and managerial experience to self-development to promote enterprise development. Global production network by combing manufactures around the world together to produce the same product, taking advantage of different regions' comparative advantages, thus expanding the scope of using resource and making the boundaries of firms obscure. Therefore, under the global production network model, enterprises should pay close attention to coordination of external resource in addition to the efficiency of internal resource allocation. The larger the global production network scope and the longer the value chain, the more external resource we can use and the greater importance of external coordination and governance. Meanwhile, in the global production network, long-term stable cooperation relationship based on the principle of mutual benefit is built between production main bodies, thus maximizing their own self-interest. Such complementary relations of cooperation must have corresponding control mechanism, making the same product run smoothly between different main bodies.

Thirdly, there's a core manager in the global production network model, controlling the whole production network based on the co-governance of all stakeholders. In every integrated production network, leading manufacturers, as the core manager, occupying the highest part of the value chain, possessing advanced technology and managerial experience, has the highest added value, so it can control the resources and production flows of the whole production network. Special capital that occupying the strategic link is of great importance in global production network, playing a very significant role in the formation and development of the whole network. Because special capital possesses all kinds of advantages, it can attract other capital, thus constantly developing and expanding the production network. This kind of special capital can gather other capital together to organize production, so it is called the core capital of production network. Core capital can be tangible, such as producer-driven technology, and it also can be intangible, such as purchaser-driven brand.

2.2 Network governance model and industrial upgrading potential

As it can be seen from the network governance model analysis that the way and degree of knowledge transfer are different as the models are different. From the perspective of supplier, different network models will directly influence the amount, complexity and value of knowledge and technology acquired from other manufacturers. Generally, it is most difficult for suppliers to get knowledge and technology from market-oriented production network. Then follow leadership-oriented network and modular-oriented network. And it is the easiest to get from relationship-oriented network, for the knowledge and information are diffused different stakeholders, which will be easier for suppliers to gain difficult knowledge. As can be seen from the analysis above, production network model controls the speed of industrial upgrading by indirectly influencing the difficulties that suppliers get knowledge.

3 The Influence of Policy Systems to Industrial Upgrading in the Network

Local industrial network upgrading is largely affected by the regional policy system. We can understand policy systems from two aspects of the local government policy and economic system. The former affects the formation and development of the global production network, the formation of industrial cluster in the production network depends largely on the local government policy, the latter mainly includes the technology infrastructure construction of the attracting foreign investment policies, human capital, etc.

Government should fully realize the importance of participation in the global production network for regional industrial upgrading, so local companies should be encouraged to involved in production and processing system of global production network more, while, this need support of policies, which includes financial, foreign exchange, taxation: First, providing preferential policies in terms of foreign exchange and tax, to create a good policy environment for the region enterprises to involve in production and processing of global production networks, such as import duty free export tax rebate policy for processing and manufacturing products of some key industries. Second, the processing enterprises must overcome technical problem, improve their level of technological innovation, which requires the support of government policies, including the provision of financial, tax and other aspects of support for the development of the underlying technology. Third, personnel policies, including the provision of technical personnel training, the information of talents flow unimpeded, etc, to meet the demand of external processing enterprises for talent.

Different economic system of a country will affect the efficiency of economic operation, and affect the speed and effect of network upgrading. Developed countries and developing countries have difference in economic system, the strategy and policy of industrial development, the path and mode of industrial upgrading, but most of leading companies of global production networks from the developed countries, as a result, many companies from developing countries and regions encountered all sorts of system constraints problems when they integrated into the global production network. Taiwan and Hong Kong of China has been able to achieve industrial upgrading rapidly through the global production network, the emphasis is the development of good economic system environment, select the appropriate industrial development and foreign trade policies, constantly absorbing and digesting the management experience and advanced technology from multinationals, improve their international competitiveness. In contrast, some countries and regions in Africa, lack of good economic system factors, lag behind in the incentive of the individual interests and maintaining of good competitive order, therefore, they cannot make full use of various advantages which is bring by the global production network, hinder the industrial structure upgrading and optimization.

We can explain why the global production network can achieve industrial upgrading by compare the policy system and economic system in policy of Asian and Latin American region. In Asia, due to the countries develop a good industrial development planning, produce technology and talent development strategies, take active foreign development policy, coupled with the influence of such factors as regional, cultural, making the production network in Asia developing rapidly. Since the late 1980 s, various measures are taken to all countries and regions to create a good environment to attract foreign investment, and encourage the development of foreign trade, attract foreign investment, such as lower threshold of the entrance of foreign investment, improve information level, increased investment in transportation construction, etc. In addition, Asian countries reduce the costs of product import and export, increase the competitive advantage of product import and export by setting various preferential policies of tariff, and on this basis to promote the formation and development of the global production network. Over foreign investment policy, tax policy measures have greatly reduced the transaction costs between manufacturers in the production network, play a key role in the process of the formation of the production network, and also promote the formation of regional industry cluster.

4 The Influence of External Environment to Industrial Upgrading in Network

4.1 Service link cost

Service link cost is the main cost of trans-regional production trade, including various coordination costs of transport, communications and other link over a long distance. Due to the international trade in global production network, the service link cost is higher than the domestic production, including various traffic, communication and other fees that come into being by enterprises from different region engage in production, management and coordination, which is important content of transnational trading costs, therefore, reduce the service link cost can promote the development of the global production network, and make enterprises from more areas participate in the global production network. Scale economy is the one characteristic of service link cost, so there will be a concentrated distribution in some areas of fragmentation of the production scale, to reduce costs, and also promote the formation of local industrial cluster, and this will in turn continue to reduce service link cost, forming a virtuous cycle effect. Therefore, in order to promote local enterprises more involved in global production network, share the benefits of global production network, should build good service system on the traffic and communication aspects, promote the formation and development of industrial cluster, thus reducing transaction costs across the region, and realize the industrial structure upgrade and optimization.

4.2 The development of related industry

In the process of promoting the development of industry, a part of industries share the same channel, service, and some common technology, is similar or complementary to each other, this part of the industries called related industry. Tend to develop in industry process, related industries gradually become a supporting industry group through continuous communication and cooperation, which has drawn the related manufacturers in the production network to the industrial clusters for the supplier, the arrival of the leading companies will make the production process of the industrial clusters increase, spawning many new production base, make more enterprises in the region enjoy the benefits of globalization; In addition, the reasonable division of labor in the related industry cluster can promote industrial independent innovation, thereby giving impetus to the development of the industry.

4.3 Factor conditions

Factor conditions include the region's labor supply conditions and the enterprises' technical conditions, these directly affect the high or low of production cost, and these are important influence factors for the local enterprises to enter global production network. Developed countries and developing countries and regions have difference in such aspects as resources endowment and economic development level, they have their own comparative advantage. Developed countries have a bigger superiority in such aspects as technical, management experience and brand, while the enterprises in developing countries and regions mainly rely on cheap labor and abundant resources advantage to enter the production network, but global labor wages increased significantly in recent years, if want to continue to maintain the local enterprise's competitive advantage and achieve industrial upgrading, then must improve labor productivity through the modes such as the transformation of devices and the upgrade of technological innovation, thus effectively absorb all kinds of knowledge and technology transferred from the network, realize industry upgrading in the form of absorption, consumption and re-innovation.

4.4 Demand conditions

The demand conditions of local and domestic market directly affect the product sales ability of enterprises, which are the important reasons of enterprises that participate in global production network to realize the upgrade. In the early stages of the participation of enterprises in the global production network, promoting domestic enterprises to continuously improve the level of science and technology, improving product quality, to improve the international competitiveness of products, which mainly rely on the international market that leading companies have, and then take advantage of all kinds of technology and knowledge acquired by the mechanism of the transfer and diffusion of the knowledge. As the local and domestic demand expanding, demand levels improving, could encourage local businesses to continue the innovation of product and technology to meet the demand of market diversification, improve the level of profits and speed up product upgrading.

4.5 Environmental foundation factors

Regional environment foundation conditions are important factor of whether multinational companies will set some production in the region, and then form industry cluster to promote local industrial structure upgrading and industrial optimization. In global production network, environment foundation factors including perfect infrastructure, such as the condition of the urban function supporting, traffic, communication, traffic communication, and government efficiency, and also including the ecological environment.

4.6 Geography and social cultural factors

Geography and social cultural factors are also the important factors influencing the formation and development of production network. The transportation cost between the regions that have adjacent geographical space is low, at the same time, the enterprises in regions could exchange easily when they have close socio-cultural background, reduce the cost created by the difference of culture or system, thus forming production network more easily. Instead, the transportation and communication between regions that have relatively distant is more, socio-cultural difference will also increase cost, and these are not conducive to the formation and development of production network.

5 The Influence of Enterprise Characteristics to Industrial Upgrading in Network

Being the microscopic body that participates in the global production network, technology, management efficiency and leader ability will influence greatly on whether it can realize the product and industrial upgrading through the global production network. While the external environment and opportunities are also the factors that could affect the upgrading of enterprises, internal factors of enterprises are the key when they in an increasingly competitive global economy, and are also the important factors whether enterprises can effectively use of external resources. Enterprise characteristics which mainly refer to enterprises' internal management mechanism and ability are the key determinants whether enterprises can realize the network upgrading.

Among them, the enterprise's own ability is mainly refers to the ability of absorption and innovation of knowledge. One of the strengths of global production network which is the new organization mode is can raise the level of enterprise technology through mechanism of the transfer and diffusion of the knowledge, and this is important approach to the promotion of local industrial upgrading. Only by the effective use of the knowledge that transfer through above two mechanisms and the continuous accumulation and digestion, can enterprises achieve technological upgrading. Between them, the process of knowledge diffusion is more important for enterprises to realize the network upgrading,

which is the process of knowledge internalization, including socialization, externalization, combination and internalization four stages, so as to build their own knowledge system. The knowledge internalization and ability promotion of processing enterprises depend largely on the enterprises' own condition. Specifically, mainly includes two aspects: one is processing enterprises' original knowledge base; the other is the strength of processing enterprises' absorption and innovation of knowledge.

6 Conclusion

For the upgrade of regional product, we need to create the learning processing and manufacturing enterprises, improve the learning efficiency and effectiveness; close to the leading companies of the global production network, get more knowledge transfer, gradually raise the level of production technology and management experience, improve the quality of products, and realize the upgrade and transformation of products from low value-added to high value-added. For the upgrade of ability of regional enterprises, we should improve the ability of absorption and innovation of the regional enterprise in China to make the leading companies in the network transfer more products or production processes of high technical content to the region, and improve enterprises' ability through the mechanism of the transfer and diffusion of the knowledge. For the upgrade of regional role, we could resist and bypass the inhibition of leading companies, improve their status in global production network, and that is the key of realizing the role for regional processing trade enterprises. For the upgrade of regional value chain, processing enterprises should make leading processing enterprises that embedded in the global production network as the core, widely absorb related enterprises' technology, make full use of resources from two markets at home and abroad to serve themselves, and realize the upgrade of production. For the upgrade of regional industry, the government must guide the investment of local foreign capital enterprises to local high-tech industry actively through various preferential policies, make more local enterprises into the global production network of high-tech industries; meanwhile, seize the development opportunity brought by the financial crisis actively, encouraging enterprises to participating actively in well-known enterprises of Europe and the United States to achieve a win-win result. For the upgrade of regional correlation and spillover, we should promote the entrance that intermediate input products in region into the global production network, improve the quality of the products, achieve the requirement of multinational companies in technology and quality; meanwhile, we should establish perfect logistics system, reduce logistics cost, and improve the income of enterprises; finally, we should promote the personnel flow between the foreign-funded enterprises and the regional, attract and retain talent, provide the guarantee of talent for the upgrade of the regional correlation and spillover effect.

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Study on the Problems and Countermeasures of Chinese Delay Retirement Process

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Abstract: Form the perspective of the demographic changes of China and the revolution of the retirement system of the developed countries, we have found that in China the delayed retirement age would become the main reform direction in the near future. The necessity of delayed retirement age of China is elucidated with the pension gap problem under its ongoing retirement system. Adjustment of the delayed retirement age would confront with generous problems such as the reform of our social policies. Thus, the essential causes of the postponing retirement age are studied profoundly, and several countermeasures are proposed to delay the retirement age of China.

Key words: Delayed retirement; Pension gap; Problem; Countermeasures

1 Introduction

Lead into an aging society in the era of changing population structure, the international community has implemented delay retirement policy to deal with pension gap. However, how to overcome obstacles delaying retirement become the universal challenges. In China, the delay retirement policy is also an inevitable trend; and in the process of implementing delayed retirement policy, China would encounter numerous resistances too. We intend to study delay retirement to find out what influencing different labor groups, income changes to different people before and after their retirement in the current income distribution system, delay retirement policies affecting on youth employment issues. Then, we would reveal out the main problem of delay retirement that China confronted with. Finally, several effective countermeasures are put forward to solve the problem.

2 The Background of Delayed Retirement Issues in China

2.1 Chinese population structure changes lead to an aging society

The sixth national census data released that, China, the world's most populous country, has a population of approximately 1,339,000,000 people in 2010. With the implementation of the population policy about birth control of China, its birth rate has evolved from 12.4 ‰ in 2005 down to 11.9 ‰ in 2011, as shown in Figure 1. Though Population growth has been effectively controlled, issues that the labor force growth rate is lower than that of non-labor has appeared. The labor force will begin to decline; aging population will accelerate, until in 2039 it will begin to decline. That is, the demographic dividend period is coming to an end in China; the situation that less than two taxpayers supporting a pensioners will come in 2039.

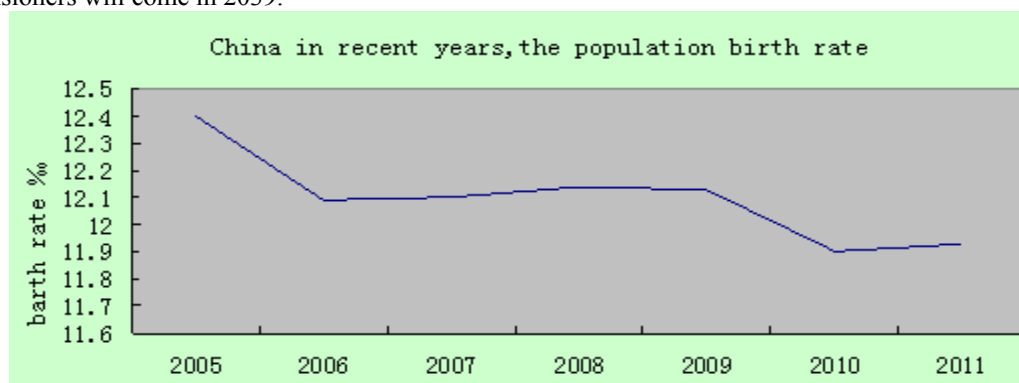


Figure 1 The Birth Rate in Recent Year in China

From the view of demographic point, children aged 0-14 account for 19.8% of the total population in 2006 which dropped to 16.5% in 2011, 65 years of age or older showed a growth trend which was 7.9% of the total population in 2006 and reached 9.1% in 2011.(as shown in Figure 2). The proportion of the child population reduced, the proportion of the elderly population increased, trend towards an aging

society was obvious.

Internationally, when people aged 65 or older account for 7% of the total population, it means that people in the country or region are in the standard of aging society. China is one of the highest aging degree countries in the world, the population of 65 years of age or older has nearly been 130 million, occupied 9.5% of the total population. The number of 65 years of age or older in China will exceed 200 million, reaching 202 million, which occupied 14.8% of the total population. In the whole 31 provinces, 26 of them has entered the aging state. By 2050, this figure will reach 432 million people, which is more than 29% of the total population.

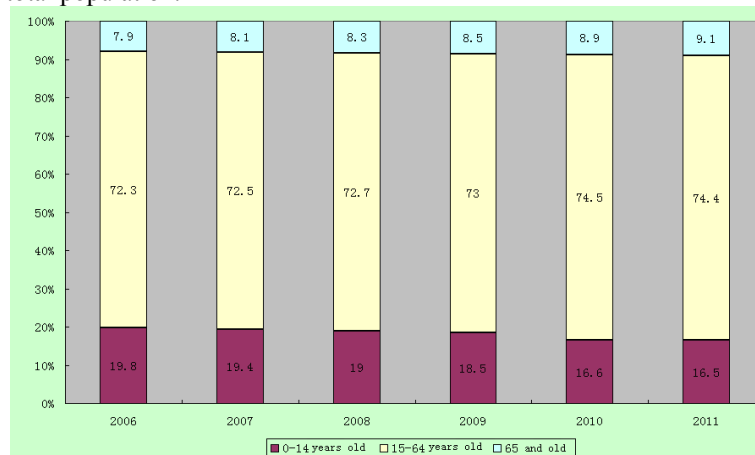


Figure 2 The Population Structure in Recent Year in China

Moreover, the longevity expectancy of the Chinese population has shown a steady upward trend. During 1980 to 2010, which average increase about one year every five years. If the existing retirement age policy (male 60, female 55) does not change, it means that after retired elderly population will increase longevity, the pressure of pension payments will rise. Pension issues of aging society can not completely burden on the young people; it can not rely on the existing pension either. Only by extend the retirement age, let older people extend their youth can help to solve this social problem.

Fertility declining, longevity expectancy increasing, and the proportion of the elderly population increasing are the signs of an aging society. In the long term, with the demographics changes especially the labor structural changes, couples with the longer longevity expectancy, extending working hours, delays retirement is the only trend.

From the “Young China” to “old China”, China complete this process for less than 20 years when western countries usually for decades or even a hundred years.

2.2 The policy changes under the oppression of retirement pension gap

In 1990s our country has set up the basic pension insurance system, the pension is constituted of the social pooling and individual accounts, and the social pooling is burdened by the unit, currently occupied 20% of total wages. The individual accounts are burdened by stuffs, occupied 8% of individual wages. Pensions paid for the retirees who retired before the establishment of the pension system, burdens by the subsequent contributors, which caused the system cost. When compared with the uptime about insurance system of American-European, China’s pension system is much younger. So there are some big problems in somewhere such as perfection in the pension system, pension accumulation funds, and pension funds operate. Exactly the 20 years running time of pension insurance is just the period-rapid development of China’s economy. Over the past nine years, China’s CPI averaged 2.2%, but investment yield of pension account is less than 2%.As the higher is CPI, a huge loss of welfare formed. Meanwhile, the urban social average wage over the last 10 years has grown at an average of 15%, made the actual purchasing power of the pensions declining. By 2013, the pension gap would reach 18.3 trillion RMB. If the current pension system does not change, the gap will enlarge year by year. Supposing GDP growth rate is 6%, by 2033 the pension gap will reach 68.2 trillion RMB, occupied 38.7% of GDP. Because of the impact of aging population, the number of retirees will increase; the country will spend more and more money on pensions.

Facing with common practice in many countries which have delayed retirement age policy recent times, many scholars have proposed that the proposal to make up for pension gap by extending the retirement age. With statistics showed, every one year it delayed for the retirement age, pension pooling

funds will grow by 4 billion RMB, cut down on expenses about 16 billion RMB, reduce pension gap about 20 billion RMB. Then after 10 years it will be able to slow down the gap about 200 billion RMB.

China can not cope with the current retirement age policy challenges raised by aging. According to World Bank data, only in the past 25 years, the average longevity expectancy in China increased from 68 to 73.5, which has reached the level of moderately developed countries, and the trend is still rising rapidly, but the corresponded birth rate is declining. Therefore, it can be predicted that the extent of aging population in the coming period will continue to deepen. “Old before getting rich” in China will face a series of challenges in the proportion of the labor force, The inflection point of the human dividend stock reduces is coming, and demand for social security will increase. Those can be seen from the increasing burden of pension fund. View from the institutional dependency ratio, population aging caused by increased proportion of elderly population, and lead to increasing demand for pensions. From the self dependency ratio, increasing longevity expectancy implies for extending the time of pension supplied. This structural change makes it more difficult for pension funds. Gradually, extending the retirement age is undoubtedly an effective measure to strengthen the financial pension system, both to increase the contribution years of labor, and to reduce pension benefits.

The current retirement age policy basically follows the general provisions of “Labor Insurance Regulations” (1951) and “the retirement Interim Measures of the staff of state organs” (1955), it can be summarized as “Male’s retirement age is 60, female cadre’s retirement age is 55, female work’s retirement age is 50 when she has served over 10 years”. It should be noted that after 60 years in this policy, lower retirement age, retirement age gap between men and women and other issues have become increasingly apparent. Apparently it can not be able to adapt to the rapid growing and changing economic, society, and population, and it can not comply with the international rule of a general increasing retirement age in most countries either. With the continuous development of social economic and increasing average longevity expectancy, it is said to be an inevitable trend to delay the retirement age appropriately.

2.3 The trend to delay retirement in international community

After experiencing the debt crisis in Europe, it was just the measure to delay the retirement age to ease the burden on national fiscal expenditure in many European countries. Throughout the world, especially in the past two or three decades, both developing and developed countries are dealing the pension gap bring by the aging society with delaying the statutory retirement age, most of which are expected to increase the retirement age 2-5 years in the early 2030s. It can be seen that almost international communities who entered the aging society have use the usual tactics as delaying retirement, the difference is to the duration of retirement, and the period of the implementing policies. Even now, the delayed retirement policy in these countries is still running. The retirement age is still changing, but it is much longer than that in China (male 60, female 55), as shown in Figure 3. In American-European developed countries the retirement age for male is 10 years later than that in China, and for female is 5 years later. So view from the international community, delaying retirement pension is the only trend to solve the aging-society problem for China.

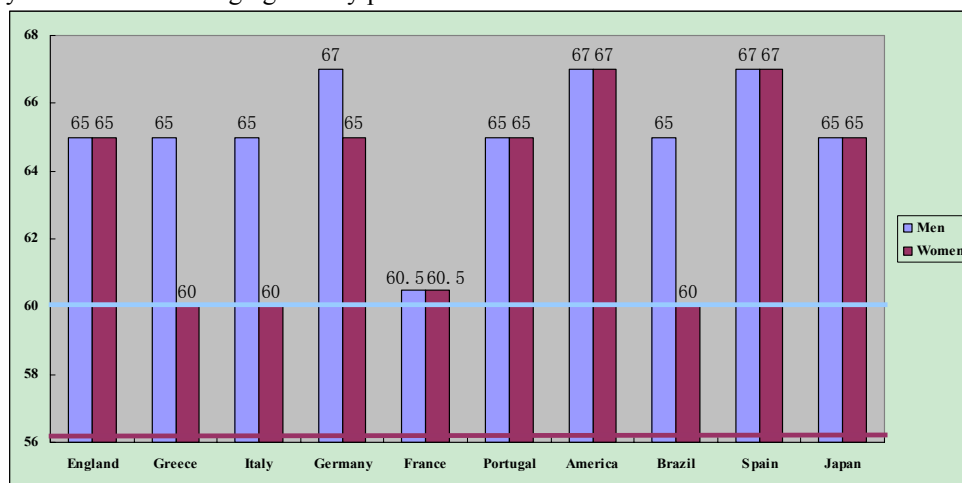


Figure 3 The Retirement Age in Developed Countries

3 The Problem to Implement the Policy of Delaying the Retirement Age in China

3.1 The diversity of labor issues brought by delaying retirement age to different group

Delaying age of retirement is a comprehensive social policy; implementing such a policy should balance the demographic change, employment conditions and the developing requirements of social security systems. From policy, technology, methods to take into account the interests of all social strata can promote the reform of retirement policy effectively. Except for a number of officials and experts expressed to support the delayed beyond retirement policy, general public conveyed voice through various means, especially by the network media, and almost unanimously opposed the implementation of the delay-retirement-policy. According to the survey results shown by www.china.com, only 2.3% of respondents indicated clearly that they support the delayed age for pensioners, while 94.2% show the opposite attitude, as shown in Figure 4.

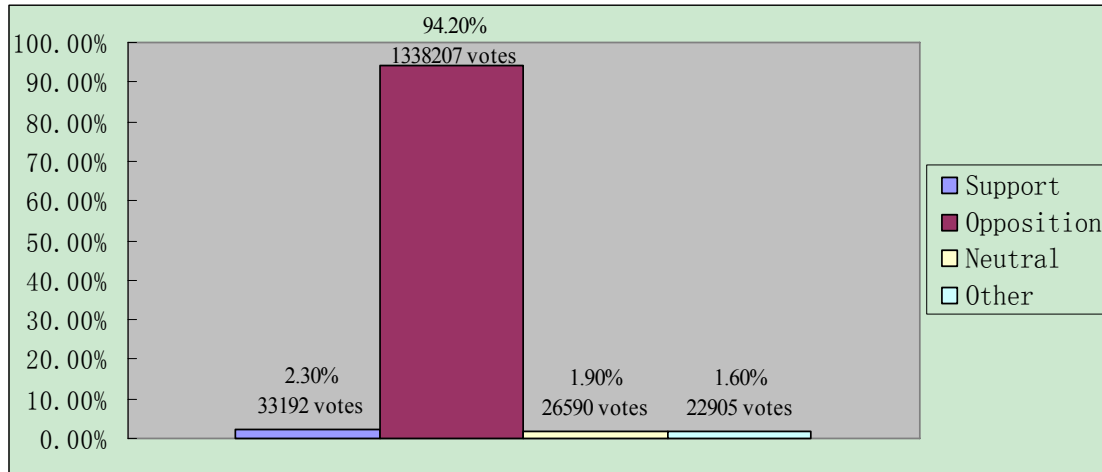


Figure 4 The Result Surveyed by www.China.com

Why there are so many objections about delaying the retirement age while the policy conform the social development. To this issue, we conduct further analysis and find that supporters are mainly technical staff, university teachers, civil servants, managers and other so-called white-collar groups because at the time their careers is coming in a stable developing stage, and have stable and substantial incomes. Especially some of them master the powerful management positions near retirement age. Therefore, these groups of people are often willing to extend the retirement age. While the so-called blue-collar groups, such as migrant workers, the general population and other social enterprises in the production line workers, are opposed to the extension of the retirement age. Because the work they are engaged in has great labor intensive, low wages, poor working condition and poor physical condition, they do not want to continue to engage in the original post. With depth study, a significant difference exists about the income between “supporters” and “opponents” before and after retirement. On the other hand, opponents raise objections that delay retirement age is also not conducive to youth employment problems.

3.2 The obvious difference of incomes for different people before and after retirement caused by existing income distribution system

Like other developing countries, in the pursuit of economic growth process there is the problem of unfair distribution of income in China. For example, the unequal assigned status lead to that some members of the community have a strong position participating in income distribution. They are able to earn high incomes, even privileged access to earn a large number of non-normal incomes. While some workers keep in a vulnerable position, only get low-income, or even unable to participate in the distribution of income, such as arrears of wages. Unfair allocation criteria, namely workers pay different for equal work. Some of the members have high-income standard, such as workers in monopoly industries; some of the members have low-income standard, such as non-monopoly industry workmen, especially front-line workers, migrant workers. Unequal distribution means that some members can only obtain labor incomes, while some members can also obtain non-normal income, with capital, technology and other factors of production income by virtue of powers means.

“Delay Group” belongs to gainers in the current income distribution system, in addition to the normal wage income in a comfortable working environment before retirement; they can earn bonuses,

benefits, research remuneration and even the gray income, etc. Once retired, other incomes disappear, they can only earn retirement incomes. Maybe they can not endure the huge gap after retirement, so they would like to extend the retirement.

“Retirement Group” belongs to losers in the current income distribution system; they work very hard with large amount of labor while their working conditions are generally worse than white-collar workers. In addition to wages, there is scarcely any other income, and there is little difference in wages between on the job and retired for them. So they do not want to extend the retirement.

3.3 The youth employment challenge brought by the delayed retirement

In the era of world economic integration, affected by the downturn of the global economic, the employment situation in China is very grim. Since 2012, economic growth in China has slowed down. GDP growth fell from 8.1% in the first quarter to 7.6% in the second quarter, and the third was 7.4%. Employment will drag by the economy, so the employment situation is even more severe.

Besides the demand market, it is difficult to expand production or provide more jobs, especially newly added white-collar jobs are limited. What's worse, the number of college graduates is steadily rising, the situation will be more severe to those graduates from in-service education. Only retirees release their existing jobs currently, can youths take the position. Delay retirement means the vacated positions would kept by delayed retirees. Young people can not get jobs and affect employment rates, at last will bring employment problems.

In order to successfully implement the policy about delaying the retirement age in China, it is necessary to improve the working environment, wages of the blue-collar group and resolve the issue about employment of young people.

4 Some Countermeasures to Solve Problems about Delayed Retirement

4.1 Improve the treatment of blue-collar workers from multiple channels

The main objectives to delay retirement are those blue-collar men who are in fair or poor job. There are not much different between their retirement pensions and wages on the job. So they are willing to take retirement pension early, then they can get pensioners while find another career, these are their expect life in old age. Due to blue-collar workers transfer different positions after retirement, the possibility of reduced income, blue-collar worker's motivation might be affected. It is proposed to adopt a multi-channel to improve the treatment of blue-collar workers to deal with retirement measures.

For sustainable development of the unit, many enterprises have earmarked expenses which are devoted to training of human resources for new employees. A portion of this budget can be used to subsidize the blue-collar workers because they can be engaged in helping with young people to develop enterprises. Indirectly, it can help the unit to save the cost for human resources training. Part of the development fund can be also extracted to improve the research environment. Thus, they can work in mental with a relatively comfortable working environment. With their experience and skills they can contribute to the sustainable development of the unit. Also, we can take temporary units personnel expenses from business administration fee to pay for those blue-collar delayed retirees. Meanwhile, state departments establish series of related sponsor policies about relief delay retiree pension obligations, indirectly increase their wages.

With a series of policy measures, the blue-collar workers would gain increased wages and improved working environment during the delayed retirement so that they are willing to delay retirement. But part of the increased revenue should not be offset by personal income tax. Appropriate policies should be set up to ensure the blue-collar workers' personal income when they postponed retirement. However, eliminating personal income tax of all retirees is not conducive to social justice, Owing to the original income of white-collar workers is high, this policy can not narrow the income gap. Raising personal income tax threshold is relatively better to protect blue-collar workers, and then they get benefits during the delayed work and support the delayed retirement policy.

4.2 Take the “small step” instead of “flexible delay”

The “flexible” in the flexible delay retirement policy implies voluntary. It can give individuals the option. Flexible selection can be based on individual physical condition. The public has the right to be self-selection, so the policy may be more easily accepted. But view from the whole society, generally it is not appropriate to delay retirement in manufacture. Suitable industries concentrate on mental industry, that's why white-collar groups are willing to delay retirement while blue-collar groups do not want to delay retirement. However, the current implemented pension is a dual system, which means white-collar groups essentially pay no pensions, so there is no help to reduce the pension gap. On the contrary it is

precisely the subject of pensions paying are blue-collar groups. So there is no use to ask workers to choose whether to work longer or not according to personal preferences as the flexible delay retirement policy for the pension gap.

Extending the retirement age is a lengthy process; it won't be set up immediately. It may take one decade, two decades or even longer to complete this process in a foreign country. "Early decision, small step, step by step", the retirement age can be delayed 1 year every 3 years and gradually rising to 65 years old. As the plan, before 2030, retirement age will reach to 65. This is also a common mode of operation in a lot of international developed countries.

4.3 Take "off-the-job" and not "retired" working mode

In the period of to delay retirement, the original managers in leadership positions must be stepped down in order to avoid getting more personal interests with power, generating more social conflicts and affecting the enthusiasm of blue-collar groups. University teachers, senior technical staff can quit teaching, researching and other first-line positions, concentrate solely on research work, To think about problems in the development of the frontier, to summarize profession problems in the research area, to guide Follow-up echelon members solidly inheritance technique. The enterprise employees of blue-collar groups exit the first line of production in the period of retirement, because there is no longer a problem with apprentice graduated master starved, they can turn to helping the young workers, and teach newcomers with valuable experience. Or they can get a reorientation work to design new products, or play an advisory role in development planning in the unit. Getting out of the first line of production, the blue-collar groups work with mental, both improve their working environment, and reduce the amount of labor, improve the production skills of young workers, develop more new products to enhance the competitiveness of the unit, create a higher productivity.

As the original groups of retired officers get out of the front-line jobs, vacated jobs can be complemented by subsequent staffs. There are still new jobs to recruit new staff, so it's no need to worry about the employment issues due to the delayed retirement age.

5 Conclusions

Based on the analysis of the main problems named implementation delay retirement policy that China confronted with, we put forward many channels to improve the blue-collar delay retirement staff treatment. Several countermeasures such as using the "small step" instead of "flexible delay" strategy, take "off-the-job" and not "retired" work strategies are proposed to solve problems of Chinese delay-retirement policy.

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The Study of Employment Problem of Post Graduates in Guangxi Beibu Gulf Economic Zone from the Perspective of Labor Market Segmentation

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Abstract: The development of Guangxi Beibu Gulf Economic Zone has provided lots of job opportunities for post graduates. As personnel training bases, universities in Guangxi province play an important role for supplying talents. Although enterprises in this area demand lots of post graduates, the employment problem is still serious. In order to solve the problem, we plan to set up a unified labor market and a public employment service system for the top-level and middle-level talents in Guangxi Beibu Gulf Economic Zone. Meanwhile, we also aim to promote the informatization of labor market, and offer compensatory salary to post graduates. In order to cope with serious competition, universities should train postgraduates to have mature skills and students should strive to improve their comprehensive quality. Therefore, this paper focuses on how to improve the service of Guangxi Beibu Gulf Economic Zone's labor market, and how to improve the comprehensive quality of post graduates.

Key words: Guangxi Beibu Gulf Economic Zone; Labor market segmentation; Post graduates; Characteristic of employment's behavior; Questionnaire method

1 Introduction

Since January 16, 2008, the Chinese State Council approved the implementation of Guangxi Beibu Gulf Economic Zone Development Plan, which provides unprecedented development opportunities for the Beibu Gulf region, and the Beibu Gulf region entered a new stage of the leaps and bounds. Nowadays, the economy of the Guangxi Beibu Gulf Economic Zone grows very fast, but the talent is the key to fast development in this region. Nine industrial base strategic decisions in Guangxi Beibu Gulf Economic Zone have huge demand of highly educated graduates with high skills. Local government and employers have realized that the talent is an important support for economic development, and they have paid a great effort in the talent introduction^[1]. However, the high-end talent is still scarce in the Guangxi Beibu Gulf Economic Zone. Looking back to the beginning of the Reform and Opening up of China, the Shenzhen Special Economic Zone and other economically developed areas grew very fast, one reason is there were lots of high-quality talents. Therefore, if the Guangxi Beibu Gulf Economic Zone wants to be the new economic growing pole, a unified labor market should be established to attract talents

Guangxi Beibu Gulf Economic Zone develops very fast and it provides lots of job opportunities for post graduates in Guangxi. As the personnel training bases, universities in Guangxi play an important role to supply talents. Since the restoration of college examination system, Guangxi Higher education enhances their ability of management and postgraduate education develops fast. The number of post graduates in Guangxi increased from 747 in 1995, to 5774 in 2003, 13291 in 2006, and 16570 in 2008. With the expansion of postgraduate education, there is no huge advantage for postgraduates compare with undergraduates when they hunt jobs, there is no academic advantage compared with the doctoral. In fact, they has gradually become an awkward group in society, also employment situation is not satisfying. Take the example of Guangxi University, there are 6300 total graduates on July 31, 2010, and the employment rate was 90.41%. Among them, 29 students were Ph.D graduates, and 28 students were employed and employment rate was 96.55%; 1551 students were post graduates, and 1336 students were employed, and employment rate was 86.14%; 4720 students were undergraduates, 4332 students were employed, and the employment rate was 91.78%. The employment rate of post graduates is lower than the average employment rate in the whole university.

Although the enterprises in this area need post graduates for working, there are difficulties when the students from universities in Guangxi hunt jobs. The reasons that lead to this paradoxical phenomenon are the rising enrollment, the financial crisis, university education mode, and imperfect

labor market^[2]. The crucial factor is the labor market segmentation in Guangxi Beibu Gulf Economic Zone, through studying the theory of the labor market segmentation and analyzing the operation condition of labor market in Guangxi Beibu Gulf Economic Zone. Base on the systematic summary of relevant literature, this paper discusses the characteristic of employment behavior of post graduates in Guangxi under the background of the labor market segmentation in Guangxi Beibu Gulf Economic Zone by studying the employment preferences and job hunting^[3].

Enterprises in Guangxi Beibu Gulf Economic Zone want to employ lots of post graduates, but the employment rate is still small. I think the main reason of this difference is the post graduates have obvious preference to the major labor market where the position is limited under the background of the labor market segmentation in Guangxi Beibu Gulf Economic Zone. Therefore, the unemployment of post graduates mainly is the structural unemployment. Meanwhile, institutional labor market segmentation also constrained the development of our country employment support policy. In order to solve the problems, we need to construct a unified labor market in Guangxi Beibu Gulf Economic Zone, and set up the senior personnel public employment service system and accelerate the informatization of labor market, and break the monopolies, and deepen the reform of household management system in gulf region, and promote the ability of absorbing employment promotion to the non-public economy unit, and offer compensatory wages, and complete the work of the cultivation of post graduates, and improve their comprehensive quality, and etc.

2 Improving Labor Market in Guangxi Beibu Gulf Economic Zone

2.1 Constructing the unified labor market

Chinese labor market segmentation is the consequence of dual economic structure, and it leads to high cost of job changing which reduce labor mobility, limits the efficient allocation of human resources, and restricts employment success of masters who have clear preferences in employment units and areas. Therefore, to alleviate the graduate employment problems in Guangxi, institutional barriers need to be eliminated, and the monopoly and labor market segmentation need to be broken, and a unified labor force market needs to be established^[4].

As the history of Guangxi Beibu Gulf Economic Zone labor is not long, the situation of segmentation here is much more serious than the developed region's and it cannot be completely eliminated in a short term. Setting up the unified labor force market is a long-term and formidable task. Thus, the integration of the labor market should be promoted based on the regional development of the labor market situation and introduced the advanced experiences from advanced regions, and it prefers to the allocation function of the market on labor resources instead of the mandatory administrative intervention of the relevant functional departments. Similarly, speeding up construction of the legal system to provide an institutional guarantee for building a unified labor market and reducing the cost for job hunting and conversion is the good ways to attract talents to come to this region^[5].

2.2 Establishing a public employment service system for the top-level and middle-level talents

Talents are very important supports for regional economy and industry development. Accelerating the pace of opening up and development of the Beibu Gulf Economic Zone and the strategic decision of nine industrial base constructions requires all kinds of talents^[6]. A consensus has been developed between governments and enterprises here on introduction and cultivation of talents and there are many preferential policies on the shortage of talents. However, the effective employment policy has not yet been introduced by local government to improve the public employment service system due to the differences in Beibu Gulf regional economy development. Beibu Gulf Economic Zone has not yet established a harmonious public employment service system for different kinds of talents which limits the cities' employment services, and the existing employment service organizations have not been fully utilized to adjust talents flow and jobs creation, which is caused by its feature of strong administration, low marketing, weak base and less efficiency. The regional governments in Beibu Gulf should take some effective measurements to fulfill its public service functions, and improve the public employment service system, and accelerate the flow of professionals who are urgently needed in this area and provide open and transparent labor market environment to reduce the costs of talents flow and transaction. With the increasing scope and intensity of the regional economic cooperation in the Beibu Gulf, market brings forward the new requirements to talent flow. Therefore, Guangxi Beibu Gulf Economic Zone need to set up a trans-regional middle and senior talent public employment service system to reduce the impact of labor market segmentation on the talent flow for the establishment of unified labor market of the Guangxi Beibu Gulf Economic Zone.

2.3 Accelerating the informatization of labor market

The efficient and convenient information platform will benefit the establishment of flexible labor markets in Beibu Gulf Economic Zone, and the timely information of labor supply and demand which is provided by higher levels informational labor markets can optimize the allocation of labor resources and speed up the unification process of the labor market in the Guangxi Beibu Gulf Economic Zone. Although the Web portal of recruitment and job hunting for Guangxi Beibu Gulf Economic Zone was established with a top-level talent section, but there are only 84 records in almost four years, and compared with that in developed regions the gap is still quite big, and the ability to provide services for both the labor supply and demand should be improved^[7]. Therefore, it is necessary to speed up the process of information-based labor market to improve its service for talents, which is an important measurement of perfecting employment service system for middle and senior talent public.

2.4 Breaking monopoly of industry

Labor market wage mechanism does not accurately reflect the relationship between labor supply and demand under the administrative intervention. The income gap between different industries in Guangxi Beibu Gulf Economic Zone has evident features of inter-industry labor market segmentation. The monopoly industries have higher wages, better benefits and working environment, while competitive industries is just the reverse^[8]. The big difference between these two industries caused that graduate students prefer to stay unemployment or continue to hunt for the company in the primary labor market. Even they cannot enter the primary labor market successfully rather than enter the secondary labor market to work. Therefore, the government needs to improve the mechanism of competition, gradually weaken the preferential policies on the protection of the monopoly industries and break the inter-industry labor market segmentation, to establish an equal competitive labor market.

2.5 Enhancing the ability of non-public economic units to absorb employment

In general, non-public economy in Guangxi Beibu Gulf Economic Zone grows rapidly under the market-oriented policy, individuals and the private enterprises as the primary non-public economy have become an important channel to absorb employment with diverse and flexible ways. However, compared with some developed regions in China such as Zhejiang, the gap is still big that the scale of non-public enterprises in Guangxi Beibu Gulf Economic Zone is small, and the productivity is poorly competitive. Therefore SME is difficult to start business and development mechanism is not fully developed. Traditional channels of employment in state-owned units, urban collective units still absorb lots of employees in urban areas, but the number is decreasing. There is some gap in non-public economic development between Beibu Gulf regions due to the economic, historical reasons and non-public employer in Nanning has become the main channel for creating jobs. In 2008, the proportion of working in non-public enterprises is more than that in public departments, and was 52.3%. In contrary, the public departments are the major employers in Beihai City. In 2008, the proportion of people working public departments is 77.6%. In order to broaden employment channels for post graduates, Guangxi Beibu Gulf Economic Zone should make efforts to develop non-public economy (Table 1).

Table 1 The Employee Distribution of Four Cities in Beibu Gulf (2008)

City	Nanning	Beihai	Fangchenggang	Qinzhou
Employees in cities and towns (ten thousand)	84.39	10.33	13.33	24.52
State-owned unit enterprises	37.95	7.23	5.79	9.46
Collectively-owned enterprises	1.99	0.79	0.87	0.88
enterprises invested from HongKong, Macao, and Taiwan	0.85	0.36	0.06	0.30
Foreign-investment enterprise	1.21	0.79	0.26	0.32
Private enterprise	28.34	-----	1.51	3.81
Individuals	18.62	-----	3.98	8.17

Note: The range of statistics is the entire city

Data source: Guangxi almanac 2009 and Guangxi statistics almanac 2009

3 Cultivating Qualified Post Graduates in Guangxi

3.1 Gradually optimizing the disciplinary structures of universities

Efforts on talent education and training applicable talents for the Beibu Gulf economic construction

are incumbent on the Guangxi Universities. The more the needs of graduate students during the economic development, the more requirements needs to be proposed on universities postgraduate training mode and structure, and that also will bring opportunities and challenges for universities postgraduate employment. Disciplinary structure is strongly correlated with regional economic development, which is a concrete manifestation of the higher education resource allocation and an important platform to carry the three main functions of higher education. With the adjustment of industrial structure, disciplinary structures in universities of Guangxi need to be optimized gradually to suit the needs of economic development. The development of disciplines in universities in Guangxi are growing fast, such as Management, Education and Law, which is in line with the trend of industrial structure from the primary industry gradually shifting to the secondary and tertiary industries, while Philosophy, History, Literature and other similar discipline are developing slightly slow. Considering that the opening of Beibu Gulf is not long, it becomes increasingly important to optimize the disciplinary structure to cultivate applicable talents for the Guangxi Beibu Gulf Economic Zone (Table 2).

Table 2 The Number of Post Graduates in Different Disciplines in Guangxi Universities

Year	2003	2004	2005	2006	2007	2008
Total	875	1461	1623	2492	3528	4363
Female	355	608	720	1171	1606	2063
Philosophy	45	53	65	99	99	102
Economy	51	76	56	81	89	171
Law	29	53	84	113	196	260
Education	36	57	70	112	171	250
Literature	165	209	210	356	466	526
History	22	29	29	48	62	81
Science	95	194	180	293	456	528
Engineering	214	404	466	667	881	1044
Agriculture	47	96	117	164	172	195
Medicine	149	181	224	370	582	752
Management	22	109	122	189	354	454

Data source: Guangxi education almanac from 2004-2009 year

3.2 Carrying out employment education for graduates

The employment guidance institutions of universities in Guangxi need to strengthen employment guidance and career planning for graduates. Meanwhile, universities need communicate more with employers to maintain close contact with the labor market, understand well the market demand what types of talents is shortage, and then widen the channels of employment of graduate students. During the process of education, universities should focus more on practical ability of graduates, to improve graduates comprehensive quality, employability and competitiveness. For this reason, universities employment guidance institutions should construct graduate internship platform to open the unify channels of internship to employment, guidance staff to provide timely services to graduate students in their job hunting. Most universities offer career guidance courses and actively explore new courses. In 2009, Guangxi University began to use external platform to carry out pre-employment education, their enrolment and vocation guidance center cooperated with the Times Honor International Education Science and Technology Co. Ltd (Beijing), brought in pre-vocational education network school. In this way they accumulate quality education resources and can provide vocational education programs for graduate students and improve their competitiveness in the job market.

4 Elevating Graduates' Comprehensive Quality

With the development of Guangxi Beibu Gulf Economic Zone, more and more college graduates from other provinces and cities regarded Guangxi Beibu Gulf Economic Zone as a new employment hotspot, employers of part of the Beibu Gulf region will hold special recruitment in other provinces colleges when graduates in Guangxi couldn't meet their requirements. Graduates from other provinces, the undergraduates, Ph. D and other practitioners of the Guangxi region all might be competitor.

Therefore, during the school time, postgraduates should strive to improve their overall quality to cope with the fierce competition for talent. On one hand Postgraduates from Guangxi should train themselves to be person with good theoretical knowledge, practical skills and creative ability to success in competition. On another hand, they should take an active part in social practice, to improve practical ability and interpersonal skills, and keep close relations with society. Employers need skillful talents who can set to work immediately, so postgraduates had better to actively take part in social practice, and combine scientific research with social practice, and find internship opportunities to improve their overall quality and get fully preparation on vocational skills and mental diathesis during the school. This is much better than adapting to the workplace and society gradually after step into the work passively. Through the research interviews, we found that the when the employers recruit graduate students, they more focus on the practical ability. They prefer graduates with combination of theoretical knowledge, practical experience, a positive attitude, and appropriate expectations. As the manager of the recruitment said, there are some understanding deviations during graduate students hunting jobs.

This research also found that postgraduates of Guangxi obviously prefer to job with high wages, but when the salary does not meet their expectations, they usually decide to have a voluntary unemployment and continue hunt another job, but this can cause waste of talent. In the case of incomplete labor market, the postgraduates should reduce salary expectation, and set a reasonable target, and take a job at first then select different careers, which is a more wise choice. Meanwhile, postgraduates in employment should adjust mindset, and start with the basics, and never be too ambitious.

Internship is the best period to adjust attitude, gain experience, and change to social style from the style of student. Postgraduates should clearly understand that solid theory cannot compete with practical ability. They should forget the degree factor and learn more from older employees, and think more of the units I need to do rather than what the units can provided for me. They also constantly absorb new knowledge in accordance with the requirements of the job, but not limited to their own professional range. At the same time, they must learn how to be mannered, as the ultimate goal is to mainstream their selves into the society, to create value for society. Whether or not they can get the maximized society support and recognition is decided by their own social level, taste and the way of dealing with others.

5 Conclusions

The segmentation of labor market will affect employment of postgraduates for a long time. Although Guangxi Beibu Gulf Economic Zone has great demand of postgraduates, the overall employment situation is not as good as expected, as there is obvious labor market preference. How to let postgraduates play a greater role as a high-level talent under the severe employment situation is worthy issue to discuss. In summary, the developing of Guangxi Beibu Gulf Economic Zone brings opportunities and challenges for postgraduates' employment; and we must accelerate the pace of constructing the labor market to build a unified labor market. Furthermore, we must cultivate postgraduates to enhance their comprehensive quality to promote employment.

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Normative Management of College English Teaching Mode*

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Abstract: English is one of the most important information carriers. The reform of college English teaching mode is the inevitable result of the development of information technology. Normative management is the key to ensure the smooth and effective implementation of college English teaching reform. This thesis probes into the normative management of college English teaching mode, aiming to improve college students' English comprehensive application ability and teachers' overall teaching and research quality.

Key words: College English; Teaching mode; Normative management; Reform

1 Introduction

As is known to all, the 21st Century is the century of economic globalization, the integration of science and technology, and the coexistence of information, knowledge and economic. Because English is one of the most important information carriers, our society is desperate for professional and technical personnel proficient in English. In order to cultivate talents of this era, the Ministry of Education has invested substantial manpower and financial resources into the comprehensive research on the current situation of college foreign language teaching, finding that "At present, The English comprehensive application ability of China's college graduates is generally low. They can't listen, speak or write well." (Zhang Hengzhen, 2004) How to reform the current teaching mode, teaching methods and improve the efficiency of foreign language teaching has become the common concern of the foreign language field.

The purpose of college English teaching reform is to make the students acquire more English knowledge and thus enhance their English level, through reforming the English teaching mode and improving the teaching efficiency on the premise of not increasing students' learning burden. In China, English learning basically relies on classroom teaching, but the success of college English teaching relies more on developing students' autonomous learning after English class. The rapid development of modern information technology, especially the development of network technology, is breaking the traditional English teaching mode. Instead there is a student-centered, communication targeted, open, vibrant and dynamic teaching mode. The various characteristics of multimedia computer technology and network technology can effectively promote students' cognitive development, and particularly be suitable for the realization of the constructive learning environment, such as "situation", "cooperation", "conversation" and "meaning construction". In a sense, the reform of college English teaching mode is the inevitable result of the development of information technology. Normative management is the key to ensure the smooth and effective implementation of college English teaching reform.

2 The Normative Management of College English Teaching Mode

2.1 With the leaders' attention and the department cooperation

College English teaching reform is a systematic project, involving the school teaching management departments, the modern information technology departments, and the teachers and students' active participation and cooperation. Among all the factors, the leaders' attention is the essential and the department cooperation is the guarantee. Only with the school leadership's enough attention and the close cooperation between the various departments can the college English teaching reform carry on smoothly and effectively.

Our school has established college English teaching reform leading group in March, 2004: the school vice president in charge of teaching as the group leader, and the deputy director of the Academic Affairs Office and the vice president of Foreign Language School in charge of teaching as the vice group leaders. The members include the head persons of the Academic Affairs Office, the Supervision Department, the department of modern educational technology, the network center, the teaching office of Foreign Language School, and the college English teaching department of Foreign Language School. The leading group holds 2-3 symposia each semester to research, coordinate and solve the problems in

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the teaching reform.

2.2 Changing ideology and unifying understanding

College English curriculum is an open system and it is the result of separate interaction of teachers and textbooks, teachers and students, students and textbooks. Teaching and courses are open, interactive, and interlocutory. Learning is not only the process of imparting knowledge, but also questing for and creating knowledge. Learning is the process of knowledge construction. Students should not be satisfied with knowing the content, but knowing the possibilities of what might be, in order to create a possible world. During the study, students should take the initiative to select and explore, to enhance the capacity of independent thinking and judgments. (Zheng Hui, Mi Sha, Yang Yali, Yang Dongling, 2010)

To implement the normative management of college English teaching mode, first of all, the guiding ideology of education should be changed from the examination-oriented education to quality education. Secondly, change the teacher’s role from the knowledge teacher to the students’ English comprehensive application ability instructor. Thirdly, change the emphasis of the teaching content from on language knowledge teaching to on the students’ communicative competence. Fourthly, the success of the college English teaching reform lies in the teaching mode changing from the teacher-centered to the student-centered. Fifthly, teaching assessment changes from the summative assessment to the combination of the process assessment and the summative assessment.

2.3 Updating teaching mode and strengthening listening and speaking

The reform of teaching mode, fundamentally speaking, is to change from the teacher-centered, simply imparting language knowledge and skills to the student-centered, imparting the normal language knowledge and skills and what’s more, cultivating the students’ language application ability and autonomous learning ability. Reasonable teaching mode is a security for the successful college English reform. The characteristics of college English teaching reform is to change the teaching ideology and the teaching mode, guarantee the new teaching mode inheriting the advantages of the traditional teaching mode, be backed with modern information technology and network technology and direct the teaching into the personalized, independent development. For the college English teaching reform backed by the modern information technology and network technology, we should not only focus on the use of new technology, but pay more attention to the real reverses of the teaching mode, the teaching approach and the teaching core. Among them, the reform of teaching mode is the most important.

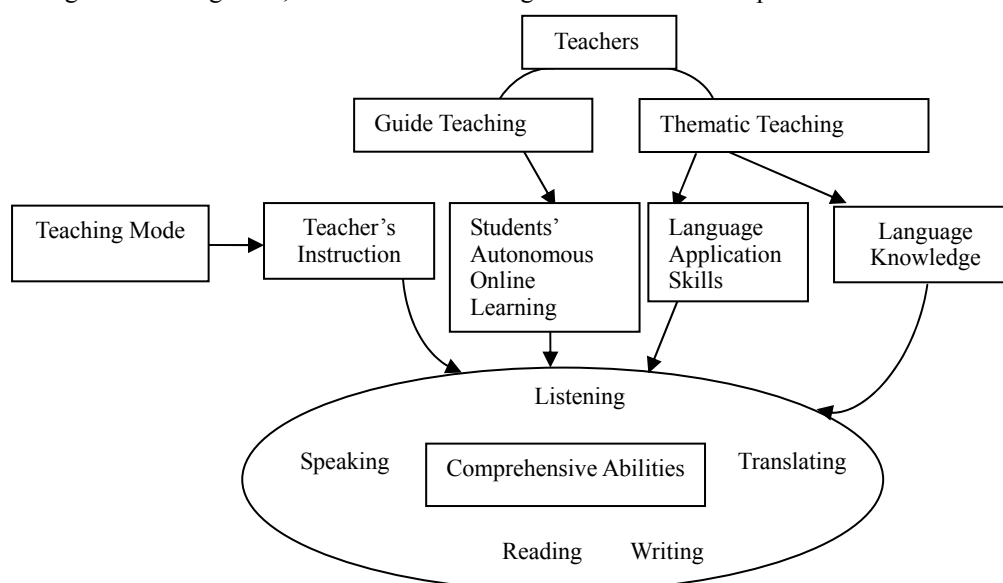


Figure 1 Teaching Mode

Teaching model is dynamic. It should be established corresponding to the basic condition of the school and the students’ English level and make adjustments with the change of the students’ English level in the operation to receive the best effects. Based on the constant exploration and summary of the college English teaching requirements and basic cultivation targets, we formulate the teaching mode integrated by guide teaching and thematic teaching with the characteristics of our university. This mode combines the traditional classroom teaching mode with the modern information technology, considering

both the relationship between individual autonomous learning and classroom teaching and the relationship between language foundation and comprehensive language application ability. Its main characteristic is to provide the teachers and students more independent space and help to improve the students' English learning autonomy and participation and the students' comprehensive abilities of listening, speaking, reading, writing and translating. (Figure 1)

2.3.1 Guide teaching

Guide teaching mainly refers to that the students do independent learning under the guidance of teachers. The main teaching content is the audio-visual course, aiming to improve the students' listening and speaking ability. We use the two instructions (i.e.: autonomous learning strategy instruction before class and online question answering guidance) and two inspection ways (i.e.: classroom teaching inspection and online course booking inspection) to ensure students' autonomous learning effect. (Figure 2)

Autonomous Learning is a modern way of learning corresponding to the traditional accepting learning. It regards students as the subject of study, and it can achieve the learning objectives through the students' independent analysis, exploration, practice, questioning and creation. (Wang Xin, Tian Ming, Yuan Lijuan, 2013) Teachers should constantly track students' online learning, knowing the study gress and effects. So that students can adjust their learning strategies and improve study methods before they start their autonomous learning with a definite aim.

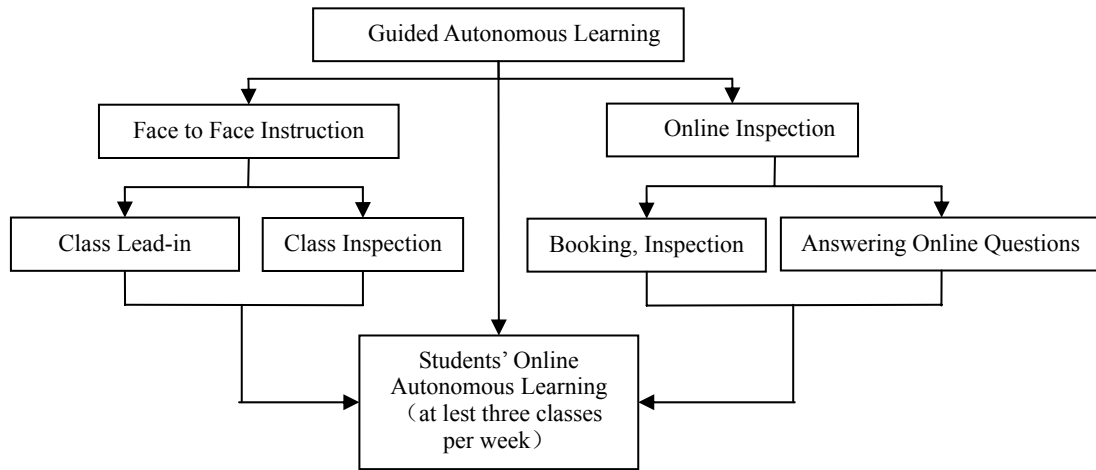


Figure 2 Guide Teaching

2.3.2 Thematic teaching

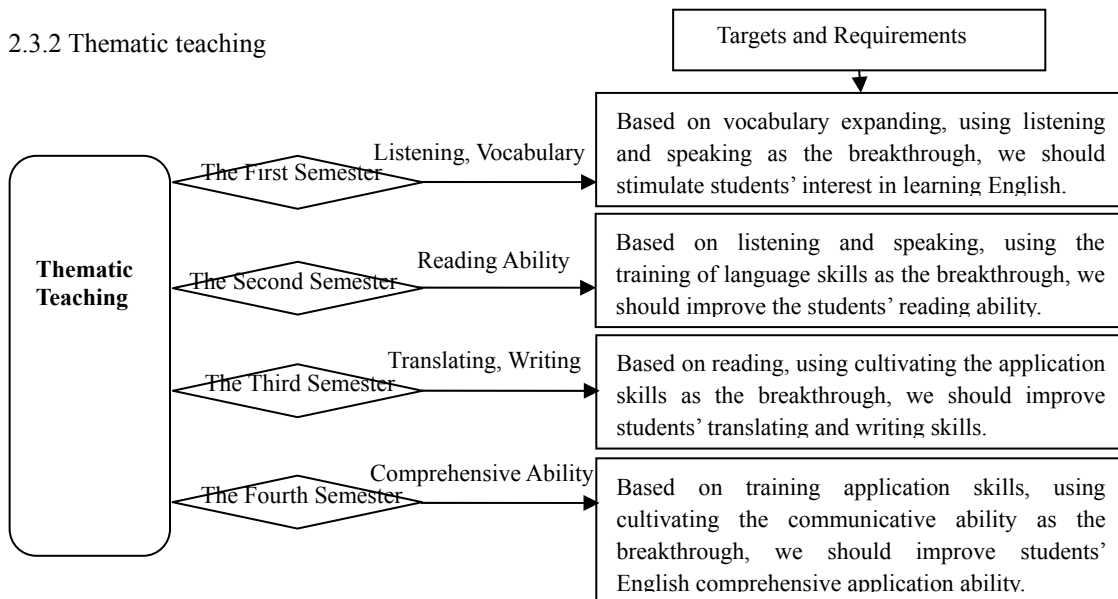


Figure 3 Thematic Teaching

Thematic teaching is a specific form of task-based teaching method. It has five characteristics: 1) The target language is learned through communication. 2) The real material is introduced into the learning environment. 3) The learners not only pay attention to language learning, but also pay attention to the learning process. 4) The learner's life experience is used as important resources of classroom learning. 5) Class language learning and after-class language learning activities should be combined together. (Wang Xiaoli, 2013)

Thematic teaching mainly refers to organize the multimedia classroom teaching by focuses and semesters. The content mainly includes reading, writing and translating. The teaching of the first semester focuses on cultivating the students' interest in learning English and training their listening and speaking skills. The teaching of the second semester focuses on training their reading skills and expanding their reading. The teaching of the third term focuses on training their translation and writing skills. The teaching of the fourth term focuses on training the English comprehensive application ability. The purpose is to improve the students' English comprehensive application ability. (Figure 3)

We can use the following chart clearly show the relationship and requirements of levels 1-4. (Figure 4)

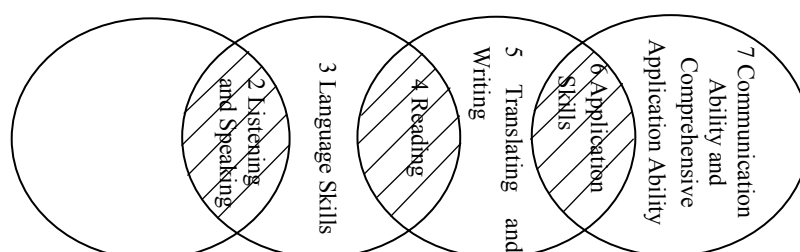


Figure 4 Comparisons Between Levels 1-4 Cultivation Requirements

From chart 4, we can see that Level 1= 1+2, Level 2= 2+3+4, Level 3= 4+5+6 and Level 4= 6+7. Each semester has its special focus. But the requirements among levels and terms are closely connected.

2.3.3 Offering higher level courses and requirements

The object of higher level stage learning refers to the students basically at level 2 according to the English classification examination at the beginning of the first academic year. These students achieve the General Requirements of the "College English Curriculum Requirements (for Trial Implementation)" after three semesters' foreign language learning. In the fourth semester, the selective courses are offered to improve students' comprehensive application abilities. After four semesters of foreign language learning, they should meet the basic requirements of "College English Curriculum Requirements (for Trial Implementation)".

The selective courses of higher stage learning are divided into three categories. Each category offers 3-4 courses for students to choose. Each course has 32-36 hours and 2 credits. Students must take two with the total of 4 credits. Students can obtain credits after passing the examinations. If they cannot pass the exam, students can retake the course or choose another English selective course until they get 4 credits.

3 Conclusion

The development of college English teaching is not motionless. That means the exploration of new modes of college English teaching is endless. To establish a new personalized autonomous college English learning mode, the first thing is to continuously strengthen the construction of the network environment, providing a good environment for students' autonomous learning. Second, teachers should face the new teaching mode, update ideas and promote the continuous development of college teaching reform. Third, colleges should intensify the training of computer network multimedia technologies for teachers and students.

The normative management of college English teaching mode can help students learn independently and arouse their interests to some degree. Students have more time to control so that they can make more decisions on their learning and they feel more relaxed without so much control of the teacher. Nearly all teachers admit the current teaching mode management possesses advantages in lightening teachers' workload, diversifying the learning channel, and providing chances for students to practice listening and speaking skills. And most teachers are optimistic that it can improve students'

all-round abilities, arouse students' interests and motivate students. As we strengthen the normative management of college English teaching mode, and adopt a series of reform measures, English comprehensive application ability of our university's students can be greatly improved. Meanwhile, the overall quality, teaching, and scientific research ability of teachers can be improved obviously.

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Research on Theoretical Framework Model of the Entrepreneurial Economy*

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Abstract: Lots of research shows that entrepreneurial economy is the main driving force for global economic development, which is substantially a kind of innovation economy. By sorting out the relevant reference of entrepreneurial economy and discussing theoretically, the author analyzed the characteristics of the entrepreneurial economy, and proposed the basic conditions for the path dependence, the multiplier effect and the value overflow, so as to construct theoretical framework of entrepreneurial economy, and provide a theoretical thinking for the entrepreneurial economy development.

Key words: Entrepreneurial economy; Chain group; Hypergraph; Path dependence; Multiplier effect

1 Introduction

The economic globalization brought the entrepreneurial activities many development opportunities in many developing countries since the 1990s. After accumulation for many years, the entrepreneurial economy in China has been a new economic growth point to the sustainable and healthy economic development. Entrepreneurial activities are quite lively in various fields, like electronic information, and biological medicine in high-technology field; information consultant, modern logistics in new service industry, all of the above make space for entrepreneurial economic development in China. John G. Burch (1986) defined entrepreneurship as the activities of setting up a corporation^[1]. While Chen, the initiator of entrepreneurial economy in China, thinks the entrepreneurship to establish one's own career through creating and seizing opportunities^[2]. Entrepreneurship is generally to create or expand an enterprise, with the core of resource integration, resource allocation optimization, and value realization. Entrepreneurship is essentially an innovation activity. Peter F. Drucker proposed the thesis of "entrepreneurial economy" in 1985^[3], thinking small and medium enterprises play the leading role in entrepreneurial economy, which has some era limitation. Since the middle of 1990s, Organization for Economic Cooperation and Development (OECD), Asia-Pacific Economic Cooperation (APEC) etc, started to make a thorough study on policies that various countries adopt to promote entrepreneurship and develop entrepreneurial economy. Domestic scholar Chen Shiqing thought, the entrepreneurial economy showed the economic regulation based on the entrepreneurship. Entrepreneurial economy reflects the laws of economic development, which concentrates mainly on innovation, entrepreneurship, opportunity, human subjectivity, and the relationship between the subject and the object. Li Zheng and Li Yuling proposed that entrepreneurial economy is an economic development model^[4], in which the productive entrepreneurial activities play a key role in growth of a country or a region. In this paper, the author believes that the entrepreneurial economy is an economic form that the entrepreneurs create new business or innovate through entrepreneurial activity, and realize value from a micro point of view, and promote the economic development from the macro point of view.

2 Characteristic of Entrepreneurial Activities

The 2010 GEM report shows that the Total Entrepreneurial Prevalence Activity Index (TEA) of China is relatively high, means China is an active entrepreneurial country. From the development and growth of many entrepreneurial enterprises, we can see entrepreneurial activities in different environment have different characteristics, due to the impact of opportunity, organizing model, and environment and so on. The entrepreneurial economy development is effected by both micro factors and macro environment (Busenitz et al, 2003)^[5]. The micro factors include entrepreneurs and the team, entrepreneurial opportunities and organizational model. In the GEM, the entrepreneurial environment is defined as financial support, government-project support, government policies, education and training,

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barriers-entry, physical infrastructure, research transfer, commercial and professional infrastructure and cultural and social norms.

2.1 Attribute of entrepreneurial economy

1) Area attribute

Due to local resources, local policy or some other reasons, the Chinese entrepreneurial economy shows the typical regional entrepreneurial economic characteristic, such as the “opportunity-based business model” in the Chinese high-tech development, represented by Zhongguancun; another example is the “survival entrepreneurship model” in the Wenzhou and south Jiangsu Province, represented by folk economy. Coastal areas and rapid-development areas have the advantages of talented personnel with higher-level education, sufficient human resources, policy to promote entrepreneurial economic development and local government support. Shanghai, Zhejiang Province and Guangdong Province are of this kind.

2) Network attribute

The network is a platform for the members to interact and exchange resources, so as to promote the economic activities. Entrepreneurial individual contacts with each other to constitute an entrepreneurial network; through this way the resources can be found. Entrepreneurial enterprises can take advantage of the networks within or between enterprises to seek opportunities for cooperation and integration of resources at any time. Whether “protogenic economy” or “derivative economy”, it is necessary to share the existing resources within the network, and promote cooperation on the basis of a relatively high trust, through relation or location convenience to constitute inner or outer network system of entrepreneurial economy. The relationship interaction can gradually expand the existing social network of the entrepreneurial economy, and improve the updating rate and covering scope of the information, finally create a social network in the pattern of "many to many". Similar entrepreneurial enterprises emerge, through diffusion via the network, to promote industrial expansion, the regional advantage, and a virtuous cycle of industry clusters and entrepreneurial economy.

3) Resource property

The resources can be divided into direct resource and indirect resource. The former includes policy resource, information resource, technology resource; the latter includes financial resource, management resource, human resource^[6](Lin Song, 2007). Acquisition and integration of entrepreneurial resources go through the whole process of entrepreneurship. The entrepreneurs should be able to identify and integrate various entrepreneurial resources, finally realize the core competitiveness and growth of the enterprise.

At the start of entrepreneurship, the identification of entrepreneurial opportunities and entrepreneurial resources are closely correlated, so the entrepreneur should decide whether there is enough resource to support the entrepreneurial activities. During the development process of an enterprise, the entrepreneur needs to pay attention to the effective use of resources as well as acquisition of entrepreneurial resources. Through test, study, growth, guidance, demonstration and share, entrepreneur can realize the expansion and mature of an enterprise. For an enterprise, the most important thing is not the quantitative accumulation of entrepreneurial resources, but the qualitative leap. The process of entrepreneurship is essentially the process of entrepreneurial resources integration, and finally gains superiority.

2.2 Characteristic of entrepreneurial economy

1) Chain group

On the basis of resources relations, enterprises are connected with each other in the form of chain. The starting point of some industrial chains is based on the industrial structure hole. The access to resources is basically the constantly exploration of the structural holes in the network; then gradually change the network structure, so that the enterprises in this network could gain a competitive advantage. On the basis of value, supply and demand, the industrial chain is formed between the entrepreneurial enterprises and other enterprises through an equilibrium process. The formation of entrepreneurial cluster is a concentrated process of chains homogenization in a specific area. Many factors affect this process, like location advantage, traditional industry, but the most important one is the combination of local traditional industry advantage and the exploration of entrepreneurial network. The pursuit of profit maximization is the intrinsic motivation and lasting power for the formation and development of an enterprise cluster. Weber's cluster economic function demonstrates that system functions of a enterprise cluster is bigger than the sum under the dispersed state, that is $1+1 > 2$.

The relative enterprises in a clan are adjacent in location, which is advantageous for information communication and technology overflow. Professional knowledge or technology is obtained whether

from independent innovation or imitational innovation. The well-known "Wenzhou pattern" has a obvious feature of chain group. Through the pattern that "one household help another household, one village help another village", Wenzhou forms a professional industrial chain, that "one breed in one town, one industry in one village", and further give birth to various characteristic professional markets. So, on the basis of similar industry, regional clusters form "massive economy", and then industry cluster one by one. Through expansion of "point", lengthen "chain" and cultivate "group", together with the "invisible hand" of market, entrepreneur could breakthrough the obstacle of marketization, to form a unified element and product market; construct regional brand; amplify the market impact; derive new interest chain and entrepreneurial group; deeply develop entrepreneurial activity and finally promote the lasting development of entrepreneurial economy.

2) Lattice

The cluster of entrepreneurial enterprises is advantageous to the formation of a new enterprise, further the expansion of that enterprises cluster. New entrepreneurial enterprise is usually derived from entrepreneurial cluster, for the cluster has concentrated technology information, active innovation, technology innovation, and relatively good innovation circumstance. Incubator effect of enterprise cluster continually promotes formation of new enterprise. "Derivative economy" of entrepreneurship is a new economic development pattern that entrepreneurial enterprise uses the surplus resources widely exist in the social network to obtain profits through production. In local entrepreneurial economy, in order to be a pillar to local industrial development, large enterprise is always the important supporting objects of the government. No matter in public or non-public ownership, large enterprises can play a leading role in a region. Local entrepreneurial economy can form an industrial structure in chain or ring type, and then cultivate a complete entrepreneurial economy chain based on social network. There are two patterns as shown in Figure 1.

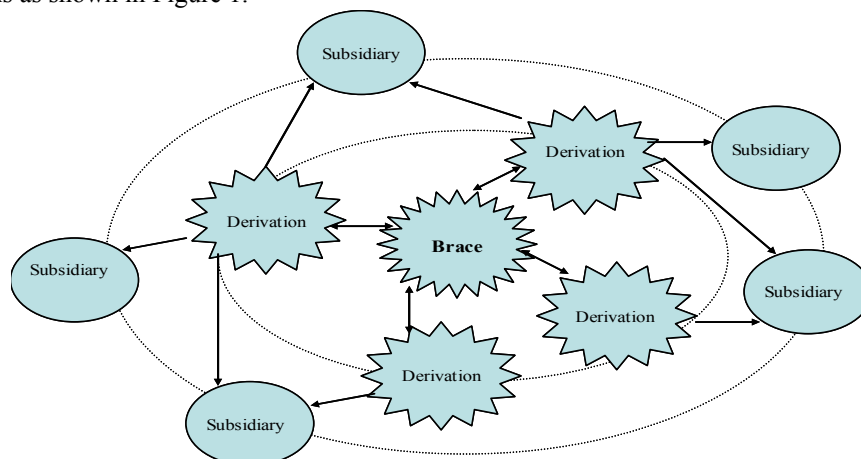


Figure 1 Social Network Radiation Effect Of Entrepreneurial Enterprise

Origin is entrepreneurship pillar enterprises, there derivative lattice network in radiation pattern, and the central region denotes the native pillars of entrepreneurial enterprises. With the improvement of social labor division and specialization, enterprise concentrate more on the core area, and create an opportunity for other aspects of the value chain to serve other enterprises. Under the economic development pattern that "a big one cultivate several small ones", dynamic entrepreneurial parks are constituted, and they are bound to bring about the development of the local service industry, and finally form a complete regional entrepreneurial economic industry structure.

In the ring network pattern, the entrepreneurial derivative enterprises, denoted by the sub-central region, are the main drive power. Derivative enterprises are always private enterprises, which are strongly rooted, and have prominent endogenous growth. After a certain stage of sound development, private enterprises obtain foundation development forces, and become the hot spot of regional economic growth. With the development of entrepreneurial enterprises, the derivative enterprises can also nurture pillar enterprises, and then evolve for the place of the original pillars of entrepreneurial economy. The new pillar shelter development of subsidiary companies, so the "grass roots economy" develop to be "banyan economy", and a new lattice emerges [7].

3) Hypergraph

There are multiple sub-networks in the network presented by the hypergraph, those sub-networks are connected with each other through differentiation of resources, resource sharing, technology imitation, competition and cooperation. Different entrepreneurial enterprises take different roles of entrepreneurial booster, for example, providing funds, providing raw materials and semi-finished products, sharing information, being a distributor or providing other value-added services. Generally speaking, entrepreneurial enterprise network is constituted by different levels of sub-networks. Each entrepreneurial enterprise is embedded into a sub-network, according to its certain functions, relationships, and resource properties. Within the network, the flows of information and resources have vectors that are from the inferior to superiority. When the entrepreneurial enterprises with the same property are at the same level of subnet, then the subnet is stable, and realizes value increment through this stable conversion cycle.

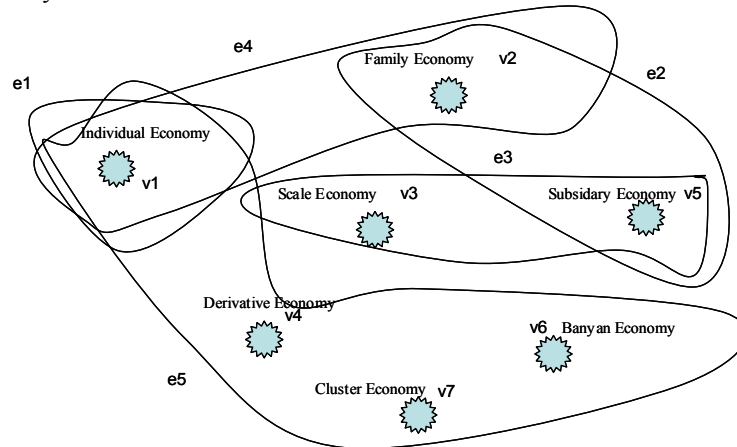


Figure 2 Hypergraph Model of the Entrepreneurial Economy

The entrepreneur experience a process that from individual to enterprise, and then to the society. During this process, the entrepreneurial resources integrate and optimize on the basis of spatial concentration, industry concentration and correlation extent. Economic forms change responding to different entrepreneurial stage, and the hypergraph pattern of entrepreneurial evolution is shown in Figure 2, V is the economy vertice, E represents the hypergraph edge. The folk individual economy transform to derivative economy through making use of existing and derivative resource network. With the development of contact between regions and industries, the banyan economy and cluster economy emerge. The discovery of super-path is advantageous to effective and sound development of entrepreneurial economy. Considering the multi-dimensional nature of market opportunities, in the hypergraph model based on correlation, any path demonstrates that two entrepreneurial economy forms have relation and is feasible. Therefore, the key to judge whether it can transform is to find the relation between the entrepreneurial relations between economic forms, in other words, to find the hypergraph path.

3 Basic Conditions for Entrepreneurial Economy

1) Path dependence

Each individual in the social network of entrepreneurial enterprise is similar to each other. Which entrepreneurial pattern to choose is mainly decided by the entrepreneurial resources and environment. Once the entrepreneurial enterprise enter the entrepreneurial network, it will rely on the network principal and resource, then develop along a certain path, and self-reinforce in the intended direction, this is called "path dependence". The original ecology of the entrepreneurial economy always starts in the form of folk family workshops, like individual entrepreneurship, family entrepreneurship, partnership entrepreneurship and franchising; then, original ecology of the entrepreneurial economy develops to "grass roots economy", under the combined effects of micro factors, like individual behavior and character, relation network, and macro factors, like policy, technology, culture; finally, it evolves to "derivative economy" through making use of excessive resources to develop new product or enterprise.

Each region has its specific entrepreneurial cluster, for their special historical traditions, the accumulation of conventional technology and the entrepreneurial spirit incentives, after a self-reinforcement and economic scale development. Among them, the self-reinforcement makes the entrepreneurial cluster

strengthen and further "lock" during the aggregation process of increasing returns; or entrepreneurial cluster may slide down the wrong path, which harms or weakens the competitive advantages. The path dependence executes the memory function of entrepreneurial enterprise, and it is a special skill.

2) Multiplier effect

The multiplier effect is a macro economic effects; it denotes the chain reaction of the economic aggregate according to the increment and decrement of a variable. The integration of entrepreneurial enterprise network resources will largely upgrade the efficiency of the entire network, and each enterprise benefits from shared network resources. Once the entrepreneurial cluster forms, it has a tendency of self-reinforcement and self-evolvement. With the growing number of enterprises, the cluster's competitiveness continuously enhance with the help of developing companies and the dominant industrial clusters. The above-mentioned is essentially the embodiment of the multiplier effect, which promote the cluster to develop to a higher stage.

Entrepreneurial economy advocates entrepreneurship to create jobs, which can get twice the result with half the effort. The entrepreneurship can bring about groups of the employment growth, rather than in the usual sense of personal behavior. In other words, entrepreneurship provides not one-to-one employment, but multiplier employment opportunities. For example, according to the State Administration for Industry & Commerce of the People's Republic of China, until the first half year of 2007, there were 5205 thousands private enterprises in China, providing 69275 thousands jobs. The average employment size of the private enterprise is 13.31 persons, means the development of this economic organization is based on the 13 multiplier means that the development of this form of economic organization is providing jobs at the rate of 13 multipliers. That is to say, one entrepreneur creates 13 employment opportunities.

3) value overflow

Value overflow means that some successful enterprises have various cumulative resources, while some may be excessive, those excessive resources will still realize their market value in the market environment in the aim of value appreciation.

In view of resource sharing, entrepreneurial enterprise social networks and industrial clusters are advantageous for entrepreneurial enterprise to coordinate, cooperate and spread risk; and they also provide entrepreneurial enterprise with invisible value-added services that cannot be measured by money. When the rational pursuit of profit is significant, the network effect is obvious, at this time, entrepreneurial enterprise network create the largest profit margins for its partners.

4 Conclusions

The entrepreneurship becomes a driving force of the global economic development. The entrepreneurial activities in China upsurges, and the entrepreneurial system is gradually established under the policy conduct and industrial structure adjustment. It is essential to carry out research on entrepreneurial economy and constitute the theoretical frame to conduct entrepreneurial economy. The research on the entrepreneurial economy often focuses on qualitative analysis, little quantitative analysis meanwhile. Using mathematical model to discuss that how to explore the lattice and hypergraph of entrepreneurial enterprises to play the creative economy is the research direction in the future.

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Utilization of Constructivism in Innovation of Listening Teaching Modes*

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Abstract: This paper takes constructivism perspective to discuss how to use the theory to reform the teaching modes of listening class. Constructivism emphasizes the learner-centered teaching and the teacher's principal role is to help and guide learners to inspire their independent study abilities, and make them to construct the meaning by themselves. The paper considers that constructivism uncovers the cognitive rules of learning process, which enlightens and conducts the reform of English language teaching. The paper explores the innovative teaching patterns of English listening class and gets the conclusion: to apply constructivism in teaching will improve learners' cognitive ability and listening comprehensive ability.

Key Words: Constructivism; Cognition; Schema; English listening teaching

1 Introduction

The development of constructivism is historically influenced by such well-known educationalists, psychologists and educational psychologists as J. Piaget, L.S. Vygotsky, J. Bruner and so forth. Constructivism, based on the cognitive theory, is the development of cognitive theory. However, constructivism was initially from the theory of children's cognitive development. In the 1960s, Swiss psychologist Piaget (1966), the specialist of cognitive development, put forward the constructivism. According to Piaget's theory children could gradually construct knowledge of the external world with interaction of environment, in addition, through the cognitive process their own cognitive structures could be developed in the end. In 1970s, a leading American educational psychologist Bruner (1960) introduced the former Soviet Union educational psychologist Vygotsky's (1978) historical and cultural psychology in American constructivist study, which promoted development of constructivism. Moreover, Kohlberg made a further research on the nature and development conditions of cognitive structure, while Sternberg and Katz emphasized the key role of individual initiative in the process of cognitive construction. Consequently constructivism is enriched by the variety of learning theories and gradually developed and formed to be a relatively completed system. Because constructivism better revealed the cognitive rules of human learning process, in 1980s, the theory became one of mainly basic theories of educational reform and was concerned and applied in foreign language teaching.

2 Guiding Significance of Constructivism in Foreign Language Teaching

2.1 Present study of constructivism in FLT

Since the 1980s, although there is still a heated discussion about the merits between cognitive psychology and behavioristic psychology, the former theory has been gradually replacing the latter one to be the main thought to guide the educational reform, by which chance, constructivism has become very important on the development of pedagogy. In 1990s, because the multi-media and internet technology developed rapidly and were applied universally in education, constructivist learning context was easily built, which provided an opportunity for the development of constructivism. Meanwhile, constructivism was introduced into China. The earlier Chinese constructivist researches focused on introducing constructivist application in education, or comparing constructivism with other teaching theories. Recently, constructivism attracted FLT educators' concerns, and the theory provided a completely new perspective of cognitive study for FLT staffs. Thus, subsequent research of constructivism involved three main aspects, such as applying constructivism to instruct the teaching reform of methods and teaching modes of FLT (i.e. teaching design, curriculum reform), to train students' cognitive strategies and learning strategies, to design and construct the learning context as well. The above shows the combination of constructivism and FLT has occurred at all research levels and fields.

2.2 Basic concepts of constructivism

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According to Piaget, children's cognitive process is gradually built up in two complementary processes: assimilation and accommodation, and their knowledge will be constantly enriched and developed in the "balance-unbalance-new balance" cognitive cycle, which means when children use prior knowledge to assimilate new information, the cognition stays in balance; when the prior "schema"¹ can't meet children's cognitive needs of achieving new information, the cognitive balance is destroyed, the children need to change their cognitive structures to understand new information; finally children modify and create new schema to accommodate new information, so as to achieve the new balance of cognitive state. Vygotsky stressed social, cultural and historical background in students' cognitive process, and emphasized the significance of interaction between the schema of prior knowledge and new information. Vygotsky defined two kinds of cognitive behaviors as "bottom-up" and "top-down"; the former emphasized the students' prior knowledge, and the latter focused on the acquisition of knowledge in learning context. Thus, students can make cognitive progress completely only when they combine the two kinds of knowledge available from two cognitive behaviors.

As mentioned above, constructivism emphasizes learners' subject status in cognitive activities, and considers that learners' intellectual schema is activated by modifying, processing and acquiring; secondly, teachers are responsible for stimulating and promoting the learners' cognitive interest, making authentic or realistic learning context for learners, providing learning resources for them and encouraging them to explore and complete the construction of meaning and cognitive process. Among teachers, learners and learners themselves, they interact with each other and do collaborative learning adequately. Therefore, utilization of constructivism will change traditional teacher-centered teaching mode and eliminate the "chalk and talk" phenomenon, and fully mobilize the enthusiasm of learners to get the ideal learning effect.

2.2.1 Constructivist view of teaching and learning

According to constructivism, learning should be based on the learner-centered mode, and learner constructs knowledge by himself in learning process. Through rethinking prior knowledge, learner creates new schema to construct the meaning of new information. What's more, in the learning process, learner should understand knowledge actively rather than just wake up memory and recite the knowledge. Yet, teacher needs to instructive and help learner to develop his analytical and problem-solving ability. (Kafai & Resnik, 1996) Moreover, teaching process can be designed as a web in which every teaching activity (i.e. new learning task, knowledge and intellectual skills) should be placed around the teaching theme. In addition, learner needs to explore and discover an appropriately prior knowledge to complete learning task with teacher's instruction. Thus, in constructivist teaching process, the learner's learning initiative is maximized, while his learning strategy is being trained. The teaching process emphasizes that teacher creates learning context and adopts a "top-down" teaching method.

2.2.2 Constructivist modes of teaching

Constructivism stresses learner-centered mode, in which teacher is the instructor and assistant of learners. Constructivist modes of teaching focus on four elements: learning context, collaboration, conversation and construction of meaning. Constructivism thinks that the knowledge of textbook makes no sense, yet construction of meaning is constructed through constant process of assimilation and accommodation of old and new knowledge. Constructivism has designed three kinds of mature teaching modes: Scaffolding Instruction, Anchored Instruction and Random Access Instruction.

1) Scaffolding Instruction

Scaffolding instruction derived from Vygotsky's theory of the zone of proximal development (ZPD). The concept of ZPD is that the distance exists between children's really independent learning ability (the first development level) and the potentially advanced learning ability (the second development level) which can be achieved with teacher's assistance. A child's mental development level should be improved from the first level to the second one, even the higher level through teaching. Based on Vygotsky's ZPD theory, constructivist uses metaphor-"scaffolding" to indicate that with the support of "scaffolding" the learner's intelligence could be facilitated from low level to advanced level without pause. Scaffolding instruction includes five points: firstly, to construct conceptual frame around learning task, teacher divides the total task into several parts and instruct learner to learn from the shallower to

1 A Schema is a structured cluster of concepts which can be used to represent objects, scenarios or sequences of events or relations. The original idea was proposed by philosopher Immanuel Kant as innate structures used to help us perceive the world. (Michael W. Eysenck, & Mark. T Keane. Cognitive Psychology A Student's Handbook, (6th.)[M] East Sussex: Psychology Press. 2010 Retrieved from psyppress.com (<http://www.psyppress.com/ek6/>))

the deeper part; secondly, to create learning context to guide learner to explore the conceptual framework; thirdly, to cultivate learner's independent learning ability with teacher's inspiration; fourthly, through consultation, every learner shares his construction of meaning to make the concept and learning task clearly and completely; finally, to do learning reflection or the evaluation of learning effects.

2) Anchored Instruction

Anchored instruction places learning situations within real event or the problems-solving context. Once the true event has been determined, the teaching content is fixed, which is similar to the ship being moored anchor. Constructivism identifies learner should be placed in real context to learn the attribute of things, law of development and relationship of things. The principles of Anchored instruction are as follows: firstly, creation of an "anchor", to design a contextualized case study and learning questions which is relevant to the learning subject; secondly, guidance of autonomous learning, to guide the learner to explore the methods to solve learning problems; thirdly, cooperation or collaboration of learners, learners get the learning clues from teacher to explore the problem-solving process, and learners exchange their views through discussion to deepen the understanding of the problem; fourthly, reflection and evaluation of learning effect, to observe and record the students' performance.

3) Random Access Instruction

Individuals may have different understandings of the same problem from different aspects. Random access instruction emphasizes teacher should display the learning task at different times, in different contexts, with diverse teaching ways and respective teaching purposes. Because the learning emphases are different, the problem can be studied from multiple perspectives. Thus, learner gets a comprehensive understanding of new learning task. This teaching mode could promote learner's cognitive ability and knowledge migration ability. Four principles are included: firstly, design of teaching context, teacher encourages learner to select different perspective to learn; secondly, teacher pays attention to training learner's thinking ability and guiding him to think from shallow to deep aspects of problem; thirdly, learner group-based discussion, learners share and evaluate the others' ideas; lastly, evaluation of learning effect, teacher analyzes learners' group contribution, especially, whether or not the learners have got construction of the new knowledge.

In a summary, constructivist modes of teaching contain four elements: teaching context, collaboration, conversation and construction of meaning. Some FLT scholars subdivide the above elements into six elements such as creating context, raising problem, building bridges, collaborating, showing the result and reflection of learning. (Feng Yufang, 2006) The above concepts of constructivism provide a new idea for FLT curriculum design and give important rules to instruct the innovation of FLT.

3 Innovations on Listening Teaching Modes with Constructivism

3.1 Utilization of constructivism in advanced learning stage

According to Spiro et al. (1991), learning has two stages: primary learning (the low stage) and advanced learning (the advanced stage). In the primary learning, teacher only teaches important concepts and facts, and learner just shows what he has learnt or feedback of learning in the test. Spiro thinks traditional teaching blurs the line between primary learning and advanced learning, so it is not reasonable to use teaching strategies of primary learning in advanced learning stage. Without doubt, constructivism is suitable for directing advanced study.

3.2 Constructivist modes of listening teaching

Brain inputs, processes and thinks language information while listening, so listening is complex cognitive process. The process of listening comprehension consists of three stages: perception, parsing and utilization which connects each other and runs in circles, being continuous and recursive. Moreover, English listening class requires students to have fixed basis of English language knowledge and application abilities, in the listening process, students need to mobilize long-term memory and prior knowledge to construct the concept of listening material. The prior experience and knowledge is the schema which plays a central role in interpreting languages and non-verbal input, retrieving information, organizing action, deciding target, allocating resource, and directing cognitive processing procedure. (Gui Shichun, 2000)

The traditional listening teaching is based on teacher-centered mode, which takes the "bottom-up" approach to understand the listening materials, such as teaching vocabularies, repeating listening material and completing the exercises. Through passive listening, students fail to activate the relevant schema. But constructivist modes of teaching gets perfect coherence among three stages of listening comprehension, especially through the creation of learning context and teaching design, the teacher

guides students to activate the long-term memory and relevant schema effectively to complete construction of meaning, further to improve the learners' ability of listening. The table below compares the traditional modes of listening teaching with the constructivist one, which is clear to show the significant differences of the two teaching theories in teaching concept, learning process, learning effect and curriculum design etc.

Table 1 Comparison of Traditional Modes and Constructivist Modes of Listening Teaching

Traditional Modes of Listening Teaching	Constructivist Modes of Listening Teaching
Teacher-centered: teacher teaches knowledge directly, students get the knowledge passively; teacher is authority.	Student-centered: teacher guides the students to explore the learning process, students are active in teaching; teacher is an assistant and instructor, the teacher's main role is negotiation.
"bottom-up" teaching method: teaching is based on textbook, vocabulary and exercise and repeating listening	"top-down" teaching method: teaching is based on problem-solving context, focuses on students' improvement of comprehensive listening ability
Fixed teaching task, the teaching begins with the parts of the whole	Around teaching task, all parts are designed as sider web to be linked with each other, teaching begins from whole to parts
Students learn alone	Students learn in groups, interaction occurs between teacher and students, and students themselves.
Feedback or assessment is through teaching, for example to correct student's mistake	Reflection and assessment is done after class, teacher analyzes students' performance (views, thinking ability, contribution to groups), students do the same analyses of the others' outcomes
Students get the knowledge through reciting	Students get the construction of meaning, improve the cognitive ability and find suitable learning strategies.

1) Creation of listening context.

First of all, teacher's task is to break down the bound of teaching task; secondly, teacher selects the relevant audio-visual materials to enrich the teaching, and before listening asks students to consider how to solve the problem when they encounter the same context, after listening, the teacher asks students to summarize the concepts of listening material, while students can get the hints of key content of listening material from teacher; thirdly, teacher designs opening questions from the surface of question to the inside one, while the teacher also introduces his personal experience or experts' methods to help students to solve similar problems, and encourages them to think about different methods to solve the problem. Based on constructivism, learning how to solve problems helps the students to develop their autonomous learning abilities and creative thinking abilities, also helps them to form good learning strategies.

2) Collaborative learning

Students are randomly divided into study groups in every class to ensure they can get fresh views of learning experience from different team members each time. Let students exchange views in groups, first of all team members get representative group opinion through group discussion, then each group exchanges and discusses the group opinions. Through collaborative learning, students actively exercise their cognitive thinking abilities, not only for the individuals, but also the learning groups get construction of meaning of new knowledge. Therefore, the learning effect is more outstanding than the traditional class.

3) Learning reflection and assessment of learning effect

The teacher organizes students to evaluate the learning effect or do assessment in time. First of all students analyze their learning behaviors, such as the learning abilities they have, learning strategies they used, the extent of new knowledge they have obtained and the problem they met in listening process, and students also evaluate learning behaviors of group members and analyze the enlightenments of the others' outcomes. Moreover, teacher gives overall evaluation on students' learning effect and process of construction of meaning, guides students to find suitable learning strategies and to identify the weak spots of listening. Through learning reflection or assessment of learning effect, the learning task turns from abstract to concrete. Eventually students acquire new knowledge and they can use the learnt knowledge to solve kinds of problem within different contexts as well.

4 Conclusions

Constructivism provides an effective cognitive concept and teaching idea for us, and it especially

emphasizes the student's principal status. Actually the learning interaction between teachers and students is more frequent and in-depth: for teachers, they are instructors and promoters who help students to construct meanings; for students, they learn knowledge actively, think actively and have completely creative and critical spirit. Thus, Constructivism effectively innovates new teaching modes of listening and instructive the reform of FLT. Nowadays, the FLT classes still see irrational teaching modes which are criticized by constructivism. Although the paper has discussed the reasonable utilization of constructivism can improve the learners' comprehensive ability of discourse in listening process, promote their cognitive ability, and eventually improve their comprehensive application ability of English, through some empirical studies, scholars find some teachers can't effectively carry out constructivist modes of teaching because of lack of higher teaching abilities. Therefore, teachers need to use constructivism critically, and it's better to do experimental teaching preparation at first, to observe the students' reflection and do continuous improvement, then to carry out constructivist modes of teaching completely.

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Teaching Exploration about the Course “Evaluation of Building Installation”*

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Abstract: As the characters of engineering management undergraduates cultivating are different from engineering technology and other management undergraduates, the ideas of teaching them is also different. In This paper, “technology” support and “ability” training are emphasized as the core of teaching. Around the core, three aspects of teaching in class should be done along with teaching logic thinking of “Evaluation of Building Installation”. Firstly, how to understand construction plan should be strengthen which is the basis of teaching. Secondly, the methods of system analysis and quantities calculating should be improved which are teaching difficult points. And lastly, the beginning and end of the classroom teaching should be extended. After analysis of three aspects above, conclusion has been made. “Evaluation of Building Installation”of classroom teaching should be done with the system concepts of engineering management to help students to engage in actual jobs of project cost and other related work smoothly in construction engineering field.

Key words: Building Installation; Construction cost; Construction drawing; BOQ(Bill of quantities)

1 Introduction

1.1 Research on Theory Teaching Mode

In the aspect of theory teaching mode of relevant engineering cost courses, scholars agree that teachers should use various teaching methods based on practice to cultivate students’ interest, to improve the understanding level of construction plan and to strengthen their calculation ability of BOQ.

Scholars think that teachers should select a typical case to organize students to analyze the situation and background of the case and to guide the students thinking and exploring actively in the context of the specific problems to meet the need of teaching objectives, which could cultivate the learners’ comprehensive ability and quality^[1].

Teachers using the method of case teaching to organize classroom teaching would help the students to contact with the engineering practice during the process of the classroom learning and would also help the students to combine the learning of theory knowledge and developing of practical ability organically, so as to improve the students’ ability of occupation^[2].

Besides research on the method of case teaching, the experts also discuss some other classroom teaching models, such as the teaching modes named “workshop” and “shunt stratification”^{[3],[4]}.

1.2 Research on Practical Teaching Mode

In the aspect of theory teaching mode of relevant engineering cost courses, scholars agree that the design training is very important for students to study building installation engineering.

Scholars believe that the curriculum design is an important part of the practical teaching, which is the crucial means to train students’ practical ability and innovation consciousness. Teachers should select the curriculum design closely combined with the practical engineering item to cultivate students’ ability to solve practical engineering problem and improve their innovation consciousness.

In the process of design training, teachers could choose some typical engineering part from a large project which is a carrier of practice teaching to combine the segmentation of the “single practice teaching” with “comprehensive practice teaching”. Thus, teachers could format some typical engineering project as the representative of the “comprehensive practice teaching”^[5].

In the process of course design, teachers can give students some time to learn and use budget bidding software, and ask them to use the software, which is good for them to improve enthusiasm and ability of curriculum initiative so as to improve the quality of curriculum design.

Therefore, teaching mode of cost courses about case teaching and design training has been done in colleges and universities. However, at the same time, we also found that in the literature the concrete

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teaching method how to improve the ability of engineering practice of students is lack, which is an important content of the research.

2 The Main Contents of the Course“Evaluation of Building Installation”

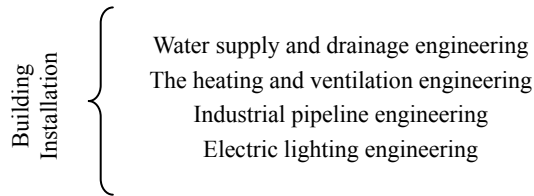


Figure 1 Teaching Contents of the Course“Evaluation of Building Installation”

3The Characteristics of Teaching the Engineering Management Undergraduates

3.1 Emphasis on "Engineering Technology" Teaching

The most important of teaching engineering management undergraduate students is how to improve the practical ability in engineering practice. On the one hand, this kind of practical ability is different from other disciplines of management engineering, which should be supported by strong special technical knowledge of such engineering disciplines as construction engineering, building water supply and drainage engineering, building heating ventilation air-conditioning engineering and building electrical engineering. On the other hand, this kind of practical ability is also different from other engineering disciplines mentioned above and should be supported by wider special technical knowledge in almost all the engineer fields. Engineering undergraduate students are always confronted with a difficult task as lack of Professional foundation both in theory and practice. Thus it is important for us to strengthen the teaching of technical courses.

3.2 Focusing on Cultivating “Engineering Practical Ability”

After graduating, most of engineering management students would do specific work in the field of engineering construction. In order to enable students to have the ability of project budget making and have the ability of BOQ bidding, it is very important for teachers to cultivate the engineering practice ability of student. As an important professional course for engineering management undergraduate students, “Evaluation of Building Installation”is no doubt that it should be taken on this responsibility. In the classroom teaching, practical ability training has been completed from four steps shown in figure 2. The first step is about identification ability of construction drawing of such engineering disciplines as civil engineering, building water supply and drainage engineering, building heating ventilation Air-conditioning engineering and building electrical engineering. The second step is about analysis capability of decomposition and re-composition of each unit of engineering system. The third step is about making BOQ according to the related calculation rules. And the last step is about summary ability of sub-divisional work cost based on BOQ.

4 The Logic Clue of Teaching the Engineering Management Undergraduates

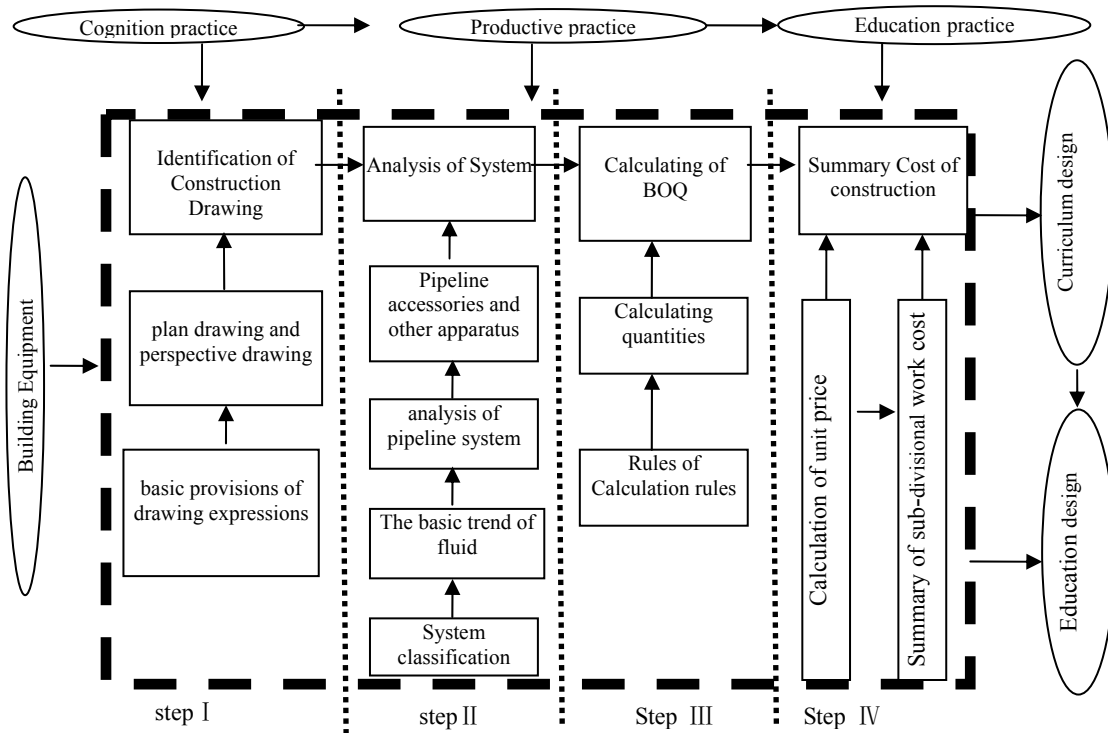


Figure 2 Teaching Frame of the Course “Evaluation of Building Installation”

4.1 Strengthening the Basis of Classroom Teaching—Identification Ability of Construction Drawing

“Building Equipment” covers a wide range and has big capacity of engineering knowledge, so it is a challenge for teachers to study and teach it. Since the restrictions of teaching time and textbook content, the basis of identifying drawing is weak for students.

In traditional teaching method, we will generally follow the existing teaching materials, starting from “step III” in Figure 2. After giving a brief overview of the basic composition of the system, teachers will directly explain cost calculating mode of quota and BOQ, and then train students according to the corresponding rules.

There are two problems in this traditional teaching method. Firstly, as the calculation rules are cumbersome, it is considerable difficulty for undergraduate students who are lack of both construction drawing foundation and practice experience to understand and absorb the rules. Secondly, in this order it is not conformity with the Epistemology: practice--theory--practice, which would affect the students to absorb knowledge.

The installation engineering involves relative large and complex engineering boundary, so each kind of installation engineering drawing would have different characteristics in expression and illustrations of its own. Compared with the identifying architectural and civil engineering drawing, students will feel it much more difficult in identifying installation engineering drawing, which is not only because of the chances of students contact with installation engineering drawing relatively fewer, but also because of the contents of installation engineering drawings relatively independent and more complicated.

Therefore, before contacting with the specialty construction drawing, students should be taught special engineering knowledge to understand construction drawing, which could get twice the results with half the effect.

For example, in teaching building water supply and drainage engineering, teachers could divide the process of identifying the construction drawing plan into two parts in which is shown as “step I” in figure 2.

One is the most important basis, namely basic provisions of drawing expressions, including expressions of proportion, elevation and pipe diameter in water supply and drainage engineering. For

example, the meaning of pipeline elevation for water supply pipeline and water drainage is different pipeline in both plan drawing and perspective drawing. Being the pressure pipeline, the elevation of water supply pipeline refers to the pipe center. However, the elevation of water drainage pipeline refers to the pipe bottom as fluid in this tube is gravity flow.

The other is made on the basis above, which is about how to analyze the contents including in plan drawings and systemic perspective drawing. For example, in figure3 we could learn some information about layout of pipeline in plan drawing, which includes the main plane distance between construction, equipment and pipeline. And we could learn other information about the layout of pipeline from systemic perspective drawing.

Therefore, in the process of teaching method to understand construction drawing, teachers should require students to cognize the plan and perspective drawing together, to understand the specific layout of pipeline and equipment from the whole.

Gradually forming this good habit, the students can find it is easy to find the level size from the plan drawing and the vertical line size from the perspective drawing, which is helpful for them to make a rapid transition from identifying of drawing (Step II in figure2) to calculating of BOQ (Step III in figure2).

4.2 Solving Teaching Difficulties—Analysis of System and Calculating of BOQ

The course of “Evaluation of Building Installation” plays an important role in relevant cost courses. In actual teaching, we teachers found that students often feel difficult in system analysis and quantity calculation as they unfamiliar with the construction engineering drawing especially the part of construction installation engineering. Thus, it is very important for us to teach students in accordance with their aptitude and characteristics.

In actual teaching, teachers can classify the overall cost course at first, and then introduce main parts of the course to students to provide a systemic view to them. Then, in the students’ initial stage of installation work cost learning, teachers could help them to establish a strong system idea to complete the learning of other various steps of this course. This is both the logical thinking training and the learning habits training to students.

As shown in Figure2, it is not only a learning logic clue of this course, but also necessary steps for students to calculate unit cost.

Strictly speaking, we could not completely separate analysis of system from calculating quantities. The purpose of analysis of system is mainly to help students to understand the drawing contents better and also to help them to calculate BOQ faster and more accurate on the basis above.

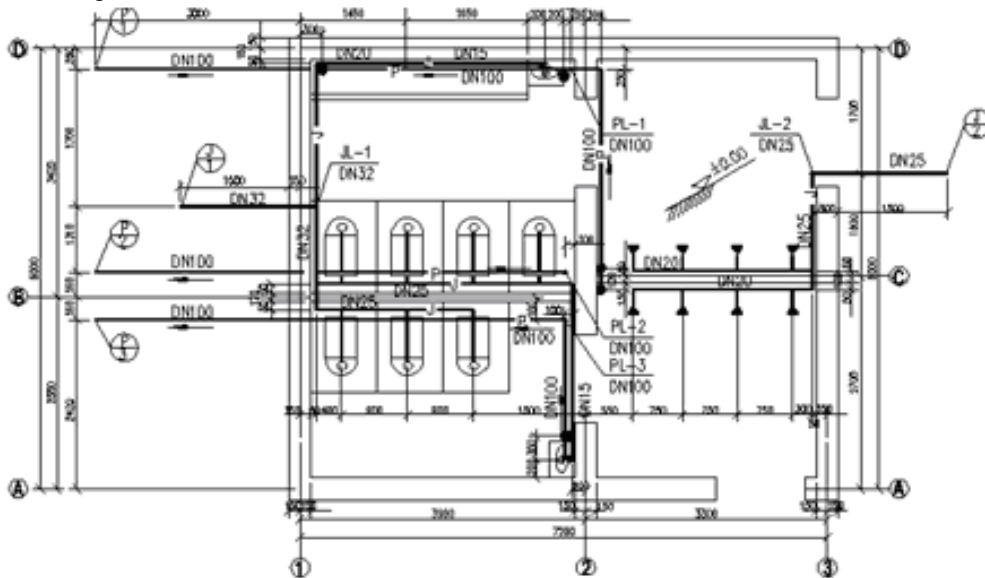


Figure 3 The Construction Plan Drawing of Building Water Supply and Drainage Engineering

For example, shown in figure3, the analysis of system can be done by taking these steps. Firstly, the system of water supply and drainage could be divided into two categories---- “P” and “J” according to the different types of fluid in the pipelines. For “J”, we can decompose it into four subsystems: the introduction pipeline subsystem, branch 1 subsystem, branch 2 subsystem and branch 3 subsystem

according to the arrangement of Equipment and pipelines. Secondly, we could calculate the amount of engineering subsystem one by one. Finally, we could aggregate forming part of the total quantities of pipelines according to the pipe material, pipe diameter and so on. In such systemic analysis method, we can easily understand the system, and can calculate the quantities of subsystems of the project, and the final summary, reducing the calculating difficulty.

4.3 Extending the Boundary of Beginning and End of the Classroom Teaching

“Building Equipment” is the leading foundation for undergraduate students to learn “Evaluation of Building Installation”. Due to time limitation, some necessary basic knowledge of engineering cost must be taught in such leading course. The main contents of “Building Equipment” include the building water supply and drainage, HVAC (Heating ventilation and air conditioning building) and electrical building construction. For example, through learning of The building water supply and drainage engineering, students should not only understand the basic composition and function of this kind of engineering, but also found a solid basis for the next study.

In order to ensure that students can quickly correspond up the project of physical and engineering drawing in the study of cost course, teachers should make full use of the cognition practice.

Teachers could not only lay the foundation for students to learning cost courses through leading knowledge teaching, but also help students to increase their actual engineering practical ability of knowledge and improve their future job capacity through extending in the subsequent process of teaching.

Since the majority of engineering management students will work in the filed of engineering cost after graduation, the follow-up practice training should be set up in order to consolidate their learning outcome and to reduce their transition time from the school to the enterprise at the same time.

These kinds of practice training generally include the course design and graduation design. In curriculum design, the teacher can assign a set of relatively independent of the drawings. The students think independently, and analyze them step by step with the method learning in the class and then complete the total cost of the project. Through the curriculum design, the students could both test the learning outcome of theory knowledge and enhance the application ability of theory knowledge stage.

In the graduation design, the teacher may require students to complete the total cost of a single project, which is not only helpful for students to strength their professional proficiency through the classroom learning, curriculum design to graduation design, but also helpful to deepen their professional understanding the connection between the two kinds of engineering courses “Evaluation of Building Installation” and “Evaluation of civil engineering”. In this way, curriculum provisions are better able to combine theory and practice, and to cultivate graduates students’ ability of engineering management.

5 Conclusions

Classroom teaching exploration should be done in three aspects, which include strength understanding construction plan, solving the most difficulties of anglicizing the system and calculating quantities of BOQ, extending the beginning and end of the classroom teaching. And this Classroom teaching exploration has been practiced in teaching practice. In the process of teaching, we found that teaching effect is good according to the feedback of students. In order to keep pace with the new development, teachers should also teach students to consider the problem about construction cost from lager field^{[6][7]}.

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Measure Model of Architecture Knowledge of the Product*

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Abstract: The product architecture (PA) is the main output of product design and embodies the strategic direction of product innovation of enterprise. For the purpose of measuring architecture knowledge of the product (AKP), this paper explores the related influence factors of AKP from a perspective of management and establishes a measure model of AKP. It consists of twelve factors classified from four aspects, which are environment, organization, technology and user. The environment factors are market competition, market expectation and sale force. The organization factors are enterprise scale, organizational support and coordination and absorption of the organization. The technology factors are product feature, technology standardization and technology learning and diffusion. And the user factors are market share, customer satisfaction and feedback. Also, it presents three optional contexts of AKP. Finally, the strategic value of measure model is discussed, as well as shortages of this paper and directions of future research.

Key words: Architecture knowledge of the product; Measure model; Influence factors; Context

1 Introduction

In the late 1990s, the influence of PA gradually attracted people's attention acting on the international competitiveness of product. Thus, the theory of PA came into birth. The PA is the main output of product design, embodies the strategic direction of product innovation of enterprise and has direct effects on product innovation, competitive advantage, supply chain management and business model innovation. Whether in the high-tech industries such as computers, software, or in the car (Chen Hong, 2010), books, machinery and other traditional industries, the PA plays an extraordinary role. Ulrich (1995) first of all proposed the concept of PA for manufacturing enterprise from multi-disciplinary perspective such as design theory, software engineering, operations management and product development management. He thinks that PA is a systemic scheme formed by assigning product function to physical chunk, embodying the decomposition and integration of product system. However, AKP is defined as the cognitive ability of the organization on learning and applying the technique, skill and experience related product that embedded into the product architecture design (GuYuanxun, 2012).

AKP is a systematic method to understand and grasp the essence of PA (GuYuanxun, 2012). It can help enterprise further understand the products from management level and business level. Thus, how to use and measure AKP is very important, which is one of the big challenges related to AKP currently. The study of measure model of AKP provides evidence for the use and measure of architectural knowledge, provides scientific and reasonable decision-making reference for assessment and optimization of the PA, contributes to understanding the product more deeply, helps enterprise

2 Literature Review

The concept of PA is put forward by Ulrich, which implies that the PA exists as a systemic unit and consists of three basic elements, that is system, chunk and interface (Ulrich, 1995). At present, the form is the dominant way to understand the PA (Ulrich, 1995; Baldwin&Clark, 2000), in this paradigm the PA is commonly divided into two types, modular or integral. In fact, the form of architecture is evolutionary switching between modular architecture and integral architecture along with the context of the firm (Shibata et al., 2005; Fixson&Park, 2006; Gu, 2012), then if we simplify the PA into either modular type or integral type, the essence of PA cannot be grasped, and we have weak measures to improve the quality of PA. Based on the above, GuYuanxun (2012) establishes a full picture of AKP from a perspective of knowledge production and diffusion to understand the essence of PA. Also, he puts the conceptual expression of AKP into a value chain perspective to think, not only confined in the PA area.

implement product management and knowledge management activities, serves for product innovation strategy, and contributes to improving core competitiveness and business performance.

Up to now, the concept and essence of PA has been discussed a lot by existing researches (Ulrich,

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1995; Baldwin&Clark, 2000; GuYuanxun, 2012; etc.). At the same time, many extended researches explore issues such as the effects of PA, the generating mechanism of the effects of PA, the context of effects evolved and model researches about PA (Henderson&Clark, 1990; Gu, 2012; Shibata et al., 2005; Sanchez&Mahoney, 1996; etc.). GuYuanxun (2012) establishes a conceptual model of AKP, which consists of the context, modules and relations among modules. Especially, the context confines the boundary of the PA. Wouters et al. (2011) propose an approach to financially assess the product architecture decision about the incorporation of a product feature. Four product architecture decisions are conceptually developed and operationalized in an assessment method. Yet up until now, we did not get a measure model of the AKP. Then, the purpose of this paper is to establish measure model of AKP and outline related strategic value of AKP.

3 Measure Model of Architecture Knowledge of the Product

Based on a perspective of management, considering enterprise external environment, internal environment, the product itself and user experience, this paper analyses the related influence factors of AKP from four aspects, environment, organization, technology and user.

1) Environment factors

Market competition (M_1) is the basic orientation of PA because the advantages of product performance represent market demand. It is a reflection of demand, thus promotes the pace of product innovation. Market expectation (M_2) reflects the strategic objectives of PA. The improvement of PA has positive effect on achieving market expectation. Sale force (M_3) is actually limited for enterprise. So, proper and adequate sale force provides an important safeguard for bringing AKP into play.

2) Organization factors

Enterprise scale (M_4) determines the form of product architecture innovation, thus affects the use and deliver of AKP. Organizational support (M_5) mainly includes support and involvement of organization managers, whether the product is incorporated into major projects and so on. Coordination and absorption of the organization (M_6) can affect the use efficiency of AKP.

3) Technology factors

Product feature (M_7), the direct expression of AKP, is mainly about product performance, product advantage and product innovations. Technology standardization (M_8) is used to adapt to the changes in the market. Its stability leads to rapid product innovation. Technology learning and diffusion (M_9) has positive effects on the use and deliver efficiency of AKP.

4) User factors

Market share (M_{10}) is measured by the number of the product users in this paper. It indirectly reflects the rationality of PA, which further implies the effectiveness of AKP. In order to make assessment and optimization for PA, we need to refer to customer satisfaction (M_{11}) and feedback (M_{12}).

For the product, the form of PA should be matched to its context. Then, we are able to understand and analyze the effects of PA very well (Gu, 2012). It is the basis and premise of the success of PA research that how to define and describe the context. This paper provides three optional contexts for the measure of AKP, namely product upgrading, product life cycle and enterprise value chain. Each context has direct and indirect effects on the twelve influence factors.

Now, we get a measure model of AKP:

$$M(AKP)=M_1K_1+M_2K_2+M_3K_3+M_4K_4+M_5K_5+M_6K_6+M_7K_7+M_8K_8+M_9K_9+M_{10}K_{10}+M_{11}K_{11}+M_{12}K_{12}+E(context)$$

Where,

M_i represents one of the twelve influence factors in sequence. Meanwhile, K_i is the percentage of M_i of the total, and $K_1+K_2+K_3+K_4+K_5+K_6+K_7+K_8+K_9+K_{10}+K_{11}+K_{12}=1$.

$E(context)$ is the effect of some specific context on the measure of AKP. Different contexts bring different effects.

$M(AKP)$ is the meaning of measure model of AKP. It has three kinds of variable, M_i , K_i and the effect of some context.

4 Strategic Value

This paper presents the essence and extension of PA, then, explores related influence factors in order to measure the AKP. Thus, a measure model is established with the definition of context from a perspective of management. It has high strategic value for the enterprise.

From the product perspective, the measure model of AKP provides evidence for the use and

measure of architectural knowledge and provides scientific and reasonable decision-making reference for assessment and optimization of product architecture.

From the enterprise perspective, this paper contributes to understanding the product more deeply, helps enterprise to implement product management and knowledge management activities, serves for product innovation strategy, and contributes to improving core competitiveness and business performance.

5 Conclusion

The architectural knowledge of the product plays key role in the understanding of product from management level and business level. Thus, it is very important that how to use and measure AKP. The measure model of AKP has three kinds of variable, that is, influence factors of AKP, its percentage and the effect of some context. The innovations of this paper lie in the measure model and three optional contexts.

Nevertheless, there are two shortages in this paper. One is the quantification of M_i , K_i and $E(\text{context})$. We need to explore an objective, scientific and reasonable method to quantify the variable, for the purpose of putting the measure model into use. The other is that the analysis of influence factors cannot be all-sided. With the continuous development of technology, the main influence factors may change. Therefore, the measure model lacks of stability, and we need to analyze the influence factors of AKP from a perspective of dynamic evolution more comprehensively. The two shortages are the future directions as well.

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An Innovative Study on Inquiry Grammar Teaching with Scaffolding Theory *

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Abstract: With the help of the scaffolding theory, an innovative method of inquiry grammar teaching, consisting of three major stages *individual inquiry*, *cooperation inquiry*, and *heuristics inquiry*, has been proposed. An empirical research has been conducted to evaluate the effectiveness of inquiry grammar teaching compared with traditional grammar teaching approach and instruction. To illustrate how each of the three stages functions, one experimental lesson on relative clause has been introduced. Based on the results of the current research, the conclusion has been drawn that inquiry grammar teaching is more effective than traditional grammar teaching approach and instruction, for scaffoldings can achieve the three effects of timeliness, dynamics, and guidance.

Key words: Inquiry grammar teaching; Scaffolding theory; Experimental research; Interaction

1 Introduction

Inquiry grammar teaching, which presupposes students' interaction while learning, can be viewed as a cognitive process of learning English that reflects the sociocultural theory proposed by the Russian psychologist and philosopher Vygotsky (1978). Vygotsky's *Zone of Proximal Development (ZPD)* involves two main stages of an individual's development. The first stage is what a child or learner can do by himself; the second stage is his potential, what he can accomplish with the help of a more competent person. ZPD refers to the disparity between the current level and the potential level concerning the children's intellectual development. Based on the concept of ZPD, such scholars as Wood (1976), Bruner (1983), Mercer (1994) proposed scaffolding theory denoting a person who helps students to accomplish what they cannot do by themselves. Scaffolding theory, derived from the cognitive psychology, is currently applied in educational psychology. The significant contribution of the scaffolding theory to the field of applied linguistics is that it shows how teachers can focus on the actual level of students, adjusting the complexity of the material so that learners will be able to reach what initially is beyond their level. In different circumstances, scaffoldings can be manifested by cognition scaffolding, tool scaffolding, and question scaffolding. (Gao Yimei, 2011)

Since its inception, scaffolding theory has drawn much attention in applied linguistics due to the great theoretical significance and the wide practical value as well. The main research fields can be divided into listening teaching (6.7%), speaking teaching (10%), reading teaching (44.4%), writing teaching (35.6%) and grammar teaching (3.3%). Figure 1 reveals that fewer researches are concerned with the application of scaffolding theory into grammar teaching. In this case, this paper attempts to probe into the inquiry grammar teaching from the perspective of scaffolding theory.

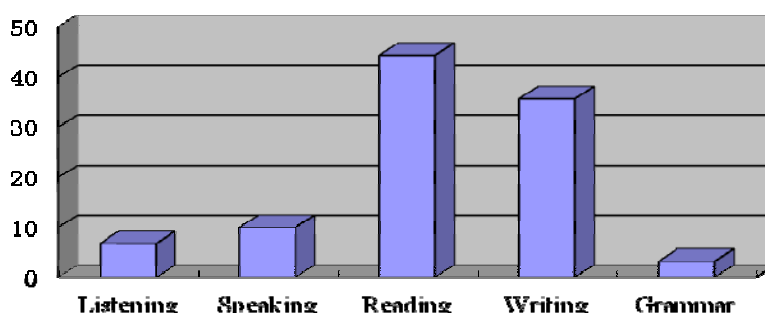


Figure 1 Data of Five Research Fields

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2 Inquiry Grammar Teaching

Inquiry grammar teaching is viewed as critical, reflective, and constructive. Under the teacher's guidance and assistance, the students take the initiatives to study grammatical points, reflect on the grammatical rules and eventually explore the problem-solving methods. In this research, inquiry grammar teaching consists of three equally important stages: *individual inquiry*, *cooperation inquiry*, and *heuristics inquiry*. To illustrate how each of these stages functions, one experimental lesson on relative clause was conducted. With the help of the scaffolding theory, the lesson achieved a marvelous teaching effect.

2.1 Individual inquiry

Individual inquiry is the first stage of inquiry grammar teaching. This stage is characterized by studying independently. Students should be given opportunities to figure out everything by themselves, receiving help only when necessary. Concerning the relative clause, choice of relatives takes the high priority. During the class instruction, each student was offered one passage containing various relative words. The passage is as follows:

It was Valentine's Day when a little old couple who looked out of place walked into McDonald's where many young couple were eating.

They walked right up to the cash register, where they placed their order with no hesitation and paid for their meal. Seated at the table near the back wall, they started taking food off the tray, which contains one hamburger, one order of French fries and one drink. Carefully, the old man cut the hamburger in half, counted out the French fries, and divided them in two poles, one share of which was neatly placed in front of his wife. He took a sip of the drink. So did his wife.

As the old man about whom the crowd were curious began to eat his share, while his wife just sat there, watching him attentively, the crowd began to get restless, thinking all they could afford was just one meal for the two of them.

A young man who was cool and gentle came over to the old couple's table and politely offered to buy another meal for them. The old man refused, saying they were used to sharing everything.

Again and again the young man offered to buy, whose face went red, but he failed. As the old man finished eating and was wiping his face with a napkin, at which time the young man could stand it no longer and wondered what they shared, demanding an answer to it. The old man told him peacefully the reason why she didn't eat was that she was waiting for the teeth.

So to the world, you may just be somebody...but to somebody, you may be the world.

Thanks to the acquired knowledge of relatives in high school, the students managed to underline all the relative words individually and accurately. The teacher provided the students with the cognition scaffolding by which the new point could be assimilated into the acquired knowledge. The teacher started from where the students were and with her help they improved their knowledge of grammatical structure. As soon as they reached a certain level on which they felt confident, they were eager to show their understanding of the subject matter. They were aware that learning English was a process of solving problems and they were willing to explore the new point based on the "love" passage. Thus, an inquiry learning atmosphere was created and highlighted.

2.2 Cooperation inquiry

Cooperation inquiry is the second stage calling for group work and peer interaction. Once students are in a group, they assign themselves roles. In this case, the role distribution is based on "who knows what to do". Peer interaction creates a certain micro-world that enables the students to negotiate the assignment, clarify tasks, and even provide each other with corrections. It definitely develops their strategic competence. (Savignon, 1972) In this stage, the "love" passage was under discussion again, where the relative pronoun *as* was excluded. Therefore, group work served to deepen the understanding of *as* by distinguishing between the following two sentences.

1) *This is the same book as I lost.*

2) *This is the same book that I lost.*

While the students were busy discussing the examples in small groups, the teacher waited for a few minutes at the outset, without circulating among the groups so that the students could establish a bit of momentum. Within the rest of the time the teacher monitored from a distance, encouraging all attempts at communication. Moreover, the teacher showed two students' textbooks in an effort to resolve their puzzles. Such a tool scaffolding facilitated the inquiry process, in consequence, the students agreed that the first sentence involved two books, while the second sentence denoted only one book.

2.3 Heuristics inquiry

Heuristics inquiry is the third stage of the process which focuses on teacher-student interaction. In the inquiry grammar teaching, the teacher is the guide, guiding the way; the students are inquirers, inquiring about new knowledge. Heuristics inquiry is a powerful solution to the relationship between the guide and inquirers. On one hand, the guide cannot let go, offering no help to the inquirers; on the other hand, the guidance should not be overplayed. As for the difference between restrictive relative clauses and non-restrictive relative clauses, the teacher made use of the following sentences to achieve heuristics inquiry.

3) *Her brother who is now a soldier always encourages her to go to college.*

4) *Her brother, who is now a soldier, always encourages her to go to college.*

The formal difference enabled the students to figure out the restrictive relative clause by the third example as well as the non-restrictive relative clause by the fourth example. Then the teacher raised several questions, called question scaffolding. The understanding could be deepened when the questions were answered gradually. The first question was to translate the two sentences into Chinese so that the difference between the two types of relative clauses turned out to be evident. The students took advantage of individual inquiry or cooperation inquiry, coming up with the correct Chinese translations. Meanwhile, the questions continued, inquiring about the implied meanings respectively. Yet the students felt bewildered. It was at that moment that the teacher acted as a mediator and guided them in the right direction to reach the second stage in the ZPD. With the help of the teacher's introduction to the definitions of the two types of relative clauses, the students understood that the third example involved more than one brother and the fourth example mentioned only one brother.

3 Experiment Design

The present research has examined the learning effect of Chinese learners of English grammar at the university level in an inquiry teaching situation. Its objective includes evaluating the effectiveness of inquiry grammar teaching compared with traditional grammar teaching approach and instruction.

3.1 Hypotheses

The formulation of the two hypotheses, null and alternative, was based on the following reasoning:

1) $H_0: U_a = U_b$

More specifically, the null hypothesis (i.e., H_0 in the formula) suggests that there exists no significant difference between inquiry grammar teaching and traditional grammar teaching approach and instruction.

2) $H_1: U_a \neq U_b$

On the other hand, the alternative hypothesis (i.e., H_1 in the formula) implies that the effect of inquiry grammar teaching is significant, namely, inquiry grammar teaching is more effective than traditional grammar teaching approach and instruction.

3.2 Subjects

The whole investigation involved a teaching experiment which compared one class that studied with inquiry grammar teaching versus another class that was taught with the traditional grammar class instruction method. The present research contained a total of 60 subjects who formed two groups, namely, experimental group and control group. The subjects were first-year English majors in Wuhan University of Technology. None of the subjects knew the purpose of this study in advance. The students in both control and experimental groups shared similar English learning background and showed no significant difference in their English grammar proficiency, which has been proved to be true through the pre-test before the teaching experiment.

Proficiency level in the pre-test was regarded as grouping criterion. Guided by the principle of "be homogeneous among groups and heterogeneous within a group", the teacher subdivided the experimental group into six mixed proficiency groups, each of which was composed of two students with an advanced level and an elementary level respectively, and three students with an intermediate level. Due to the teacher's justification of the use of small groups for inquiry, the students agreed upon learner groupings. However, they had no idea of the criterion of learner groupings.

3.3 Procedure

This research was a classroom-based research, which lasted two months. In order to control the elements of the teaching research, the teacher taught both the control and experimental groups. The students in experimental group were taught by means of inquiry grammar teaching with the help of scaffolding theory, which was manifested by *individual inquiry*, *cooperation inquiry*, and *heuristics inquiry*. The above-mentioned experimental lesson on relative clause elucidated how each of these

stages functioned.

With regard to the control group, the situation was widely divergent. The students in the control group learned the same textbook as those in the experimental group. But they were taught in a totally different way. The teacher emphasized on grammar, drill patterns and simple question-and-answer, which was the traditional dominant approach in English grammar teaching. The students listened to the lectures given by the teacher for most of the time. That is, nearly no inquiry between the students happened. Certainly, they were asked to sit for pre-test and post-test that were identical to the two test papers respectively in the experimental group.

4 Data Analysis and Discussion

4.1 Experimental results and interpretation

The results of this study are presented according to different data sources in the teaching research. They are test scores including pre-test and post-test. The data got from the pre-test is analyzed by means of SPSS software. The results can be shown clearly in Table 1 and Table 2.

4.1.1 Result from pre-test

According to the nature of the research, the related theory in statistics and SPSS software, since the samples are relatively small and the groups are independent, the appropriate test is the *t*-test for independent samples. The critical value of *t*-test for the 5 percent level and 58 df (degrees of freedom) in a two-tailed test is 2.000. The calculated value of *t* shown in Table 1 does not exceed the critical value. In this case, the means are not significantly different at the 5 percent level. Thus a conclusion can be drawn here that there is no significant difference between the two groups of learners in grammar proficiency before the teaching research.

Table 1 Comparison of Grammar Achievements Between the Two Groups

	Group		t
	experimental	control	
Mean	14.267	14.000	1.000
SD	1.202	0.983	

Note: maximum score=20 n₁=30 n₂=30 P< .05 df=58

4.1.2 Result from post-test

After the teaching research, the students in the two groups took another grammar test. SPSS software is again applied into the analysis of the data. Since the samples are small and the groups independent, the appropriate test is again the *t*-test for independent samples. The critical value of *t* for 5 percent level and 58 df in a two-tailed test is 2.000. Table 2 shows that the *t*-value for the comparison of grammar achievements between the two groups is 7.393, which exceeds the critical value of 2.000. Furthermore, the mean of the experimental group is higher than that of the control group. Therefore, it comes to the conclusion that grammar achievements of the experimental group are significantly better than those of the control group.

Table 2 Comparison of Grammar Achievements Between the Two Groups

	Group		t
	experimental	control	
Mean	15.833	13.500	7.393
SD	1.234	1.140	

Note: maximum score=20 n₁=30 n₂=30 P< .05 df=58

4.2 Comparison and discussion

In this present study, the teacher applied inquiry grammar teaching in the experimental group and traditional grammar teaching method in the control group. The contrast between the two groups is striking. The success of inquiry grammar teaching is attributed to three effects of scaffoldings: timeliness (i.e. scaffoldings are provided whenever in need and removed when the students are capable of solving the problems), dynamics (i.e. scaffoldings vary with the difficulty of grammatical points), and guidance (i.e. scaffoldings serve as guidance rather than substitution in grammar learning).

5 Conclusions

Grammar teaching is not the transmission but the transaction and the transformation of knowledge. (Zhao Jiaping, 2009) With the help of the scaffolding theory, an innovative method of inquiry grammar teaching, consisting of three major stages *individual inquiry*, *cooperation inquiry*, and *heuristics inquiry*, has been proposed. An empirical research has been conducted to evaluate the effectiveness of inquiry grammar teaching compared with traditional grammar teaching approach and instruction. Based on the results of the current research, the conclusion has been drawn that inquiry grammar teaching is more effective than traditional grammar teaching approach and instruction, for scaffoldings achieve three effects of timeliness, dynamics, and guidance. Needless to say, the present research is far from perfect because of some objective and subjective limitations. Inquiry grammar teaching calls for the further study on the degree of individual inquiry, the validity of cooperation inquiry, and the profundity of heuristics inquiry.

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Knowledge Discovery of Online Learners' Characteristic Behavior Based on Rough Entropy

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Abstract: Learning evaluation is an effective way to ensure the quality of online education. However, Most of online learning researches have not fully considered the influence between the effectiveness of online learning and the learners' behavior. This paper lists all of the online learners' behaviors factors which may influence the effectiveness of E-learning. These behavior factors are redacted by rough entropy. The behavior factors are identified, which impact the effectiveness of online learning significantly. Meanwhile, Reduction algorithm based on rough entropy is given out. The valid of the algorithm is tested through examples. It is concluded that the algorithm could accurately identify factors which influence the effectiveness of online learning. This will be conducive to the development of online education.

Key Words: Entropy; Online learning; Rough Set; Behavior

1 Introduction

Lifelong learning is the current development trend of social education. Construction of modern network education is the primary means of lifelong learning system. Internet offers an ideal learning environment for distance education. With the launch of online learning, its' quality has aroused extensive concern. Quality of online education is the key to development for online learning, is also the core competence for the long-term development of online education. How to discover the knowledge of the online learners' characteristic behavior at the different level is conducive to enhancing the qualities of online learners.

Nowadays, the concept of online learners' behaviors has not been clearly defined neither in domestic nor abroad. There are many concepts similar to the concept of online learning behavior, such as "Distance learning behavior", "Online self-Learning behavior", etc. These concepts mainly are: Learners make use of network media to learn online course. In this process, learners need control their cognitions, motivations and behaviors. The characteristic is making use of various of information resources, communication tools from network platform. It emphasis on "Self-directed, Self-motivation, Self-Monitoring"^[1]. It also emphasis on "Temporal separation" and "Media Education". However, as a new learning concept, a product of learning mode, network learning behaviors should be given richer content^[2]. It include: E-learning behavior is a form of multi-dimensional and multi-level learning which is carried out by means of the Internet; E-learning behavior is a kind of self-discipline, self-control of learning behavior^[3]; Actors have full autonomy to decide learning objectives, learning progress, learning strategies and learning behavior's occurrence, development and change. Learners can discuss topics and communicate the issues by various communication tools to achieve online distance collaborative learning. Learners can obtain support and help from teachers, partners, experts and learning support system in the learning process.

Currently, some scholars from domestic and abroad have researched the online learners' behaviors. Such as Karin, Anna and Hummel analysis the online learners' behavior by online learning platform and database log^[4]. Du and Jin divide the online learning model into learner model of personality and learners' behavior model, and present learners' behavior model^[5]. LU Rurong analysis the factors affecting the students' online learning behavior^[6].

In summary, the research of learners' behavior is still in the exploratory stage. Quantitative research on online learners' behavior characteristic is lacked.

2 Online Learners' Learning Effect and Learners' Behavior Attributes

Learning effect is divide into better, worse and general. The learning effect is presented by d . The Learners' Behavior contain c_1 : Information retrieval ability c_2 : Information dissemination ability c_3 :

Information exchange ability c_4 : Computer skills, c_5 : Problem-solving ability, c_6 : Information dissemination ability.

3 Online Learners' Behavior Identify Model Based on Rough Entropy

3.1 Rough Set Introduction

Rough set is a data analysis theory, which is presented by Professor Zdzislaw Pawlak. Following probability theory, fuzzy set theory, evidence theory, rough set is a new math tool, which is used to analyze incomplete and uncertain data. It can effectively analyze and deal with imprecise, incomplete, inconsistent, incomplete and other type data. Meanwhile, it could discover the hidden knowledge from this information. Rough set redact the data and obtain minimal expression of knowledge from information provided by data self. Rough set method can identify the data dependencies.

3.2 Data Discretization

Let Decision Information System $DS = \langle U, C \cup D, V, f \rangle$, domain $U = \{x_1, x_2, \dots, x_n\}$, C , D , respectively, as a condition attributes and decision attributes. For each condition attributes and decision attributes $C_i (i = 1, 2, \dots, m)$, $D_i (i = 1, 2, \dots, m)$, its value range is divided into k equal or unequal levels. Respectively $1, 2, \dots, k$ as the indicator value of each level. The value of the property is determined by discrete values falling into the scope.

3.3 Attribute Reduction and Attribute Core

Idea of Attribute reduction is to remove redundant attributes and identify attribute core values *Core*, while maintaining the same premise of knowledge classification ability. The basic idea of attribute reduction is: when a property is removed, if $Pos_C(D) = Pos_{C-a}(D)$, property a relative to the decision attribute D is unnecessary. a can be reduced, otherwise, property a is not reduced. If each of the properties in a are irreducible, C and D is independent. If there are $B \subseteq C$ and $Pos_B(D) = Pos_C(D)$, meanwhile, B and D is independent. It is claimed that B is the reduction with C respect to D . It is claimed $Red_D(C)$, C is all about the intersection of D reduction of core attributes called D . It is claimed $Red(R)$.

3.4 Reduction Algorithm Based on Information Entropy

Attribute reduction is the core research in rough set theory. The traditional rough set reduction algorithm is based mainly on the expansion of discernibility matrix algorithm, which is presented by professor Skowron. However, attribute reduction algorithm based on discernibility matrix have some limitation, when the incompatible rough set is reduced. There are many incompatible data in many online learners' behaviors data, therefore, the method of seeking core properties based on information entropy is presented. Heuristic algorithm for attribute reduction based on mutual information quadratic reduction algorithm is presented to resolve attribute reduction of incompatible decision tables.

3.4.1 Information Entropy of Knowledge, Conditional Entropy and Mutual Information

Definition 3.1 Knowledge of P information entropy is defined as:

$$H(P) = - \sum_{i=1}^n P(x_i) \log_2 P(x_i) \tag{1}$$

$P(x_i)$ is a probability of x_i in the dipartition of P based on U , $U/P = \{x_1, x_2, \dots, x_n\}$, $P(x_i) = \frac{|x_i|}{|U|}, i = 1, 2, \dots, n$.

Definition 3.2 Knowledge Q relative knowledge of P conditional information entropy is defined as:

$$H(Q|P) = - \sum_{i=1}^n P(x_i) \sum_{j=1}^m P(y_j | x_i) \log_2 P(y_j | x_i) \tag{2}$$

Subject to $P(y_j | x_i) = \frac{|y_j \cap x_i|}{|x_i|}, i = 1, 2, \dots, n; j = 1, 2, \dots, m$

Definition 3.3 Knowledge of P and Q mutual information is defined as:

$$I(P, Q) = H(Q) - H(Q|P) \tag{3}$$

3.4.2 Reduction Algorithm Description

Let Decision table is $T = \{U, C \cup D, V, f\}$, U is domain. C is condition attribute set of U , D is decision attribute set. Let $a \in C$, if mutual information $I(C, D) > I(C - \{a\}, D)$, then a is core attribute. Set C_0 is constituted by all of the core attributes. Then C_0 is called core attribute set.

The algorithm is as follows:

Step1: $I(C, D)$ is calculated

Step2: All of the core attributes a are calculated. Core attribute set C_0 is obtained. Then, let $B = C_0$

Step3: $I(B, D)$ is calculated, if $I(B, D) = I(C, D)$ then algorithm is end. Otherwise, step4 is executed.

Step4: Attribute P is selected sequentially from the condition attribute set C , $p \notin B$, $I(B \cup \{p\}, D)$ is calculated. The attribute is selected when $I(B \cup \{p\}, D)$ is maximum. If there are many attributes making the mutual information achieving the maximum at the same time. The attribute is selected., which make combination with B least. Meanwhile, $B = B \cup \{p\}$, at last, go to Step3.

4 Case Study

Now, there are eight online learner. Through data of online learners' behavior and data of the E-learning effect discretization based on table 1, decision table 2 can be obtained.

Table 1 The Level of Discrete Values

Discrete values	1	2	3
C_1 : Information retrieval ability	Worse	General	Better
C_2 : Information dissemination ability	Worse	General	Better
C_3 : Information exchange ability	Worse	General	Better
C_4 : Computer skills	Worse	General	Better
C_5 : Problem-solving ability	Worse	General	Better
C_6 : Information dissemination ability	Worse	General	Better

Table2 Decision Information figure

U	Behavior attributes (C)						Effect attributes (D)
	C_1	C_2	C_3	C_4	C_5	C_6	d
U_1	3	3	2	3	3	3	Better
U_2	3	2	3	3	3	3	Better
U_3	3	3	2	3	2	3	General
U_4	1	1	2	2	2	2	General
U_5	1	1	2	2	2	1	Worse
U_6	2	2	1	1	1	1	Worse
U_7	1	2	2	2	1	2	General
U_8	1	2	2	2	1	2	Worse

Rough set theory shows that:

$$U / C = \{U_1, U_2, U_3, U_4, U_5, U_6, (U_7, U_8)\}$$

$$U/D = \{(U_1, U_2), (U_3, U_4, U_7), (U_5, U_6, U_8)\}$$

$$\text{According to formula (3-1): } H(D) = -\left(\frac{2}{8}\log_2 \frac{2}{8} + \frac{3}{8}\log_2 \frac{3}{8} + \frac{3}{8}\log_2 \frac{3}{8}\right) = 1.565$$

According to formula (3-2)

$$\begin{aligned} H(D|C) &= -\left(\frac{1}{8}(1\log_2 1 + 0 + 0) + \frac{1}{8}(1\log_2 1 + 0 + 0) + \frac{1}{8}(1\log_2 1 + 0 + 0)\right) \\ &+ \frac{1}{8}(1\log_2 1 + 0 + 0) + \frac{1}{8}(1\log_2 1 + 0 + 0) + \frac{1}{8}(1\log_2 1 + 0 + 0) + \frac{2}{8}\left(0 + \frac{1}{2}\log_2 \frac{1}{2} + \frac{1}{2}\log_2 \frac{1}{2}\right) \\ &= 0.25 \end{aligned}$$

According to formula (3-3)

$$I(C, D) = H(D) - H(D|C) = 1.315$$

Similarly

$$I(C - \{c_1\}, D) = 1.315, \quad I(C - \{c_2\}, D) = 1.315, \quad I(C - \{c_3\}, D) = 1.315$$

$$I(C - \{c_4\}, D) = 1.315, \quad I(C - \{c_5\}, D) = 1.065, \quad I(C - \{c_6\}, D) = 1.065$$

As $I(C, D) > I(C - \{c_5\}, D), I(C, D) > I(C - \{c_6\}, D)$, so c_5, c_6 are core attributes.

So $C_0 = \{c_5, c_6\}$, Let $B = C_0$, According to calculating: $I(B, D) = 1.065$.

Just as $I(B, D) \neq I(C, D)$, Consequently, According to Reduction Algorithm in 3.4.2, $I(B \cup \{c_1\}, D)$ need to be calculate. so $I(B \cup \{c_1\}, D) = 1.315$.

As $I(B \cup \{c_1\}, D) = I(C, D)$, Algorithm is end. then, $B \cup \{c_1\}$ is relative reduction of table. So $B = \{c_1, c_5, c_6\}$. the E-learning effect can be determined by c_1, c_5, c_6 . If the learners' problem-solving ability (c_5) is better, then the effect of e-learning is better. If the learners' problem-solving ability (c_5) is general, then the effect of e-learning is general. If the learners' problem-solving ability (c_5) and information dissemination abilities (c_6) is worse, then the effect of e-learning is poor, so the problem-solving ability is most important to the effect of e-learning.

5 Conclusions

Many factors influence the effectiveness of online learning. This paper makes use of rough entropy reducing the behavior attributes which influence the effect of e-learning. It concluded that the learner's problem-solving ability and information dissemination ability and Information retrieval ability influence the effectiveness of e-learning remarkable. Rough entropy can effectively identify the behavioral factors which influence the effectiveness of e-learning.

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A Study on Relationships among Art, Nature and Society

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Abstract: Art is closely linked with nature and society. In this paper, from the perspective of art, the spirit of art is defined as a social product of labor, and a kind of important social phenomenon. Besides, this paper assumes social effect just means art criticism to society way is the reason why it exists and art is a projection of our times and cultural metaphor and symbol, which will present the world itself. Finally, this paper puts forward that it is art tell us the age and society and promote the historical development of human society, which has a certain significance.

Key words: Art; Nature; Society; Social effect; Mental labor products

1 Introduction

Art, is a natural person. This is Francis Bacon's words, who is a great painter and was injected with one of the most essential thing that is hidden in everyone heart the most gentle of poetry, and poetic rise to philosophy, so as to communicate with the whole nation to complete, and human love together. His every ounce of joy and pain, are associated with nature and society, in the process of appreciating natural to appreciate art, enjoy life, and in after suffering arrived in noble and beautiful.

Painting is a process of setting not only need to use eyes to see, but also using the soul to feel, listening to natural music, and experiencing the natural sense of humor. Love is natural with sensitive nature. If we strongly feel the splendid nature, we will linger on everything. But not everyone can see, even without name, because it is not the reason you will be able to access and analysis, it can only be understand by love, have no this feeling will not be able to become a painter.

Vast twilight, like the nilkfog, such as cotton thin rain, wrapped in ice river: the distance Snow reflects the rosy sky, and sky bit the black color of the jungle, and extension: the spring twilight thousand form the shape color cloud, leisurely moving with the wind, in the dusk's arms... Levitan, the Russia in the 19th century outstanding landscape painter, he only lived for forty years in the world. All his life, poetry and all feelings, dedicated to the nature. He experienced the natural mind, earth and sky, mountains and rivers, birds, trees and flowers and plants, wind and rain lightning, light and moonlight... He colors blend in so many kinds of joys and sorrows.there, his creation of landscape, surreally quiet and quiet. You desire to went into his prairie, into those sending out the bitter with the sweet spied the haystack. On the far side of a bit thick, there are some small village, people are working peacefully. When the sun has not yet put, moon in green air appeared. Red clouds illuminated the lover's clothing, under the moonlight of birches deep and mysterious.

In the late 19th century Russian art, and it's contemporary literature, music, are assumed with distinctive ethnic features and is famous for its spirit of critical realism. Levitan Isaak Iliich and other contemporary landscape painters showed a Russian culture connotatio from the landscape areas with unique angles of viewpoints. Their poetic lyricism, solemn and stirring and philosophical meaning were full of melancholy mood, and seemed to have something type of Chekhov. Their poetic attitudes have the same understanding of nature and the simple art language. Momentum is not sweep, but it has the artist of his day to pursue national emotion, local and democratic tendency. So he scenery always keep the light and air for a very serious performance, and find out the person's feeling from the image of nature and feeling, from the early famous work "autumn, feeding the eagle", "twilight", "the day of the spring, the sun" can see him on the details of the processing, as well as the charming color. All in their body and mind to love nature and subtle dig deeply in the charming poetry.

Levitan gave life into his drawings, which can reveal the vitality and the beauty of nature; However, his works were not just pure beauty of artistic conception because his own youth suffered greatly from discrimination. So that the painter expressed heavy emotional and dripped wet brush strokes, whose color can actually read through the nature associated with the suffering of the people. His realism and the last in the studio was not the same because he repeated observation, pondered over and over again. He didn't give up the pursuit of a harmonious unification of aesthetic feeling, and presented the most natural picture. Finally have such a wonderful work.

As a man who always loved the nature, Levitan leaved all day in the cry of urban people and tired back to the mysterious beauty of nature. As a result, he could have such advocate natural beauty of the

artist, is really a treasure of human beings and let a person feel the beauty of nature, the earth's beauty, the original habitat for humanity is so beautiful, can think of now environment is sharp, harsh destroyed, those beauty will leave us forever. Wish the world more than a few Levitan that natural landscape painter, with the mind to arouse the people to the natural beauty of empathy and care for the environment of strong consciousness^[1].

2 The Relationship Between Art and Nature

Because art is a social mental labor products, it has traditionally been treated as some kind of social phenomenon.

However, it is condensed into a free entity, rather than obeying the existing social norms and displaying their own social effect, which means that art criticism to society way is its very existence. Art is for the survival conditions of degeneration of a wordless criticism. For example, from Russian painter Ilya Yafimovich Repin's work "Tracker on the Volga River" (1870-1873), it is easy to see: broad on the Volga River, a group of slaves who pull a heavy boat loan, support somberly ahead, they weathered's heat were shabby, looked through the black, but can't see a trace of sorrow and melancholy sorrow in his eyes, still staring at the front, in the crowd of different ages, different personalities, different experiences, then send the red clothes young straight body, hand grasp cordelle action, revealing a kind of unbearable the backlash. Tracker were silently sweating flow, gulping for heavily, and they consistent pace, which seemed to feel out of the ground shaking slightly, a solid pace, and a social system of dark stripes. This group of people were suffering savings invincible power. He reflected heavy emotion and dripping wet brush strokes to depict the suffering of the people, the painter used touching artistic language to tell people to love their land and people, and to shoulder the sacred responsibility of history^[2].

3 The Relationship Between Art and Society

Art can express the nature of society, sometimes revealing the dark of the society at the same time, also have a pure expression of beauty.

As the painting of Mona Lisa, Leonardo Da Vinci, no matter any direction you stand, she always smile to you directly. And you will feel that she had been watching you, the reason is that her face is 3/4 of the observer, is the most critical and her eyes were moving to the same side, and the pupil area no specular highlights. Oneself forget this is not an artist, but Da Vinci in his painting, he slowly exploring, is a genius of innovation to create a shocked the world wonderful results, corners of the mouth slightly become warped up of Mona Lisa, a noble grace fully mysterious smile, the whole painting color transition is very uniform, particularly in the hands of representation. Natural soft together. If it's not long time and make it fade's masterpieces, the hands that you must be can't help to lift your hands into the picture kiss. Three piece of Leonardo Da Vinci's most famous women's portrait is hidden in a kind of desire. This verve "auspicious, Huang De Qi Car" behaved in the most appealing, the protagonist is neither take Mona Lisa heart did Sarah laugh, without cutting has led the tender submission, the young man gently beautiful dark eyes across the us, the curve of the lips sensitive presents without compromise. Deserted ChiBing, the haze of smoke, dark trees, check the reflection in the water around the light with the woman. For artist, she was flesh and blood. Besides, art can show something of society, sometimes revealing the dark of the society at the same time, also have a pure expression of beauty.

Leonardo Da Vinci is the most outstanding representative of the Italian Renaissance, painting for he is only one way he wants to know the world. The Bancroft Virgin is treasures of his paintings. Renaissance artists in the performance of the religious subject matter often god as the humanized handle, make works more vivid and real. Reflected a kind of very simple emotion, from the virgin's face filled with happiness, we can feel the existence of the real. Hand flowers is a kind of guidance and enlightenment for Jesus, haunts a kind of sweet atmosphere between mother and son this is the first time that human painting history describe the soul communication between mother and son's masterpiece. No matter what theme painting, image composition of choose and employ persons, both can show Christ between dust atmosphere of life experience, and idyllic atmosphere of the world can show the ancient pagan gods.

4 The Relationship Between Nature and Society

Today the existence and development of art continues to be brought from the mass culture.

In the field of literature, art as well as painting, like the peak of the world of pop music has its own literary world, enables us to achieve that kind of situation. Such as the three giants of the Renaissance.

Shakespeare in the literary world, the music of Johann Strauss, Leonardo da Vinci painting. Not only that, today's artists are from the ancient times, the art of its traditional heavy pressure. Art is impossible in vacuum, the temple of narcissistic, artistic creation is also difficult to really completely abandon traditional and innovative, let alone a posturing for innovation.

After modern art and modern art are undoubtedly implies heavy contradictions, problems or even dangerous. It is against traditional even against art, there were also some of them grandstanding, vulgar, extreme and through the head, for innovation and innovation. Anyway, art is a projection of our times and cultural metaphor and symbol, and it can show the world forever, because this society is not only art that inhabit it, also because of art not only bear the world needs, more because art is the human, is with the people and society are each other's ontology. Indeed such as John Russell said: "when the art renewal, we must also be updated." We with our age has the feeling of a closely related, there is a sharing and power by the spirit of strengthening, that's what life should be the most satisfying things contribute to age. If this is possible, we said to herself, so everything is possible. In the history of human consciousness, a brand-new of period has started... It tells us time, art is the art tells us social, it is also the art that we know ourselves.

5 Conclusions

At one time, as noted above, the same meaning was given to art that was applied to techniques. The blanket description that each involves the skill to make or do something is no longer true or accepted, however.

Nature is now generally thought of as applied science. The old terminology still has some validity in the role that skill plays and also in the transformation of matter. The skills of the artist, the craftsman, and the technologist all generally involve changes in the natural world. A block of marble is shaped into a statue by a sculptor. Silicon, metal, and plastic are shaped into a microchip by a technician using a machine. Otherwise art and Nature have diverged completely. The goal of artists is to give permanence to the present, to speak to their age by creating works that will endure for all time. The goal of technicians is to press on to the future and to new discoveries.

Nature suggests permanent change and improvement. Once a new technique is discovered and adopted, society does not attempt to revert to the former technique. The automobile displaced the horse and buggy; the electric light replaced kerosene lamps; sound movies replaced silent films; and word processors are rapidly making typewriters obsolete.

This forward march of Nature is called Society. In the fine arts such Society does not exist. The skill of the artist rests upon knowledge and experience, just as the skill of the technician does. But the creative processes involved seem to be different. Today, for example, one can admire the design of a Roman chariot, but few people would ever want to depend on it as a regular means of transportation. By contrast, it is still possible to walk into the Vatican's Sistine Chapel and be astounded by the magnificence of Michelangelo's frescoes. These paintings have an excellence that will never become outmoded.

A work of art, whether it be a painting by Titian or a concerto by Mozart, is not a stepping-stone to something else that will someday be considered better. It is not like the vacuum tube, which served its purpose well enough until the transistor was invented. Each artwork stands on its own--distinctive for all time. Even poor imitations cannot damage the goodness and integrity of the original.

All the paintings and pieces of sculpture that have been done since Michelangelo and Leonardo da Vinci are different from the works of those two masters. But the more recent work can in no sense be viewed as an improvement in the same sense that the steamship is an improvement on the sailing ship. Painting of the 20th century, no matter how good it is, cannot be considered an improvement over the prehistoric cave paintings discovered near Lascaux, France; it can only be considered different.

In the late 20th century art and nature have been united by the computer. It is possible to create musical compositions on a computer. It is also common to design three-dimensional models of commercial products or to sketch out blueprints. Computers are used by sculptors, filmmakers, architects, printmakers, and other workers in the visual arts. It is even possible to create finished works of fine art on a computer screen. But the distinction between Nature and art persists. Computers make the execution of some kinds of art more challenging and interesting; they do not, however, make art better.

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The Pattern and Application of Corporation Design Strategy

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Abstract: In recent years, more and more scholars have began to realize that the importance of design strategy on the corporation, and to force in the research of this aspect. However, current research still stays on concept level rather than on the level of design strategy system. This paper, on the basis of previous studies, defines the concept and composition of design strategy, advances four patterns of design strategy, and takes the design strategy of Apple as an example as the basis for empirical research. I hope which facilitates the research on the enterprise strategic.

Key words: Corporation design strategy; Strategic pattern; Application

1 Introduction

With the progress of society and science and technology in the 1990s, the concept of industrial design translated from the category of single, specific product design to an integrated globalised system. Many influential people, such as entrepreneurs, government officials, design educators, and designers began to realize that the success of a product needed the co-coordinated co-operation of several corporate departments. Design was just one link in the whole systems. More recently design has begun to influence the corporation's market positioning, product development and competitive mechanisms. Increasingly, much attention is being paid to those who are winning market share through design. Design strategy arises at an historic moment.

At present, the research on design strategy remains at concept level, and has not penetrated into the strategic design system. Many scholars study the concept of design strategy, but seldom speak about the application of design strategy for specific purposes. This paper on the basis of previous studies, defines the concept of design strategy and composition system according to the characteristic of design activity, then advances four patterns of design strategy. Corporations can choose strategic pattern according to the characteristic of design activity in order to make the operation of design activity more smoothly and effectively.

2 The Implication and Composition of Design Strategy

2.1 The Implication of Design Strategy

Design strategy is a literal translation new word from western in the field of modern design. Different scholars have different views from different angles on the concept of design strategy. Caijun(2002) consider "Confronting with rigorous market challenge and environment, design strategy is the strategic plan for sustainable development aiming at market development, manifested the strategic thought and culture principles of corporation."^[1]Some scholars taking design strategy as strategic resources of design management, which is the method and reflection of it. Liu Guoyu(2003) claim that "design strategy is proposed a series of definite guidelines for design activity, evaluating environment of a particular product for ensuring the success before design activity."^[2]Yu Zhonghua(2007) argue that design strategy is taking design management as a strategic resources, mixing design management and strategic management of corporation together and balancing the corporation interest.^[3]Wang Xijun(2008) state that achieving balance of corporation profit, design strategy is the long-term plan and strategic method for design works on the basis of corporation circumstance, the plan of design stage development, and the principle and method of design.^[4]

Based on the concept of design strategy above scholars mentioned, this paper defined design strategy as followed: design strategy is the overall plan of organizational design activity, finding and confirming the core competitiveness or development direction of corporation, enclosing product with certain method and measures, and confirming the concept and target of product strategy according to conditions and target market positioning of corporation.

2.2 The Composition of Design Strategy

On the composition of design strategy, Caijun(2002) believe that design strategy should be composed of seven aspects, such as market strategy, research and development of the consumer centered

life forms, identification of corporation image and product design, future strategy, integration process of design and exploitation, design strategic orientation and design management.^[5] Famous British experts MarkOakey of managing product design pointed out: “proper design strategy can great use of corporation resources and fully manifested in the market.^[6] He claims that the corporation must go through three steps to form its own design strategy, including market understanding, the potential ability of correct appraisal corporation and form strategy”.

Therefore, refer to the related concept and composition analysis of design strategy by Caijun etc; we consider that “design strategy is consisted of market analysis, strategic concept, strategic orientation and strategic implementation”.

3 Strategic Pattern of Corporation Design

The design strategic pattern should be selected by the corporation based on the design strategic system considering its own characteristics. During the strategy design, the characteristics of design object and the plan as well as the procedure of the operational activities should be determined first. Corporation can engaged in single or multi-design field. Therefore, we can divide design strategy into single and multi-design strategy. Whether corporation select single or multi-design strategy, it all under any one condition of cost leadership or differentiation competition strategy. Therefore, design strategy of corporation can divided into four aspect, including low-cost strategy of single or multi design (LSSD\LSSM), and differentiation strategy of single or multi design (DSSD\DSSM), as shown in Table 1.

Table 1 The Pattern of Corporation Design Strategy

Design Business Field		Single Business Field	Multi-Business Field
Corporation Competition Strategy			
Cost Leadership Strategy	Low-cost Strategy of Single Design LSSD	Low-cost Strategy of Multi-Design (LSMD)	
Differentiation Strategy	Differentiation Strategy of Single Design DSSD)	Differentiation Strategy of Multi-Design DSMD)	

3.1 Low-cost Strategy of Single Design

LSSD refers to that the design activity of corporation focused on a certain field, serving in design strategy of cost leadership. The characteristics of LSSD reflected in two aspects: on the one hand, the design of corporation focused on industrial design or sub-industrial design; on the other hand, design activity of corporation emphasized on low-cost advantage to gain the advantage of market competition and seek survival and development.

The key to implement LSSD is to analyze the value chain of corporation design deeply, understand the value chain of competitor, study mechanism of cost formation for value activity, and establish the pattern of design activity, and then establish low-cost advantage through the practice and accumulated experience unceasingly.

The advantage of the design strategy is that corporation concentrates their power on a certain area to accumulate experience and reduce unforeseeable risk; form their competitive advantage to resist competitor through accumulated experience and the formation of lean management system.

The disadvantage of the design strategy is that due to the oneness of design business, corporate will confronted with huge risk once challenged by powerful competitor; it is easy to lose the insights of market change and the sensitivity of technological change to the disadvantage of sustainable development of corporation.

3.2 Differentiation Strategy of Single Design

DSSD refers to that the corporation’s design is stable, and the product is unique compared with competitor in order to establish unique competitive advantage. Obviously, the characteristics of DSSD reflected in two aspects: on the one hand, the corporation design focused on a certain core field to develop, and also it can through some way of cooperation design to use outside design ability when necessary; on the other hand, the design activity of corporation emphasized on exploiting unique product in order to gain the market competitive advantage.

The key to implement DSSD is to take its product design as leading, accurate positioning customers of target market and its unique characteristics of value need, analyze the impact of design value chain of corporation for customer value need, evaluate and test the existing and potential core

ability of corporation and its origin to continue ascension in order to keep sustainable competitive advantage.

The advantage of the design strategy is that corporation concentrates their power on a leading position of certain field for sustainable development, easy to accumulate specific core competitiveness of design; through the concentration of market research and exploitation forming the unique ability to recognize customer need.

The disadvantage of the design strategy is that exploitation of unique innovative product is difficult, and imitated by competitor easily, once the corporation cannot introduce innovative product continually, then getting into passive easily; due to the design business is too centralized, losing the insight and sensitivity easily about transformation of market life cycle and revolution of new technology to the disadvantage of sustainable development of corporation.

3.3 Low-cost Strategy of Multi-Design

LSMD refers to that the corporation utilizes ability of multi-design to get a low-cost advantage product and form competitive advantage. The characteristics of LSMD reflected in two aspects: on the one hand, the design business of corporation involves in multiple fields; on the other hand, the design activity of corporation emphasized on low-cost to get the market competitive advantage.

The key to implement LSMD is to combine the characteristics of design, excavate customer needs as the center of design business to integrate, develop a cost advantage of product to gain market competitive advantage through the lean management.

Due to the added value and market profit of low-cost product is relatively low, hard to provide a high level of performance resources support in multi-design team of corporation, which is not to the benefit of sustainable development of design system. Therefore, the strategic pattern of corporation should exploit the ability in market insight and product exploitation, transferring to DSSD in order to cultivate core competence and achieving sustainable development ability; or transferring to DSMD in order to achieving high value of product and cultivating the core competence of corporation.

3.4 Differentiation Strategy of Multi-Design

DSMD refers to that the corporation utilizes ability of multi-design to get unique market competitive advantage. The characteristics of DSMD reflected in two aspects: on the one hand, the design business of corporation involves in multiple fields; on the other hand, the design activity of corporation emphasized on exploiting unique product in order to get the market competitive advantage.

The key to implement DSMD is to cultivate core competence of perceptive identification of collaborative innovation and customer need, excavate and create potential customer needs, evaluate and test core ability of corporation and its origin to continue ascension in order to keep sustainable competitive advantage.

The advantage of the design strategy is through differentiation of product design to get market competitive advantage; through high added value of differentiation product to get high returns, which provide the good sustainable development conditions for multi-design team; through research and exploit on market to form the unique recognition ability for customer need.

The disadvantage of the design strategy is that exploitation of unique innovative product is difficult, and imitated by competitor easily, once the corporation cannot introduce innovative product continually, getting into passive easily.

The four strategies have a certain conversion demand relationship between them, as shown in figure 1 below.

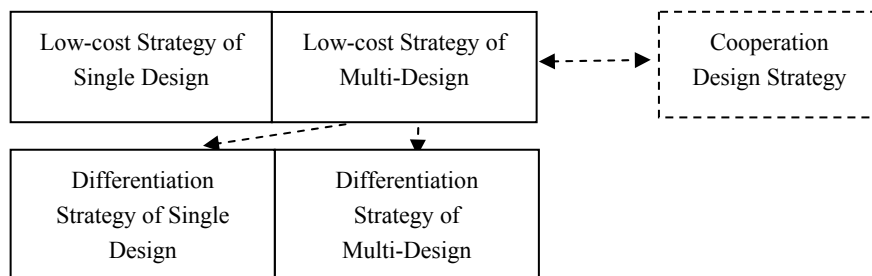


Figure 1 Conversion Relationship Between Design Strategic Patterns

4 Application of the Apple Design Strategic Pattern

The success of Apple lies in its use of DSMD, its design business involves the iMac, iPod, iPhone, Pixar (Pixar animation studios) and so on, its rich product portfolio and unique product winning the market for its competitive advantage, and taking effective measures to prevent the competition in the field of opponents to imitate.

The miracle differentiated combination patterns of Apple reflect in two aspects: iPod + iTunes, iPhone + App Store. Innovation is the foundation of differentiation combination patterns in Apple. The unique combination pattern of Apple is iPod player + iTunes and online store + copyright protection technology. This pattern provides consumers with bundled services (iPod and iTunes forced binding) for e-consumer and music retail simultaneously. Intelligent mobile phone is the development trend of the mobile phone market, and also the chance for Apple. Therefore, Apple launched a combination for iPhone + App Store.^[7]

The unique product of Apple is not the false speculation, but the concern for unique design. The senior vice President Mark Rolston in charge of business innovation once said, "Apple and manufacturers have close relations, they have an amazing interest in selecting material and manufacturing process, they are always asking producers what they can do for them." Meanwhile, Apple keeps hard working on improving product performance and quality, realizing product differentiation, the evolution of the iPhone series is obvious.

The design strategy of Apple develops on the distinctive product and service of user oriented by virtue of its own professional technology. Those products and services form the competitive advantage for the corporation to earn high gross profit, so that it can reinvest again and continue concentrate on more attractive products.

5 Conclusions

In conclusion, the design strategies have the following characteristics at present:

(1) Design strategy is the strategic plan attached to the corporation and the basic guarantee of success in design, reflected the guiding and cultural principle of overall management strategy, and also provides definite direction and goal for various design activities in the corporation.

(2) Design strategy is the core element of design management. Design strategy evaluates and analyzes the environment of a particular product, proposes a series of definite guidelines to design activity for the guarantee of design success.

As the guiding of a series of standards for the behavior of the corporation design, design strategy is an important part of the corporation strategy. The introduction and formulation of design strategy can not only increase the value-added of the product, and also set up a good image of the corporation, above all enhance the core competitiveness of the corporation, thus the corporation always maintains a competitive advantage.

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Levels of Faculty Rank: A Higher Education Policy Issue in China*

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Abstract: Levels of faculty rank problem has been a hot higher education policy issue in China from 2006. Based on 1990-2010 paper citation data of JCR 2011 representative journals from WOS database with using descriptive statistics method, we think faculty rank level should be set as 6. Age and creativity curve also supports this argument. And academic title rank practice in prominent USA university (for example Harvard university) supports above argument too. A natural corollary is that 13 levels policy implemented from 2006 by The Chinese Government Ministry of Personnel and Ministry of Education is absent in empirical evidence.

Key words: Faculty rank level; Citation analysis; Chinese university Ministry of Personnel and Ministry of Education

1 Introduction

Academic ranks has long been 4 levels in USA and Europe universities, after the Second World War higher education in developed countries come into Higher Education Popularization age, some new fact in university management emerges mainly as following: (1) Dramatic increase in the number of university teachers; (2) The average life expectancy increases, university teachers can work to 70-year-old before retirement; (3) The pressures of budget constraints are increasing for majority of universities, higher education leaders face the challenge of encouraging research vitality of their faculty to perform research.

Different strategies such as adding a new rank into the faculty rank hierarchy, establishing post-tenure review, offering travel funds, have taken to respond above new factor in university management after the Second World War. Among the above different strategies, many scholars and policy makers believe that changes of the faculty rank hierarchy would be an effective way to influence faculty behavior^[1].

One representative of these authors is Tuckman. Because of his worry about the aging effect on reducing the overall research productivity of American faculty, Tuckman has suggested changing the academic reward structure by increasing the numbers of ranks that faculty can attain.

From the review of management practice, in 1989 the Executive Yuan in Taiwan submitted a plan to the legislature to change their present rank system by adding a new rank level. In 1994, the government in Taiwan did add a new rank of assistant professorship to the Taiwanese faculty career ladder (University Act, 1994). A policy of adding a new rank to the faculty career ladder was implemented in Taiwan in 1994^[2].

The opinion of adding a new level to faculty rank was suggested independently by some China mainland scholars. One of these scholars is LIU Yufen. LIU Yufen^[3] suggested that the four academic ranks in Chinese university are not enough, so that each level of four academic ranks is full of different age university teachers, even appears rather strange phenomenon of four generations university teachers crowding in a academic rank. This phenomenon greatly reduces the incentive effect of academic ranks. LIU Yufen suggested more level should be introduced into Chinese university academic rank, but LIU did not specify what on the earth how many levels Chinese university academic ranks should be.

During long time from 1911 to 2005, Chinese university follow academic ranks system of USA university. In 2006, The Chinese Government Ministry of Personnel, Ministry of Education, the Ministry of Finance launched a university personnel policy reform. So from 2006, academic ranks level of Chinese university are 13, this number is double that of USA university academic ranks. In fact, it maybe is the maximum academic ranks in the world academia. Then a question naturally emerge that what is the reason and argument of stipulating academic ranks of Chinese university as 13 levels? Official documents of Personnel Department did not give explanation.

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2 Data and Method

This paper uses citation analysis method to analyzing the reasonable levels of the academic title of university teachers' problem. The basic analysis thinking way is as following: Generally the norm for the professoriate should be the tripartite responsibility of teaching, research, and service in university. However, many studies show that faculty research productivity is the most important criterion for promotion in universities due to the objectivity of academic research^[4]. Evaluation on research is relatively easy than teaching for university management. There are many types of research results of academic research such as books, papers, patents and so on, but paper is most representative type for its huge number and cross disciplines property (almost every discipline researcher face the famous pressure of "publish or perish"). In a national survey of department heads at 134 higher education schools, Centra described sixteen criteria which might potentially be used to evaluate research^[5]. "Number of articles in quality journals" was ranked first by the department heads, both in response to what is currently done and what ought to be used.

A basic fact in scientometrics is: Paper citation counts in academic journal obey power law distribution^[6]. Power law distribution demonstrates typical hierarchical characteristics. Generally a higher citation count means better paper quality in same discipline or more correct on same research topic, and vice versa.

Paper citations counts hierarchical level definitely and objectively reflect paper author research ability difference, so a rather reasonable idea emerges naturally, we can adopt hierarchical level number of paper citation counts distribution as the appropriate academic title ranks number, and by so reasonable faculty rank level problem is given an objective reason and argument.

The data used in the study are obtained from the Web of Science (WoS) bibliometric database. Division of academic fields also adopts WOS database frame.

Taking into account the enormous article counts of the various disciplines and the representative degree of paper citation data, the paper citation counts data of the highest impact factor journal in each discipline has been selected as research data set.

Time window for paper citation counts is 20 year (SCI, 1990-2010) and 25 years (SSCI, 1985-2010). The life cycles of citations and the peaks in the citation distribution curves vary from discipline to discipline. 20 years is enough to make a correct judgment with a very high accuracy for majority proportion of paper.

Paper citation counts data set is gathered as following: the highest impact factor journal in each discipline has been selected based on JCR 2011 report. Citation counts of paper published in 1990 of the highest impact factor journal in each discipline until 2010 are collected. SCI journals are 128, SSCI journals are 41.

Division of intervals of citation counts are as following: [0,20), [21,40), [41,80), and so on. The upper value of first division of interval is 20 because paper citation counts gathering time windows is 20 years. A paper can hardly be viewed as having long-time academic value if citation counts of the paper is lower than 20 after its publication.

3 Basic Results

SSCI and SCI citation counts are discussed separately for human and social disciplines are rather different with natural and engineering disciplines. The analysis method of SCI is same to SSCI citation data.

The Detailed analysis is as following: academic Title classification is for most people and most paper, so if a value of academic title rank covers most of papers of most journals, then we can safely set the value as feasible academic title rank levels. An example is as following:

As a famous econometrics journal, *ECONOMETRICA* published 63 papers in 1990. according to paper citation counts of *ECONOMETRICA* in table 1, 100% paper and 100% journal (i.e. all *ECONOMETRICA*) can be covered while the value of academic title rank equal to 8. Further analysis demonstrates that about 95% papers in *ECONOMETRICA* 63 papers in 1990 can be covered while the value of academic title rank equal to 5.

We extend above analysis on all journal in table 1. If a value of academic title rank covers a high proportion such as 95% of papers of all journals, then we can safely set the value as feasible academic title rank levels.

We select top 6 journals in table 1 as discussion target because top 6 are representative of all SSCI journals in table. If a value of academic title rank covers 95% of papers of top 6 journals then this value

covers 95% of papers of all journals.

Table 1 Paper Citations of Top 6 SSCI Journals in Table 1

	1	2	3	4	5	6	7	8
ECONOMETRICA	16	14	10	16	3	2	1	1
JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY	85	70	76	35	21	6	1	1
JOURNAL OF FINANCE	35	21	10	6	5	1	1	
CHILD DEVELOPMENT	36	41	31	19	11	4	1	
AMERICAN ECONOMIC REVIEW	77	27	23	20	11	0	2	
AMERICAN JOURNAL OF PSYCHIATRY	46	35	44	26	13	1	2	

Table 2 Paper Coverage Proportion under Different Rank Level of Journals in Table 2

	4	5	6	7	8
ECONOMETRICA	89%	94%	97%	98%	100%
JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY	90%	97%	99%	100%	100%
JOURNAL OF FINANCE	91%	97%	99%	100%	100%
CHILD DEVELOPMENT	89%	97%	99%	100%	100%
AMERICAN ECONOMIC REVIEW	92%	99%	99%	100%	100%
AMERICAN JOURNAL OF PSYCHIATRY	90%	98%	99%	100%	100%

It is obvious that table 2 means 6 is enough for academic title rank for art human and social disciplines. Set the coverage proportion of every SCI journals is same as SSCI journals, i.e. 95%.under the same analysis process as above SSCI journals, Results of SCI journals are demonstrated in Table 3.

Table 3 Paper Coverage Proportion under Different Rank Level of SCI Journals

Rank level	Paper coverage proportion
6	80%
7	95%
8	99%

Table 3 means that academic title rank level in science and engineering disciplines,7 is enough, higher level is unnecessary totally.

4 Discussions

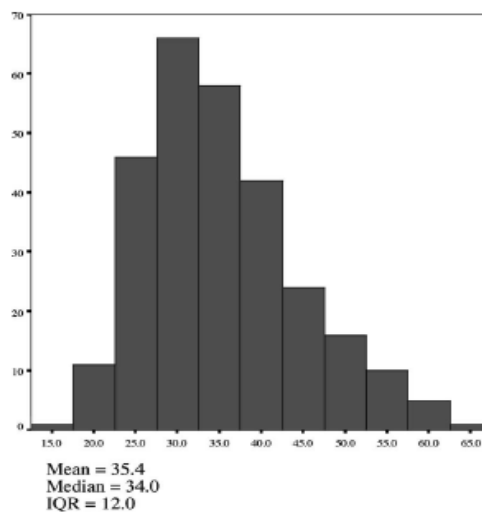


Figure 1 The Age of Peak Scientific Achievement, 280 Scientists

Satoshi Kanazawa^[7] study a random sample of the biographies of 280 scientists (mathematicians,

physicists, chemists, and biologists. Fig. 1 presents the distribution of the peak age among the 280 scientists in Satoshi Kanazawa sample.

The highly similar rules exist in arts field such as music or paint. Fig. 2 presents the relationship between age and productivity in jazz music^[8].

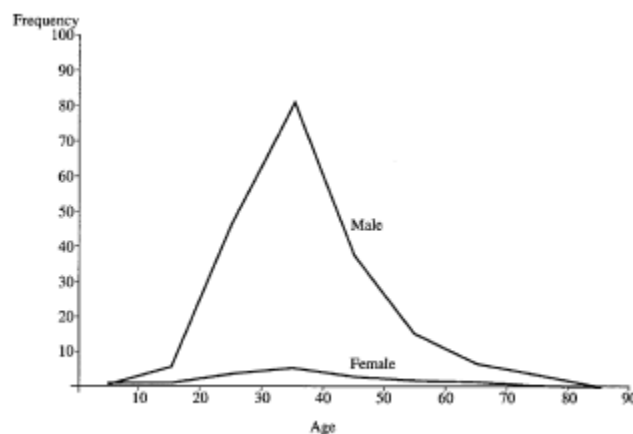


Figure 2 The Age-Genius Curve among Jazz Musicians. Source. Miller(1999)

A rather new and large sample research in 2011 concerning roughly 3600 French and Italian physicists showed that the age of academics is negatively correlated to both number of publications and impact^[9].

In a word, for majority researcher especially researchers in natural and engineering disciplines their creativity ability and activities keep at a high level during 25-50 and majority people reach their creativity peak during this age range.

Based on basic fact that majority people reach their creativity peak during 25-50, we can make a simple and powerful calculation. For a long time after 1949, academic title promotion cycle time is 4 years in Chinese university. A university faculty can apply for higher title when he has achieved current title for 4 years. So academic title level in Chinese universities is $(50-25)/4 \approx 6$. Of course this rule is for majority, not for researcher with excellent academic performance.

5 Conclusions

Faculty rank level is basic parameters in faculty employment contract and influences motivation effect of faculty employment contract significantly. So reasonable faculty rank level problem is indispensable problem of human resource management in higher education, but the problem had gone unnoticed in literature for a long time.

This paper found that: (1) faculty rank level should be set as 6, based on 1990-2010 paper citation data of JCR 2011 representative journals from WOS database. (2) calculation based on age and creativity curve support basic argument in this paper. (3) Academic title rank system in prominent USA university (for example Harvard University) support basic argument in this paper. (4) 13 levels subdivision of academic title rank which is implemented from 2006 by The Chinese Government Ministry of Personnel and Ministry of Education is absent robust empirical evidence.

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What to Be Done for English Education in Private Universities under the Impact of MOOC? —Based on English Education in Guangdong Peizheng University

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Abstract: It is anticipated that the popularity of MOOCs (Massive Open Online Courses) will have a great impact on all the conventional university education in China. This paper intends to make an analysis on the present situation of English education that the private universities in China are facing by taking Guangdong Peizheng University for example. And then it comes up with some ideas on how English education in private universities should respond to the great changes of information-based education. Finally, it concludes that innovation in English education is the only way out for private universities in China.

Key words: English Education; Massive Open Online Courses; Reflections; Innovation

1 Introduction

“Education is power” is a famous saying put by the great English philosopher, Francis Bacon, which has been a motto in countless schools or universities of China, and which has influenced one generation after another. However, a book entitled “Knowledge Is Not Power” puts: “what’s the point of knowledge if a person knows a lot of facts but does not know how to get along with other people and tackle problems, since it is very easy to gain knowledge in internet era?” (Fang Bolin 2012) The explanation of the author reminds us that we should reflect what the nature of learning and education is.

With Massive Open Online Courses coming into the life of every student, the conventional learning methods will be sure to be challenged. It’s high time that the English teachers in private colleges and universities began to think how to make knowledge become power.

2 The Opportunities and Challenges English Teaching Faces

In recent two years, the application of information such as electronic library and computer-aided teaching has constantly promoted the progress of information-based education. It can be seen that the future higher education will face three major trends. First, on-campus will give way to above-campus, that is to say, learning in classrooms made up of bricks and cement will become mobile learning from online. Second, ownership will move to access, which means that the teachers in the past who were afraid of letting known what they taught in the class will be pleased to make their teaching content accessible online so that they might be noticed by the public. The massive open online courses from many world-known universities both abroad and at home are good examples. The third trend is from “protection” to “share”. It is known that intellectual property rights prevent many things, such as journals, from being developed or shared, but massive open online courses can make ordinary people enjoy the basic right – education. Everyone in the world who is capable and enthusiastic enough can learn what they want, so as to pursue a better life for themselves, their family members and their communities. English education is very necessary to meet these three trends. That is why all the universities in China establish English courses so that they can keep up with the trend of globalization. Guangdong Peizheng University is such a one whose aim is to build the students into high quality talents who are supposed to know how to use English properly in different fields. The emphasis of learning practical English, and the great efforts made for this aim is a wise choice undoubtedly.

But for decades, English teaching in private universities has been influenced by that of public universities. Teaching modals are similar to each other and so are the evaluation modals. The national band 4 and band 6 examinations and the national TEM4 and TEM8 are like magic potions that keep our students unable to be their own. The requirement of graduation paper for our students is even the same as the one for public university students. But is it true that all the students have gained enough knowledge and made it into power?

Most probably, we cannot give a positive answer, because English teaching in private universities has constantly tried to move towards making students know something. They really know how to find a correct answer from the four multiple choices, but when it comes to why the answer is right, they don’t

know how to explain. They understand they can have an easy access to many wonderful English reading and spoken materials by only using a cable, but seldom bother having a try. Some students have been taught to be such learners that, when they are in danger and asked “How are you?” by the rescuers they would only respond mechanically by saying “I am fine, thank you! And you?”

From all these discussed above, there is still a long way to go before English teachers in private and vocational schools as Peizheng University develop the students into innovative talents with global version that satisfy the demand of the society. What is to be done then? The renovation of concepts, and the exploration on applied English teaching are very necessary in order to establish a curriculum system for the students in universities like Peizheng University.

3 Reflections

MOOC that win the most popularity with the young students are the hottest topic in 2012 Educause. In order to promote MOOC, some education providers have supplied a learning platform named Coursera which wants every student to make use of the textbook freely, move the conventional classrooms out of campus and set up evaluation systems between students.

Another online course set up by the co-operation of MIT and Harvard University places great emphasis on independent study and co-operative study based on Wikipedia, including interactive activities in online lab.¹ MOOC have been accepted more and more and even have been used by some universities to replace the regular credits. It can be predicted that more students far from luck or cleverness will be able to make up for the poor teaching of some higher education and learn to be what they want to be.

3.1 Guidance and motivation

The great difference between private universities and public ones is the difference of the students in learning capacities and skills. The students of ours are generally poorer in basic English, and weak in self-control. Moreover, many of them are not confident enough. So, English teachers in private universities have to take more responsibilities.

First of all, English teachers must understand, if they want students to be of benefit to the society when they are out of campus, they should teach them to be true to themselves. Good English teachers should be more patient, tolerant and well-disciplined, so that they can be a good example for the students to follow. Second, an English teacher should be a good guide, that is, to introduce students how to make a reasonable schedule and learn efficiently. Take electronic learning for example. Teachers should push the teaching resources to the students in an easy and fast way through internet and drive them to be interested in mobile learning. To build up a good study atmosphere is a key to improving education level so that the students will be made to know the essence of education — learning. Teachers may give them some suggestions on choosing some English reading materials according to their English levels. They should also play a role as a facilitator in checking how much they have read, and finally hold a meeting to celebrate their great achievement in reading at the end of a semester. In the third place, teachers should frequently reflect their own teaching methods. Some teachers regard mobile phones or computers as sirens which may often distract the attention of the students from classroom teaching. What a teacher should do is to have an effective counseling, and try to seek for chances to use them in a proper way. In the practice of translation from Chinese into English or from English into Chinese, it will be a good idea to ask the students to look for answers from computers. Their answers may be different and not right, but you can ask them to discuss, argue and lead them to the right answer. Don't say “no” to them at the very beginning. Only by frequent two-way interactions, can the students have interests in analyzing, thinking and innovating critically.

3.2 Training modes

Peizheng University, like many other private universities, is a university that focuses on developing practical students. In fact, universities of this kind can also be built into a strong and excellent one with its own characteristics if we draw on the experience of other universities or allow for trials and errors.

First, a private school like Peizheng must know clearly whether it should focus on developing a student's strong points or developing their weak points. Education in China, in fact, often spends much more time helping students to gain what is beyond them. Teachers often ask the students who have difficulty in pronunciation to practice again and again, but as a result, they are depressed at their

¹ http://www.edu.cn/zy_6504/20130129/t20130129_898338.shtml

progress and lose confidence finally. They also try to force the students who are tired of English to learn English. And the students end up in failure. The way advisable is to let students choose to work at what they are capable of or what they are good at. Teachers or educators may set up some courses especially for those who are good at speaking, translation, and reading or some project English courses related to law, economics and business. Those who have trouble in pronunciation should be encouraged to exert their potential in reading to the full and those who can speak fluent English should be encouraged to strengthen their spoken English so that they can find jobs relating to written work and oral work respectively in the future. The non-English majors should be allowed to be in English programs if they have changed their mind after entering the university.

If a student is strong in English but his total scores in the national entrance examination prevent him from being enrolled in a university, a private school might as well accept him to be in a program without diplomas, since Peizheng University, unlike many public schools, has many foreign English teachers, from whom his potential in English can be realized.

As far as English majors are concerned, much more importance should be attached to the courses in the training of fundamental English skills in the first two years, and other courses in the last two years should be offered as both required ones or selected according to several modules. Those who are interested in doing translation can select the courses related to translation, those who are interested in teaching can select courses related to education and those interested in business can select courses concerned with business and communication. Of course, all the courses in each module can be regulated in accordance with the change of social economy. It's not necessary to divide the students into different classes according to the so-called orientations, because their diplomas conferred by the university are "Bachelor's Degree in English Language and Literature." (Peng Ping 2012)

Second, more practical courses should be opened. Studying in Guangzhou, some English majors are lucky enough to have the chance to participate in Guangzhou Trade Fair. However more students don't have as many opportunities as the students in public universities whose English level is higher and enjoy better education resources. So a private school should focus their attention to some small enterprises or businesses around it. To combine their course work with social practice may be a good attempt, which is known as project learning. Peizheng University is close to Shilin, a world known town for the manufacture of leather bags, suitcases and so on. They have much to do with foreign businesses in many parts of the world. So they would use English in their promotion of products, communication with their partners, and doing the imports or exports practices. In this aspect, English majors can have a service-learning without any difficulty. They can learn how to put their English into practice if they have an object, even if they have difficulty at first. Their teachers can give them suggestions, and what's more they can surf on internet, from which much information is available. The course practice can prepare students for becoming a businessman, a secretary, and a trader dealing with foreigners, an English teacher, an English tour guide, and a customs officer etc.

At present, Peizheng university is confronted with a difficulty in finding an English teacher who has much experience in practice, such as office work, business, management of companies etc. To solve this problem, it is supposed to set up relations with enterprises, companies, and businesses, or select some good young teachers to work in those enterprises or businesses so that they can gain some experiences in production, management and trade.

Third, it is necessary to let freshmen get hold of learning strategies, which are of vital importance to them. They must be taught to know very well what they are doing in the university. All the students in China are offered to study in a university depending on their scores achieved in the national entrance examination without any study plan. But in most universities of western countries, scores in high schools are only an element for them to accept the students' application. The most important thing for a university to consider about is to get to know what kind of men the students will become, what career they will pursue, and whether they are doing what they originally planned. Because the students are not sure of their own future, the training of learning strategies is very necessary. This work can be only done by teaching affairs office, academic and career consultants, and courses teachers who work together to interact with the freshmen frequently.

3.3 Teaching evaluation

Huang Daren, the former president of Sun Yat-sen University, has a very vivid description of public universities and private or vocational universities, in which he compares state-key universities to cars and private universities to tractors. "The function of tractors cannot be replaced by cars. Tractors can plough fields that no cars can do. But if we drive tractors on motorways, even the poorest-quality cars can run faster than tractors." (Huang Daren 2012) Since the universities like Peizheng are tractors,

and live at the foot of the mountain, the teaching evaluation should not be the same as the one for universities which are cars, which can run around the mountains. Unfortunately, most of the tests in private universities are centering round “memorization” as the public universities do. That happened to be what many students in private universities are short of. Why technology of computers and mobile phones is popular with young students in both public universities and private universities lies in the fact that part of our memories in the brain can be replaced by them. Then what should we do with this part of memories? Of course, it would be a good idea to use them to do creative thinking such as, analysis, application, comprehension, and estimation. The tests in the future are supposed to be more about task analysis, content analysis, procedure analysis which let the students digest what they have taken as a whole.

Paper writing is another means to evaluate students' English level which decides whether a student can successfully get his bachelor degree or not. The standard for an English paper is the same as the standard in a public university and so is the number of words required. Since Peizheng University has oriented itself as a university aiming at practical training, why not let students choose to do what they are interested in, for example, writing an investigative report, setting up a website, and coming up with a marketing plan, promoting plan, or a business plan etc.

3.4 Teaching Methods

More and more attempts in English teaching, such as presentations by students themselves, group activities, and role plays, have played an important part in stimulating the interests of students' learning. But with more activities organized by the students on their part, they are not happy any longer. They think teachers are lazy, and they can not learn anything in classroom teaching. So it is necessary to teach students according to their aptitude. Teachers should try to arouse the curiosity of students all the time. English teaching practice should be based on the actual situation or facts in everyday life. A good case in point is to let students do or complete a real task. The task-oriented teaching approach is helpful to make students more analytical, creative, innovative as well as cooperative and independent. Students who are used to being spoon-fed can not tolerate this method for sure. Disagreement from the students can be understandable, but innovation or change in teaching must be carried on. English teachers are required to learn from books, internet, and other sources all their lives. Otherwise, they will be unable to face the students who can absorb large amount of knowledge from the internet easily.

4 Conclusion

From what has been discussed above, it can be concluded that private universities do need to have innovations in English education. Both the educators and teachers in private schools should take actions and do something at an era when the massive open online courses in the world-known universities come into the life of average students freely. Only when reality-based learning, problem-based learning and project-based learning are applied more and more, can the education in private universities survive the rat race in this world and make knowledge powerful.

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Performance of Socially Responsible Investment

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Abstract: For ten years, companies have stated their desire to better control the social and environmental consequences that may exercise their activity throughout the economy. Anxious to preserve their image as they try to carry out policies protective of the environment, their employees but also all of their financial and business partners. A general movement, often referred to as "sustainable development", which aims to ensure that the global economy healthy growth over the long term. The application of these principles to investment strategies led to the development of Responsible Investment (SRI) Socially. It defines its investment choices based on socio-environmental criteria to place on the same plane as the financial criteria commonly used.

If SRI is still far from having conquered the whole of the financial sector, development of great interest on the part of practitioners who are more likely to consider these criteria. The purpose of this research is to analyze the performance to date of this type of investment to determine whether it will remain restricted to a class of investors more concerned with their own values in their wallets or if announces a real transformation of investment strategies.

The introduction of SRI has led to many studies and researchers have mainly addressed the issue of performance, which is considered crucial for its future development. There are two clans: on the one hand critics of SRI, based on financial theory to highlight the weaker performance of this type of investment, and other supporters of SRI empirically demonstrate that the good results of this strategy. Studies have mainly focused on the United States and Europe, home of SRI. They are also of great statistical diversity, using measuring instruments and multiple complex performances.

Key words: Socially Responsible Investment; performance

1 A priori Less Efficient Investment

1.1 Less diversification

According to modern portfolio optimization financial theories, the primary goal of any investor is to maximize the return on his investment while enjoying taking minimal risk. Several models are applied to define the optimal strategy, of which the most used is the CAPM. The CAPM (Capital Asset Model Evaluation) was developed in the late 1950s as the CAPM and represents a major breakthrough in understanding the balances involved in the financial markets. The model assumes perfect information to market participants, who all have the same data on securities (profitability, risk, correlation with other securities). These seek to maximize their profitability while minimizing the risk associated with their portfolio. The model thus pushing to minimize the variance of the portfolio that each investor makes the best he can by diversifying its portfolio to the maximum, since the proliferation of securities in which it invests reduce portfolio risk (for example, a portfolio containing two securities with the same volatility has a lower volatility than the sum of the volatilities of the two components).

In doing so, each participant in the market will eventually eliminate the inherent risk of each activity by investing the same proportions in a "market portfolio." This portfolio contains all securities available in proportion to their capitalization: it is characterized by a minimal risk, "market risk."

This shows that the model urges all investors to diversify into possible portfolio. But the principle of selection in SRI excludes a number of companies that do not meet the defined criteria and reduces its investment universe. It contains fewer securities than the market portfolio; the SRI portfolio is less diversified and therefore is exposed to lower returns for a given risk.

Based on this financial theory, many economists demonstrate the necessary poorer performance of SRI. Thus in 1981, A. Rudd¹ says that the introduction of any constraint in the investment universe of a portfolio (size, price-to-book ratio ... or social criteria) reduces performance. Taking the example of the portfolio excluding the shares of companies involved in South Africa, it demonstrates that the actions chosen correspond to smaller companies and are therefore subject to changes much less correlated with the market. Similarly, R. Clow² emphasizes the industrial means confronting an SRI Portfolio rejecting a number of industries; it concentrates risk in a small number of sectors. In both cases, the inherent risk of the portfolio increases and exposes the investor to greater variations.

Less theoretically, it is clear that SRI simply reduces the choice available to the investor. Thus, a

universe of 1,000 shares, if the SRI selection excludes in advance 200, the investor will have more than 800 investment choices to try to outperform the market while a typical investor can choose between all 1000 titles available on the market. In addition, the reduction of the universe can often include particularly performing stocks, as is the case for example for the arms companies.

In addition, the method of selecting securities SRI is still far from being systematic and criteria defined by the rating agencies are not always clear or easy or very applicable. And SRI is it for a certain mode of investment disconnected from relevant financial analysis and therefore reduced to a rather subjective choice of titles. The random nature of this investment therefore inevitably decreases performance.

1.2 At the enterprise level

Finally, critics of SRI are convinced that the inclusion of social and environmental constraints in a business is necessarily accompanied by additional costs. These costs are then passed on to prices and products become less competitive. The company recorded lower profits, which inevitably affects the price of his action ... and reduces the performance of SRI portfolio.

Thus, financial theory seems to condemn SRI to poor performance. An empirical analysis of the situation is needed to confirm or refute these findings. I wear my analysis on two types of indicators SRI equity indices and funds management.

2 Method used to Measure the Performance of SRI

2.1 First performance measures

The simplest of the performance of a financial asset is measured in calculating its profitability. It has the advantage of being easily calculated and provides a first estimate. Monthly performance for a month i are calculated as follows:

$$R_i = \frac{V_{31} - V_1}{V_1}$$

With V_1 the value of the assets on the first day of the month i

V_{31} the value of the assets on the last day of month i

The profitability average is calculated by geometric average:

$$\bar{R} = \prod_1^T (1 + R_i)^{1/T} - 1$$

In addition, analysis of returns can not be made without taking into account the volatility of these returns, which is calculated using the statistical variance of a sample of size n :

$$\sigma^2(R_p) = \frac{\sum_1^n (R_i - \bar{R})^2}{n - 1}$$

With \bar{R} the average of R_i over the period given of time

However, these measures are still too brief to form the basis of a rigorous proof. That's why I put on this study two other performance measures, such as the "Sharpe ratio" and "Jensen alpha."

2.2 Deepening the performance measurement

The Sharpe ratio is based on the idea that a rigorous measure of performance must include both the returns of the assets identified in excess of the risk-free rate and the risk of the asset. It is therefore a measure of the premium variability. For an ex-post measure, it is often stated as:

$$S_p = \frac{\bar{R}_p - R_f}{\sigma(R_p)}$$

With R_f the risk-free rate over the period studied

The Sharpe ratio represents the limits of its assumptions, including that postulate that returns follow a normal distribution and that the risk-free rate is constant over the period studied. However, in this study, such assumptions can be accepted without reducing the significance of the results.

The second performance measure used in this analysis is Jensen's alpha. According to the CAPM model presented above, the cost of a financial asset must satisfy the following equation:

$$E(R_p) = R_f + \beta_p \times (E(R_M) - R_f)$$

$$\text{With } \beta_p = \frac{COV(R_p; R_M)}{\sigma_M^2}$$

Ex post, therefore Jensen's alpha measures the outperformance of the asset over its expected performance, that is to say:

$$\alpha_p = \bar{R}_p - E(R_p)$$

If these two measures have certain biases we have already mentioned, yet they have the advantage of being easy to use, unlike other measures of modern performance. These new measures are also not unanimous in the world of researchers because of their technical expertise. In addition, the historical data characterizing low SRI is still too little suited to this kind of action. That is why I chose to limit myself to the ratios presented above.

3 Compared with a Benchmark

To refine the comparison between two indices, it is often useful to calculate the average of the differences between their returns and the variance of these differences. Finally, since the purpose of this study is to analyze the difference between the performance of SRI indices and those of their benchmarks, it is important to test the validity of this hypothesis. It is therefore to provide a test of hypothesis to accept or reject the hypothesis H_0 against the hypothesis H_a as:

$$H_0 : \mu_d = R_{ISR} - R_{benchmark} = 0$$

$$H_1 : \mu_d = R_{ISR} - R_{benchmark} \neq 0$$

For this, I will use a t-test for a confidence interval of 95%, the formula is as follows:

$$t_d = \frac{\mu_d}{\sigma_d}$$

With μ_d the average of the differences

σ_d the variance of the differences

This value must be compared to the value of t after the Student table with a degree of freedom equal to the sample size - 1. If $t > t$ or $t < -t$, then we can reject the hypothesis H_0

4 Conclusion

Socially responsible investing has formed since the eighteenth century around a conscious reconciling material respect moral enrichment religious ideology. Initially reserved for religious congregations, it has been a decade largely developed through the global financial sphere. The emergence of an entire class of professionals who specialize in this sector, such as rating agencies or socially responsible funds, demonstrates the growing interest in this type of investment. Its development will be assured however that once the debate on the quality of its performance ended. This question has been the subject of numerous studies among researchers. I did my own study based on data on the performance of indices and socially responsible funds.

It is too early to draw any real conclusions about this research: the phenomenon is new and we do not yet have the necessary perspective. However, it seems that

Socially responsible investment has a positive impact on the policies of the companies and helps select those that are the most successful financially. A trend that has not escaped investors, more and more people consider these criteria in their investment choices.

If the specifics of the SRI are now well represented in the strategies of investment, valuation models are still far from the mainstream. That is why in 1998, Statman proposes an extension of the evaluation of the CAPM model, the "behavioral asset pricing model". In this model, the expected asset returns are calculated considering both utilitarian criteria (such as beta, the level of taxation, liquidity, dividend yield) and criteria expressing the values important to investors ("value-expressive features"). We perceive how quickly the design of such a model is complex: how to formalize the social criteria and legal requirements of investors? This is a vast field of action that opens to the research devoted to SRI.

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A Research on Effect of Vacuum and Pressure Treating Seeds on Mung Bean Sprout*

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Abstract: In this work, mung bean seeds were pre-treated by vacuum and high pressure for 4 h respectively, and the untreated one as a comparison group. Then the comparison group and two pre-treated groups sprouted under the same condition. Results showed there are no significant differences in germination rate, sprout crown and stem of the three groups of mung bean seeds. but there are great differences in root of the three groups of mung bean. mung bean sprout pre-treated by high pressure was worse in growing, while the group of pre-treated in vacuum became better.

Key words: Vacuum soaking; High pressure soaking; Mung bean

1 Introduction

As is well known that mung bean is rich in nutrition, which not only plays an important role in the treatment of scurvy and removal of fat and cholesterol in the vessel wall deposition, but also has a good curative effect for oral ulcer, constipation, gastrointestinal cancer and for prevention of cardiovascular disease. However, root and tip of mung bean sprout is easy to be rotten in the germination process. Therefore, it has important application value to study how to reduce rotten root and tip of mung bean in the germination process.

It recently has been gotten more and more attention that pressure parameter is regarded as the description of biological growth process and behavior rules of molecular mechanics and dynamics [1]. Many scholars have done lots of research about the influence of pressure on plant growth. Liang Ling etc. have studied the effects of high pressure on seed germination and seeding development of wheat. Wu XueHua etc. have investigated the influence of the growth characteristics of miniature tomato seed treated by high pressure nitrogen [2], and so on. These studies show that the effects of pressure on the growth of the organism can not be ignored. It has been not reported the effects of pressure on mung bean seeds. Therefore, this paper discusses the effects of different pressure on mung bean root by pre-treating mung bean seeds, which aims to find a Physical method that is helpful for growth of mung bean root..

2 Materials and Methods

2.1 Material

New green mung bean seeds, purity 95%, cleanliness 97%.

2.2 Processing method

It was divided into three groups of mung bean seeds, the weight of mung bean seeds for each group was 200g.

The First Group (pre-treated by high pressure): mung bean seeds were treated for 4 hours in the high pressure 12.7MPa and temperature 26.7 °C. processing medium was mixed gas of argon gas and air, the pressure of the air was 0.1 MPa.

A Second Group (pre-treated by vacuum): mung bean seeds were treated by vacuum for 4 hours, which vacuum degree was 0.04 MPa to 0.05 MPa and temperature was 26.7 °C.

The third group (the comparison group): untreated mung bean seeds.

2.3 Seed soaking

Three groups mung bean seeds were put respectively in three separate foam box (size 800 × 500 × 400) in the same conditions, mung bean seeds were soaked in the water for 5 hours. We observed the changes of the mung bean seeds during the soaking.

2.4 Sprouting

After soaking, three groups mung bean seeds were put respectively in three separate foam box in the same conditions (there was disinfection of treated rice straw in the bottom of box), mung bean seeds of each group were watered every day in the same conditions, at the same time we recorded the time,

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temperature and humidity and observed the changes during the seed germination. The duration time was 7 days.

3 Results

3.1 The effects of pressure on germination rate of mung bean seeds

At room temperature, three groups of mung bean seeds were germinated in the same condition. The results show in figure 1. The germination rate of mung bean seeds in pressure treated group is 85% and the Vacuum treated group is 87%, while the Comparison group is 84%. There are no significant differences in germination rate of the three groups of mung bean seeds.

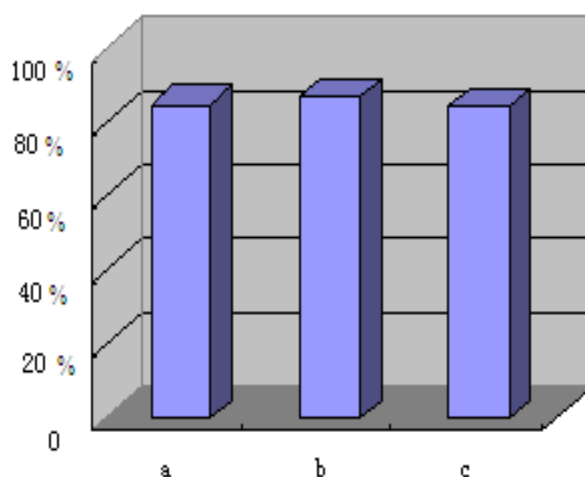
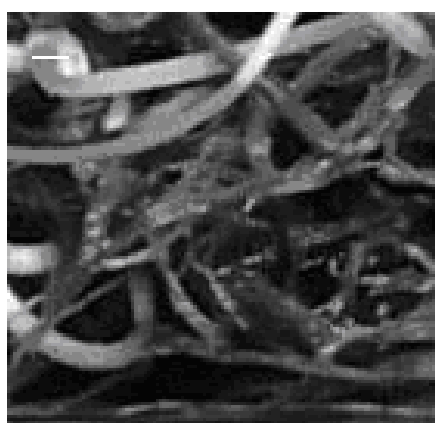


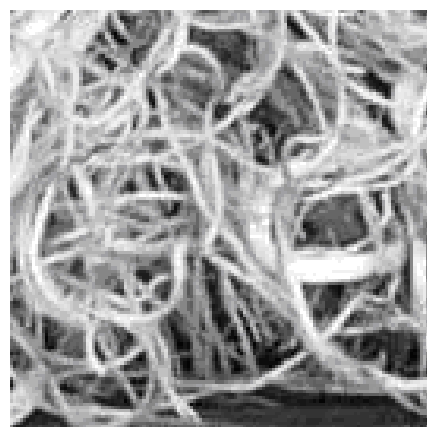
Figure 1 The germination rate of mung bean seeds
a. Pressure treated group b. Vacuum treated group c. Comparison group

3.2 The effects of pressure on mung bean sprouts

After seven days of germination, results showed that there are no significant differences in sprout crown and stem, but there are great differences in root of the three groups of mung bean. For the first group, root of mung bean sprout is dark brown and not developed. There is seriously rotten root and tip of mung bean in the germination process. For the second group, root of mung bean sprout is white and well developed. There is not rotten root and tip of mung bean in the germination process. For the third group, root of mung bean sprout is slightly hazel and well developed. There is partly rotten root and tip of mung bean in the germination process. As shown in figure 2.



a. Pressure_treated group



b. Vacuum_treated group



c. Comparison group
figure 2 Appearance of mung sprout of groups

4 Discussion

Wu XueHua etc. have investigated the influence of the growth characteristics of miniature tomato seed treated by high pressure nitrogen. They believe that the decline of mortality rate of tomato is affected by oxidative stress of exercise during growth and development to some extent^[2]. Therefore, the mung bean root by treated in vacuum is white and well developed, there is partly rotten root and tip of mung bean in the germination process. It may be related to 5 hours hypoxia by vacuum treatment. In some extent, hypoxia caused oxidative stress of exercise of mung bean, stress to normal conditions the activity recovery speed, corrosion resistance improved obviously, so mung bean sprout pre-treated by in vacuum became better.

Cucumber cotyledon, hypocotyl and tomato peel after the cold exercise and so on were tread with 12 MPa pressure helium and nitrogen by Saltveit etc.. Its results show that chilling injury degree will aggravate^[3]. Chen Liying etc. found that disease-resistant ability of periwinkle plant by high pressure seed treatment had been dropped^[4]. Li Guishuang, Bai Chengke etc. also reported rice growth is restrained obviously by hydrostatic pressure processing. Many experiments showed that high pressure had inhibition or destroy effect on the biological growth, and also damaged the cell membrane^[5]. High pressure maybe increase the thickness of the membrane and lead to a net volume decrease, which affects the membrane fluidity. In this experiment, for the first group(pre-treated by high pressure), root of mung bean sprout is dark brown and not developed. There is seriously rotten root and tip of mung bean in the germination process. It is possible that the high pressure damaged mung bean seed cell membrane structure and the growth of the mung bean sprout is inhibited, which lead to undeveloped roots and weakening of corrosion resistant ability and rotten root and tip.

5 Conclusion

In summary, it has the promoting effect on the growth of mung bean by the vacuum processing of the sprout seeds, while high pressure treatment has the inhibition effect on the the growth of mung bean. mung bean sprout is rich in nutrition, We will test Nutrition contents of mung bean sprout of each groups in the next step.

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The Epochal Characteristics and Practical Application of the Experiential Teaching Method in Universities*

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Abstract: The key value of the experiential teaching in universities is its link with educational Innovation. Not only does it boost the revolution of the traditional teaching styles and behaviors, it also poses considerable influence on the traditional educational concept to a great extent. This paper tries to take the characteristics of experiential teaching of the course “Social Issues in Contemporary China” as the entry point, discuss its epochal characteristics, practical applicability and trend of its modes and values, so as to provide theoretical support and practical thoughts for experiential teaching practice in universities.

Key words: Experiential teaching; Teaching innovation; Game theory; Course of “Social Issues in Contemporary China”; Characteristics and practice.

1 Introduction

If we take a closer look at the fields of innovation in China’s higher education, we will find out that the promotion and development of experiential teaching are always happening along with the educational reforms in universities. As it is the case in the course of “Social Issues in Contemporary China”, in particular, the application of experiential teaching Method not only accelerate the transformation of the ideas of traditional classroom teaching, it also induces the transformation of the teaching behaviors in classrooms in a sense. And it has become an approach in which university students may achieve self-liberation in a classroom, a foundation on which personalized knowledge may integrate, a catalytic agent with which fine personality may be nurtured, and a guarantee under which a healthy mind may be cultivated. This paper will take the course of Social Problems in Contemporary China as a point cut, conducting theoretical analysis and practical investigation of the characteristics, practical issues and developing trend of experiential teaching. And hopefully, the research and discussion conducted in the paper may provide some new thoughts for the educational innovation in China’s universities.

2 Contemporary Characteristics of Experiential Teaching in Universities

Traditional experiential teaching refers to a teaching philosophy and approach in which education is conducted in accordance with the characteristics and pattern of students’ cognition, an actual or similar scenario and opportunity is created and reproduced, so as to make students construct knowledge base, develop ability, formulate emotions and grasp gist in the process of personal experience. While in the field of education in ordinary universities, especially during the teaching process of the course “Social Issues in Contemporary China”, the experiential teaching is more like a characteristic which promote college students’ practical activities expansion, conscious grasp of social laws and principles and transformation of self-perception.

2.1 Promote the Transformation Process of Teaching Practice from Static Teaching to Dynamic Exploration

The general teaching practice is always conducted in a static way of theory and approach teaching, although certain society-related case studies will be done and some social practice work will be organized in the classroom. However, it is, seen as a whole, still a one-way static teaching practice from teachers to students. And it is lack of an atmosphere in which teachers and their students could have considerable interaction, thereby affecting the organization and conduction of the intellectual delivery to the students. While experiential teaching may arouse a healthy and active emotional experience from students during the process of education delivery, so as to motivate students’ initiative of cognition and

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achieve the targeted outcomes through vivid, enthusiastic and creative process of teaching and learning.

In a creative way, the author inserted a cartoon scenario into the teaching practice of the course of “Social Issues in Contemporary China”. By watching the video clip of the fairytale of Cinderella, students will be guided to find out the social issues that are reflected in the story. The process of cartoon watching is also the process that students’ cerebral cortexes are relaxing and their emotions in the childhood are awakened. The experiential function and creative potentials are stimulated through the process of watching the fairytale and analyzing the issues together by the teachers and their students. For instance, the students will have better understanding of the “social fairness”, “political enforcement” reflected in the fairytale in comparison with the actual situation of “a government lack of credit” in the real life. And a better teaching outcome can be achieved. On the one hand, students will be led to experience the psychological changes of different roles based on the cartoon images and will have multi-form and multi-lateral experience, comprehension and creative thoughts in accordance with their own cognition and needs. This has well shown the subjectivity and personality of individual student. On the other hand, students may analyze the social phenomenon in the real life based on the stories in the cartoons. And this will create empathetic conditions and cognitive foundation for teachers to deliver teaching contents with real cases and to arouse students’ in-depth thoughts.

2.2 Promote the Transformation Process of Teaching Practice from Phenomenon Collection to Principles Grasp

University students living in the campuses are always considered as a unique social group. And they do understand some of the social phenomenon or issues to certain extent in their growth. However, due to the restriction of the factors including environmental issues and personal experience, their understanding of those phenomenon or issues is plain and superficial. And their understanding is merely a collection of the simple phenomenon and is far from the in-depth grasp of the social laws. As one of the compulsory courses of Sociology major, the course “Social Issues in Contemporary China” is designed to deliver the basic social knowledge and ethical issues to students from the theoretical and practical angles, help university students analyze the existing social issues and be precautious of the potential social crisis. Therefore, in order to realize the teaching objective of the course “Social Issues in Contemporary China”, teachers shall fully exert the characteristics of “simulated personal experience” of experiential teaching method, thereby transforming students’ learning process from collection of phenomenon to grasp of social laws and principles.

The core part of “simulated personal experience” theory is the integration of the direct and the indirect, which means students are no longer the passive recipients of knowledge during the teaching process. They are encouraged to participate in the teaching process in terms of their behaviors and emotions and accumulate their knowledge base through their direct or indirect experience. The so-called “direct” refers to highlight the intuitive feeling function of the situations through a variety of themed scenarios design. For example, the author adds the fairytale of “Here comes the Dingdong” into the course design, in which the phenomenon of conformity is reflected. This design has fully mobilized students’ visual feelings and has made them cognate, feel, analyze and investigate the essence of the social issues reflected in the fairytale. Therefore, a psychological interactive experience of their own will be formed. In the mean time, phenomenon that students have superficial knowledge about the social issues will be greatly improved. The so-called “indirect” refers to the scientific discussion and analysis of the appearances, causes, trends of a variety of social issues through necessary teacher-student interaction and student-student interaction on the basis of direct experience, so that social laws and principles can be grasped and bad habit like metaphysics and mechanical application can be eliminated.

2.3 Promote the Transformation Process of Teaching Focus from self-spontaneity to self-awareness

From the perspective of sociology, the focus of the course “Social Problems in Contemporary China” is the real issues occurred in the present society, among which some are ones left over by history, and some are new products brought by the social progression, including issues of social norms, social fairness, social organization, public security, population and ecological environment, etc. It is the core part of experiential teaching to help the university students fulfill the transformation from independent awareness of social problems to understanding social disciplines.

In order to realize the transformation of the learning focus, it requires the emphasis the principle of “integration of appearance and essence” in experiential teaching during the process of teaching practice, so as to drive students transform from self-spontaneity to self-awareness. All appearance is the representation of essence, and essence has to be expressed through appearance. The settings in experiential education are all consciously selected and personally optimized by teachers. And the social phenomenon reflected in the optimized settings, especially the carefully selected fairytales, will provide

students a much better experience of the story, vividly affect students' psychological cognition, and even can help students learn how to think, summarize and be abstract. While teachers may step back and seek for education opportunities from students' performance by observing students' psychological changes. In that case, a classroom may then become a place where students take their own initiative and study, and a place where students' self-awareness about social issues may generate.

3 Realistic Problem of Experiential Teaching in Universities

Although experiential teaching enjoys some obvious advantages in the area of creativity in universities, it is still undeniable that we need to be really careful to spread and popularize it because certain issues do exist which are generated by some historical and factual matters.

3.1 The imbalance between the Contents and Forms of Experiential Teaching

During the process of teaching innovation in universities, the style and contents of experiential teaching are closely related, interdependent and indispensable. In the mean time, they are mutually restricted and can affect each other, thereby forming a relation of unity of opposites. The contents of experiential education will lose its carrier without the style, which then make the contents impossible to be expressed. Likewise, the style of an experiential education without proper contents is very much alike a body without a soul, and will be unworthy existing in the world. Taking the course "Social Issues in Contemporary China" as an example, experiential teaching is not only the tool to express its contents, but also a basic prerequisite which makes teaching practice deserve to be called a teaching practice. This requires us, on the one hand, stress the dominant position of the education contents and pay much attention to the influence that education contents have to education style. Also, the function of education style cannot be overlooked. Great efforts shall be invested in transforming the teaching style to promote the optimization of teaching contents, adjusting the sentiments of teaching contents, and adding aesthetic elements to classroom education. Only by doing that can we achieve the goal of "teaching contents are changed after the style and teaching styles are innovated after its contents".

However, in the actual teaching practice, it is commonly seen that imbalances between teaching contents and its styles in experiential teaching are existing. And it is usually the case that the education contents and styles are disunited and sometime only contents or styles are emphasized. This will lead to a distortion of knowledge delivery. On the one hand, some teachers always believe that the more experiential materials and questions, the better. However, with the excessive experiential sources, insufficient experiential time-space will be left over for students. Teachers will then, therefore, find it difficult to inspire students on how to identify and formulate questions, and students will undergo mismatch between emotional cognition and spiritual experience. On the other hand, some teachers partially believe that the more situational expression modes in the experiential teaching the better. So they overuse different kinds of experiential modes in one single teaching period. From a certain perspective, perhaps, diversified experiential modes may make new knowledge fun to learn. However, it can easily lead to a situation in which students will have a way too fast sense and feelings, and way too short time for critical thinking. This is definitely not the objective that experiential teaching would like to achieve.

3.2 The Imbalance of Pre-determinative Teaching and Generative Teaching in Experiential Teaching

From the perspective of the theories of modern education, pre-determinative teaching is a teaching method that abides by certain teaching principle and designs the teaching objective, contents, approach and styles, so as to elevate the teaching efficiency. Generative teaching is the innovation and improvement under the framework of pre-determinative objective and contents. Pre-determinative teaching reflects the scientific nature of teaching practice, while generative teaching reflects its artistic nature. Sparks will be produced when teachers try to use both of the teaching methods in a classroom. Unfortunately, this needful balance of pre-determinative and generative teaching has become the main stream of experiential teaching. And quite a lot of imbalanced cases can be observed. First, too much pre-determinative work has been done in the lesson preparation. Indeed, pre-determinative work before a class is indispensable when conducting experiential teaching. Yet in practice some teachers have done too detailed pre-determinative planning which seriously affect students' autonomous experience. The teaching practice will then become a mere formality, and the teaching outcomes and original teaching design may be widely divergent. Second, given the background that generative teaching has become dominant in educational reforms in universities, some people falsely believe that the basic teaching practice will transform from pre-determinative teaching method to generative teaching. Consequently,

per-determinative teaching method, together with its inherent drawbacks, has become the target of critics. In contrast, generative teaching method becomes the perfect prototype which has countless advantages. This has led to the imbalanced situation between pre-determinative teaching and generative teaching method.

Both of the above-discussed phenomenon stem from the improper handle of the duality of experiential teaching method. On the one hand, generative teaching is advocated in the experiential teaching and the old-fashioned pre-determination-oriented teaching practice has to be abandoned. This fact is totally misinterpreted. On the other hand, the fact that pre-determinative teaching is the foundation of generative teaching method is not properly taken into consideration. Therefore, advocating generative teaching method does not equate with denying per-determinative teaching method. And it is unnecessary to change all the pre-determinative teaching into generative teaching method. The guideline is that the pre-determined key points should be clear teaching objective and systematic teaching ideas, and should also provide macro-level of guidance for creation of discussion atmosphere, perception of issues and ability of critical thinking, etc. And the control of the dialectical relationship between pre-determinative teaching and generative teaching not only turn the classroom into a platform for students to show their abilities, but also a place where teachers may present their intelligence and reflect the core value of “Teaching serves Learning” in experiential teaching.

3.3 The Estrangedness of Teacher-Student Interaction and Student-Student Interaction in Experiential Teaching

The dominant factor in experiential teaching is the mechanism of interactive teaching, among which the most important part is teacher-student interaction and student-student interaction. From the sense of philosophy, they are mutually interdependent, and also complement each other, and it is safe to say that they together determine the development direction of experiential teaching. Teacher-student interaction requires teachers to establish a classroom teaching system which complies with the “Students First” principle. Under this framework, the teaching and learning attempts between teacher and students shall be promoted, knowledge obtaining and practicing shall be carried out in a multi-directive interaction, and the phenomenon of excessive dependence of teachers and learning all by oneself shall be avoided. Student-student interaction is designed to conduct activities including feeling expression, experience summary, problem discovery and countermeasures raising among students, and connect classroom teaching practice and theoretical investigation, so as to make all the students consciously conduct critical thinking about the issues reflected in the teaching contents. In that case, every single student has become the designer and researcher of the teaching settings. And when it comes to the teaching practice of the course “Social Issues in Contemporary China”, experiential teaching is a process of multi-element interactive teaching reforms and innovation of teaching theories. Therefore, the harmony of teacher-student interaction and student-student interaction becomes very important.

Undeniably, it is a common situation that teacher-student interaction and student-student interaction cannot coexist in ordinary classroom teaching. Some teachers have very superficial understanding about the teacher-student interaction and cannot appreciate the internal connection between teacher-student interaction and student-student interaction from different angles. They attach too much importance to the teaching position and teaching function of teacher-student interaction and do not realize the problems in such interaction like little room for idea-exchanging, impossible to have all the students involved in the process of thinking and experiencing, etc. These misconceptions will lead to a serious situation in which students in the classroom are only a bunch of audience who do not care about what’s happening on the stage. It is especially the case for the lesson with complicated contents. Students have no communication with each other, either emotionally or behaviorally. Therefore, a better teaching outcome can never be reached. This demands our teachers to make student-student interaction a supplementary component to the classroom teaching, and encourage students to come up with their personalized viewpoints, so as to elevate their cognitive competence and abstract analysis ability by defending and even arguing for their own point of view. By doing this, not only do we provide a platform for those who are eager to think and learn, we also help achieve the “integration of emotion and context” in the experiential teaching

4 Practical Tendency of Experiential Teaching in Universities

Although plenty of research has been done regarding the experiential teaching, the research of it in terms of ordinary universities are still remaining on the aspects of its characteristics, value and ways of realization. Very limited research regarding its trend of development in future has been conducted. So it is much needed that we have to do rational reflections about teaching styles, teaching objective and

teaching activities from a certain height.

4.1 Coexistence of Situational Teaching and Emotional Teaching

As the educational reforms in ordinary universities goes deeper, the simple situational teaching method can no longer cater the need of the development of experiential teaching in universities. It has become a tendency that situational teaching method and emotional teaching method will have equal importance in classroom teaching. Research on emotional psychology shows that individual emotion has at least three aspects of function on cognitive activities: power, consolidation and adjustment. Hence, emotional teaching needs to create situations to inspire, arouse and satisfy students' emotional need, thus makes the teaching activities even more active. A combination of situational and emotional teaching method is not only helpful for college students to create harmonious and cozy teaching relationship from the appearance of situational teaching, it also can facilitate students' transformation of learning emotion, abandon the past perplexed and superficial learning moods, reposition learning goals and reshape learning behaviors.

As far as the course "Social Issues in Contemporary China" is concerned, the key point of "coexistence of mood and mentality" lies in the fact that the development of mood shall be prompt while that of mentality shall be gradual. Prompt mood development attaches importance to the guidance of the development of university students' learning psychology and requires them to form proper appreciation about the psychological status like happy, angry, love, hate, fear and sorrow aroused by experiential teaching situations during their learning process. Moreover, university students are expected to have self-control over their personal quality or comprehensive ability expressed during the process of situational teaching practice. In contrast, gradual development of mentality emphasizes that university students' learning mentality shall move forward or upward in a more systematic and ordered way, so as to achieve a situation in which the need for learning comes from the deep of their hearts. And their heart and soul become the first classroom where experiential teaching is conducted, and emotions become the major drive of students' learning behaviors.

4.2 Coexistence of Realistic Education and Future Education

Based on the practical experience collected through working in the universities for many years, the author believes that the theory of "reality teaching and future teaching coexist" can focus on the reality and the future of teaching object at the same time. It is not only the key to solving the imbalance between per-determinative teaching and generative teaching, but also the only way in which experiential teaching in ordinary universities can develop. Namely, in the process of experiential teaching, we have to take "facing reality and facing the future" as the logical origin, no matter the per-determination of emotional situation or the generation of teaching objective. In that case, students will realize that the present learning situation and outcomes are not only the need for the completion of a single academic job, but also the foundation of future development. Therefore, the cultivation of students with strong ability of sustainable development becomes the common agreement among teachers and students.

As for the course interface of "Social Issues in Contemporary China", on the one hand, experiential teaching advocates to take "Learning for learning's sake" as the starting point, which requires students to retrieve their knowledge base, take initiative to use the strategy of collection and summarization, reorganize all the existing theories and practical knowledge, and turn them into basic factors that are needed for academic learning. On the other hand, it is also promoted that students shall make their study plan according to the principle of "learning for future career's sake". And all the university students should set their target as mastering the professional qualities required by modern society and industries. So they can develop their ability of abstract analysis and perfect themselves for future development by connecting the experiential materials and social issues.

4.3 Coexistence of Generalized Teaching and Personalized Teaching

During the process of experiential teaching in universities, it is an indisputable fact that generalized teaching has been playing the dominating role. And it is common to see that same kind of experiential teaching setting and teaching resources have been used by many subjects, or sometimes even many majors. Such kind of generalized teaching method is beneficial to the expansion of experiential teaching to a larger scale. However, it comes with a price, which is the sacrifice of personalized teaching practice. We have to admit that personalized teaching method effectively connects teacher-student interaction with student-student interaction in the experiential teaching practice. The personalized teaching method, in a sense, is the internal driving force of the development of experiential teaching in universities.

5 Conclusions

As for the teaching practice of the course "Social Issues in Contemporary China", it requires a

visionary insight and sensitive thoughts to optimize and highlight the teaching mode and contents, so as to construct a brand new context for generalized teaching method. Meanwhile, teachers should also discard the misgivings of experiential teaching which is believed to be too limited, and facilitate students to grasp the principal contradiction in the teaching contents and the major aspects of the contradiction under the actual educational conditions. With the deepening of teacher-student interaction and larger-scale of student-student interaction, the features of the course will be very well demonstrated. Therefore, when remedying the defects and omissions of generalized teaching, the teaching context of “personalized teaching and personalized learning” shall be deemed as the banner of the experiential teaching reforms in universities.

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Evaluation on Financial Synergy Effect of Enterprise Group Based on the Unascertained Measure Theory

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Abstracts: Due to the complexity and diversity of organizational form, the financial cooperative governance issues of the enterprise group become the significant problem of modern enterprise group. On the basis of the existing research results and the principle of systematic, the paper constructs three dimensions of financial cooperative system, which includes financial strategy cooperation, financial resource cooperation and financial interest's cooperation. It puts forward the index system of enterprise financial cooperation effect evaluation, by means of questionnaire and financial data the listed companies publish, and uses unascertained measure model to judge the financial strategy cooperative ability, financial resource cooperative ability and financial interests coordinative ability, finally it is the financial cooperative ability evaluation and analysis of the 20 enterprises. Through the research, the financial cooperative ability of enterprise group is weak, mainly due to the insufficiency of the financial resource cooperative ability and the weakness of financial interest's cooperative ability.

Key words: Enterprise group; Synergistic governance; Synergistic effect; Evaluation system; Unascertained Measure Theory

1 Introduction

The enterprise group is the legal entity which is formed by a plurality of enterprises or organizations through the organic economic link, it plays a decisive role in the today's market competition and economic development, and it's the concentrated expression of national competitiveness. Since the reform and opening up, the constant adjustment of national economic development, a great number of enterprise groups with independent intellectual property rights, well-known brands and international competitiveness spring up rapidly, and become the backbone of national economy. Because of the complexity and diversity of organizational form, the financial cooperative governance issues of the enterprise group become the significant problem of modern enterprise group, and also become the main issues that many foreign and domestic scholars concerned with. In recent years, domestic and foreign scholars study a lot about the financial synergy development agent, mechanism and influence. However, the current research has not solved the integration between the traditional financial management theory and systematic, and its perspective on the lack of dynamic state and application oriented, therefore making it difficult to explain the financial synergy deep mechanism. On the basis of the existing research results, the paper combines the economics, management science and system science, and adopts the methods of literature research, questionnaire survey, empirical analysis and theoretical reasoning, it aims at trying to solve two key problems: one is to reveal the financial synergy governance mechanism, model construction and realization way, the other is to construct the evaluation system and method of the financial synergy governance effect.

2 Financial Synergy: Three-Dimensional Evaluation System in Enterprise Group

Financial synergy governance is related to many factors, therefore we need to design the evaluation index from various angles and levels, in order to ensure that the evaluation results reflect the true level. On the basis of existing literature, and according to the factors affecting the financial synergy governance, the basic framework of financial synergy effect evaluation index system can be constructed (Figure 1) It can be divided into four levels: the goal layer refers to the top of the index system, namely the financial strategy synergy, financial resource synergy and financial interests synergy. The index layer refers to the concrete index contains the various subgoals, the specific meaning and code are shown in Table 1: The object layer contains the financial synergy effect evaluation object, namely the 20 listed corporations.

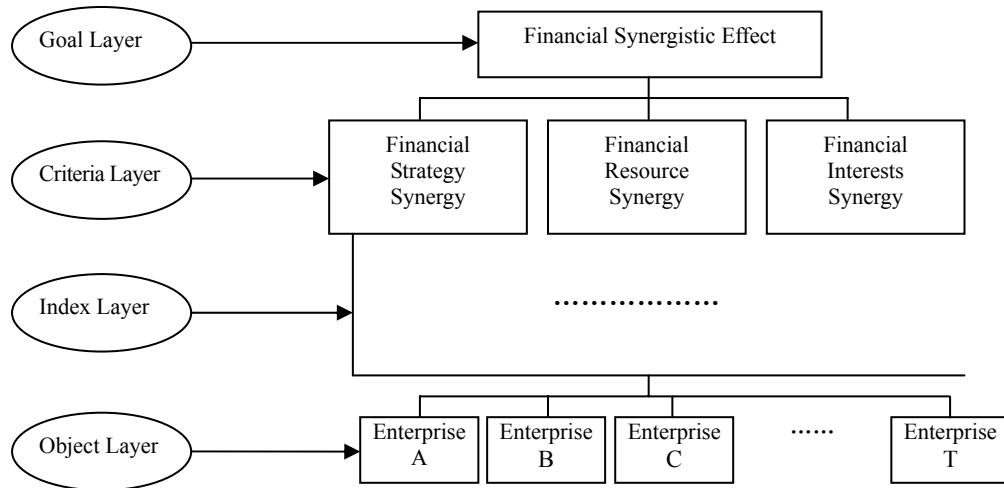


Figure 1 Evaluation Index of Financial Synergistic Effect

Table 1 Evaluation Index of Financial Synergistic Effect

Goal Layer	Criteria Layer	Index Layer	Code
Financial 3D Model of Synergistic Governance (X)	Financial Strategy Synergy Model (X1)	Market Environment Adaption Visibility	X11
		Investment Environment Adaption Visibility	X12
		Precision Visibility of Industry Competition in Profit	X13
	Financial Resource Synergy Model (X2)	Resources Allocation Advantage Visibility	X21
		Property Allocation Advantage Visibility	X22
		Capital Allocation Advantage Visibility	X24
	Financial Interests Synergy Model (X3)	Shareholder Satisfaction	X31
		Employee Satisfaction	X32
		Customer Synergy Visibility	X33
		Supplier Synergy Visibility	X34

3 Based on the Unascertained Measure Model, the Construction of Financial Synergy Effect Evaluation Model

3.1 Single Index Model of Financial Synergy Effect Evaluation

The financial synergy evaluation index contains both quantitative indicators and qualitative indicators, taking the uncertainty and order distribution into consideration, the unascertained measure model is used to evaluate the financial synergy capability.

Set up x_1, x_2, \dots, x_n is to be evaluated n collaborative project financial indicators, the evaluation object space $X = \{x_1, x_2, \dots, x_n\}$. To $x_i \in X$, have m Evaluation indexes I_1, I_2, \dots, I_m . Then the evaluation index space $I = \{I_1, I_2, \dots, I_m\}$. Thus, for $x_i \in X$ Can be expressed as m Dimensional vector $x_i = x_{i1}, x_{i2}, \dots, x_{im}$, Where in x_{ij}

Evaluation of the object representation x_i . An evaluation I_1, I_2, \dots, I_m $i = 1, 2, \dots, n$ For an index $I_i \in I$, have k Secondary evaluation $I_{i1}, I_{i2}, \dots, I_{ik}$. Then the two evaluation space $I_i = \{I_{i1}, I_{i2}, \dots, I_{ik}\}$. Then x_{ij} Can be expressed as k Dimensional vector $x_{ij} = \{x_{ij1}, x_{ij2}, \dots, x_{ijk}\}$. Wherein x_{ijr} Evaluation of the object representation x_i . About an indicator I_j . The following two indicators measured values. For each x_{ijr} . With p Rank

c_1, c_2, \dots, c_p Then the evaluation space $C = \{c_1, c_2, \dots, c_p\}$ And if c_k Indicates the importance of financial indicators, then k Level than $k + 1$ Level and recorded as an important $c_k > c_{k+1}$. If the $\{c_1, c_2, \dots, c_p\}$ Met: $c_1 > c_2 > \dots > c_p$, Called $\{c_1, c_2, \dots, c_p\}$ Is to evaluate the spatial C An ordered partition classes.

$$(\mu_{ijq})_{m \times p} = \begin{bmatrix} \mu_{i11} & \mu_{i12} & \dots & \mu_{i1p} \\ \mu_{i21} & \mu_{i22} & \dots & \mu_{i2p} \\ \dots & \dots & \dots & \dots \\ \mu_{im1} & \mu_{im2} & \dots & \mu_{imp} \end{bmatrix}, \quad i = 1, 2, \dots, n$$

The formula for the object x_i , The single index measure evaluation matrix

3.2 Evaluation of Corporate Financial Synergies Entropy Model

Objects x_i About indicators I_j Observations x_{ij} The object is c_1, c_2, \dots, c_p Each evaluation level unascertained vector is: $\mu_{ij1}, \mu_{ij2}, \dots, \mu_{ijp}$, Denoted $(1 \leq j \leq p)$ Indicates x_{ij} Make x_i At the evaluation level unascertained measure, then $\mu_j^i = (\mu_{ij1}, \mu_{ij2}, \dots, \mu_{ijp})$.

Single index measure μ_{ijk} The value reflects the degree of decentralization and centralization I_j Indicators distinguish x_i .The size of the contribution of the category, that decision I_j Indicators About x_i Sample classification weights w_j^i The size of the μ_{ijk} The degree of decentralization and centralization values available information entropy to quantitatively describe. Defined by the information entropy can be obtained:

$$H_i(j) = -\sum_{k=1}^p \mu_{ijk} \log \mu_{ijk} \quad v_j = 1 + \frac{1}{\log p} \sum_{k=1}^p \mu_{ijk} \log \mu_{ijk} \tag{1}$$

$$w_j^i = \frac{v_j^i}{\sum_{j=1}^m v_j^i} \tag{2}$$

Order

Obviously there $0 \leq w_j^i \leq 1$ and $0 \leq w_j^i \leq 1$

The above formula, w_j^i Is the indicator I_j To x_i Classification weights. Call $W^i = (w_1^i, w_2^i, \dots, w_m^i)$ As an indicator on x_i Classification of the weight vector.

3.3 Financial Synergy Enterprise Multi-indicator Model Evaluation

Known About x_i The single index measure evaluation matrix, on x_i Classification index weights each vector $W^i = (w_{i1}, w_{i2}, \dots, w_{im})$, There are:

$$\mu^i = W^i \cdot (\mu_{ijk})_{m \times p} = (w_1^i, w_2^i, \dots, w_m^i) \begin{bmatrix} \mu_{i11} & \mu_{i12} & \dots & \mu_{i1p} \\ \mu_{i21} & \mu_{i22} & \dots & \mu_{i2p} \\ \dots & \dots & \dots & \dots \\ \mu_{im1} & \mu_{im2} & \dots & \mu_{imp} \end{bmatrix}$$

$$\mu^i = (\mu_{i1}, \mu_{i2}, \dots, \mu_{ip})$$

Then μ^i To x_i Evaluation vectors.

3.4 Enterprise Financial Synergy Evaluation Criteria

As the evaluation rating $C = \{c_1, c_2, \dots, c_p\}$ Is ordered, and satisfies $c_1 > c_2 > \dots > c_p$, So the

use of home linearity criterion.

On confidence $(0 \leq \lambda \leq 1)$, Usually calculated taking $\lambda = 0.7$:

$$K_0 = \min \left\{ \left[\sum_{l=1}^k \mu_{il} \right] \geq \lambda, k = 1, 2, \dots, k \right\} \quad (1 < i < n)$$

Thereby that the evaluation sample x_i Belong c_k Classes.

4 The Financial Synergy Effect Based on the Unascertained Measure Model

On the basis of unascertained measure model, the paper makes an empirical study of the 20 listed enterprises. Firstly, calculating the unascertained measure value of qualitative index, then the quantitative index, the multi-indexes, finally the financial synergy capability of 20 sample enterprises.

4.1 Unascertained Valence of Qualitative Index

For instance, the A1 enterprise, its financial interests synergy evaluation dimension (x3) involves shareholder satisfaction (x31) and employee satisfaction (x32). Shareholder satisfaction of enterprise A1 can be divided into five classes: I, II, III, IV, V, they separately mean worse, relatively worse, medium, good and excellent. Experts' scores of X31 are shown in Table 2. Assuming the participating personnel's comprehensive reliability is $\beta = [0.113, 0.101, 0.095, 0.098, 0.103, 0.096, 0.097, 0.093, 0.107, 0.097]$.

Table 2 Experts' Evaluation of Shareholder Satisfaction

Results Indexes	Experts' Numbers									
	1	2	3	4	5	6	7	8	9	10
X311	4	3	3	2	4	4	3	5	5	3
X312	3	4	4	2	2	3	5	4	4	5
X313	4	3	5	3	4	2	3	4	2	5
X314	3	3	3	4	3	2	2	4	3	4
X315	4	3	4	4	5	3	3	5	4	3
X316	5	3	4	4	5	4	4	5	3	4

Set up $f_{31}(x), f_{32}(x), \dots, f_{36}(x)$ is the comprehensive evaluation value of x_{311}, \dots, x_{316} , $f_{31}(x), f_{32}(x), \dots, f_{36}(x)$ is the blind number, they are shown as follows:

$$\begin{aligned}
 f_{31}(x) &= \begin{cases} 0.098, x = 2 \\ 0.39, x = 3 \\ 0.312, x = 4 \\ 0.2, x = 5 \\ 0, others \end{cases} &
 f_{32}(x) &= \begin{cases} 0.201, x = 2 \\ 0.209, x = 3 \\ 0.396, x = 4 \\ 0.194, x = 5 \\ 0, others \end{cases} \\
 f_{33}(x) &= \begin{cases} 0.203, x = 2 \\ 0.296, x = 3 \\ 0.309, x = 4 \\ 0.192, x = 5 \\ 0, others \end{cases} &
 f_{34}(x) &= \begin{cases} 0.193, x = 2 \\ 0.519, x = 3 \\ 0.288, x = 4 \\ 0, others \end{cases} \\
 f_{35}(x) &= \begin{cases} 0.391, x = 3 \\ 0.413, x = 4 \\ 0.196, x = 5 \\ 0, others \end{cases} &
 f_{36}(x) &= \begin{cases} 0.208, x = 3 \\ 0.483, x = 4 \\ 0.309, x = 5 \\ 0, others \end{cases}
 \end{aligned}$$

According to the blind number, μ_{31} can be used to represent the unascertained measure value evaluation :

$$\mu_{31} = \begin{pmatrix} 0 & 0.098 & 0.39 & 0.312 & 0.2 \\ 0 & 0.201 & 0.209 & 0.396 & 0.194 \\ 0 & 0.203 & 0.296 & 0.309 & 0.192 \\ 0 & 0.193 & 0.519 & 0.288 & 0 \\ 0 & 0 & 0.391 & 0.413 & 0.196 \\ 0 & 0 & 0.208 & 0.483 & 0.309 \end{pmatrix}$$

Enterprise A1, the shareholder satisfaction can be measured as W1:
 $w_{31} = (0.1726 \ 0.1758 \ 0.1776 \ 0.1568 \ 0.1589 \ 0.1583)$

From the formula $\mu_{31}^* = w_{31} \cdot \mu_{31}$, Enterprise A1 shareholder multi-indexes evaluation can be measured as μ_{31}^*

$$\mu_{31}^* = (0.0000 \ 0.1186 \ 0.3331 \ 0.3656 \ 0.1828)$$

Through the above methods, Enterprise A1 personnel multi-indexes evaluation can be measured as μ_{32}^*

$$\mu_{32}^* = (0.0000 \ 0.1065 \ 0.3536 \ 0.3682 \ 0.1718)$$

4.2 Unascertained Valence Quantitative Index

Take the enterprise A1 for example, the financial interests synergy dimension is also designed with two quantitative indicators, including customer synergy visibility (X33) and suppliers synergy visibility (X34). To ensure quantitative indicators and qualitative indicators measure the same, firstly, we need to determine the division of quantitative indicators nature space $F \{a_1, a_2, \dots, a_k\}$. Comprehensive survey results and experts' opinions, these quantitative indicators for each division in each category are shown in Table 3.

Table 3 Single Index Valence Space of Financial Synergy Effect

Indexes Symbols	Index Name	I Worse	II Relatively Worse	III General	IV Good	V Excellent
X11	Market Adaption Visibility	0.2	0.4	0.6	0.8	1
X12	Investment Adaption Visibility \geq	0.1	0.3	0.4	0.5	0.8
X13	Industry Competition Profit Visibility	0.1	0.2	0.3	0.4	0.5
X21	Resources Allocation Advantage Visibility \geq	0.4	0.5	0.6	0.7	0.8
X22	Property Allocation Advantage Visibility \geq	0.2	0.3	0.5	0.6	0.7
X23	Capital Allocation Advantage Visibility \geq	0.1	0.2	0.3	0.4	0.5
X33	Customer Synergy Visibility \geq	0.3	0.4	0.6	0.7	0.8
X33	Supplier Synergy Visibility \geq	0.3	0.5	0.6	0.7	0.8

According to the Table 3, calculating enterprise A1 unascertained measure value of customer synergy visibility(X33) and supplier synergy visibility(X34):

$$\mu_{33}^* = [0.09 \ 0.224 \ 0.365 \ 0.206 \ 0.115]$$

$$\mu_{34}^* = [0.17 \ 0.315 \ 0.07 \ 0.117 \ 0.328]$$

According to the former μ_{31}^* , μ_{32}^* , μ_{33}^* and μ_{34}^* , the unascertained measure vector value μ_3 of enterprise A1 financial interests synergy indexes can be figured out:

$$\mu_3 = \begin{bmatrix} 0 & 0.1186 & 0.3331 & 0.3656 & 0.1828 \\ 0 & 0.1065 & 0.3536 & 0.3682 & 0.1718 \\ 0.09 & 0.224 & 0.365 & 0.206 & 0.115 \\ 0.17 & 0.315 & 0.07 & 0.117 & 0.328 \end{bmatrix}$$

Enterprise A1 indexes weight of financial interests synergy is w_3 :

$$w_3 = (0.2428 \quad 0.2410 \quad 0.2592 \quad 0.2570)$$

From the formula $\bar{\mu}_3 = w_3 \cdot \mu_3$, we can figure out the unascertained measure valence vector $\bar{\mu}_3$ of financial interests synergy indexes:

$$\bar{\mu}_3 = (0.0670 \quad 0.1935 \quad 0.2787 \quad 0.2610 \quad 0.1999)$$

According to the above method, we can figure out the financial strategy synergy measure value $\bar{\mu}_1$, financial resource synergy measure value $\bar{\mu}_2$, financial interests synergy measure value $\bar{\mu}_3$, finally we can get the multi-indexes measure value of financial synergy μ :

$$\mu = \begin{pmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \end{pmatrix} = \begin{pmatrix} 0.1079 & 0.1107 & 0.3627 & 0.2606 & 0.1581 \\ 0.1227 & 0.2540 & 0.3442 & 0.1554 & 0.1236 \\ 0.0670 & 0.1935 & 0.2787 & 0.2610 & 0.1999 \end{pmatrix}$$

Enterprise A1 criteria layer weight of financial synergy is w :

$$w = (0.3312 \quad 0.3340 \quad 0.3348)$$

Through the formula $\bar{\mu} = w \cdot \mu$, we can figure out unascertained measure evaluation vector of each criterial layer index $\bar{\mu}$:

$$\bar{\mu} = (0.0991 \quad 0.1863 \quad 0.3284 \quad 0.2256 \quad 0.1606)$$

$\lambda = 0.7$, we can figure our enterprise A1 financial synergy evaluation grade.

$$k_0 = \min \left| k : \sum_{i=1}^k \bar{\mu}_i \geq \lambda \right| = \min \left| k : \mu_5 + \mu_4 + \mu_3 \geq \lambda \right| = 3$$

Because of the unascertained measure vector $\bar{\mu}$, $k_0 = 3$ can be worked out, therefore it belong to the third class, namely Class III. For the realization of the financial resource synergy evaluation results ranking, we can adopt the scoring criteria to calculate:

$$q = \sum_{k=1}^k a_k \cdot \bar{\mu}$$

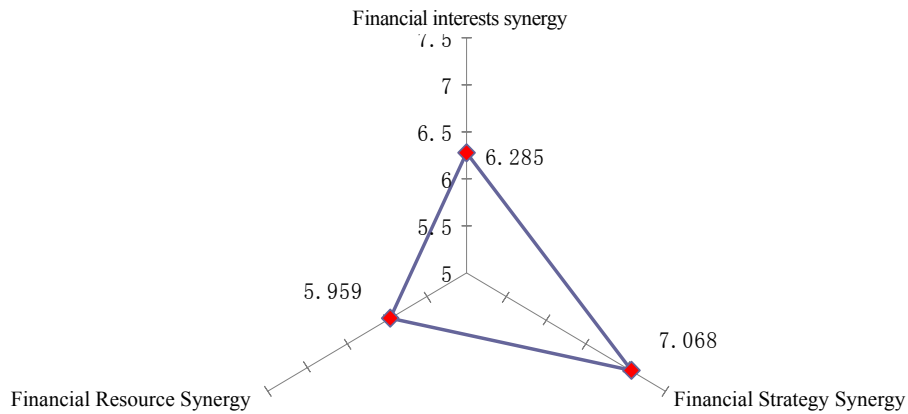
Financial resource synergy shows the property space of F, $a = \{2,4,6,8,10\}$, $q = 6.3246$. According to the values of enterprises'q, the 20 sample enterprises financial synergy comprehensive effect can be ordered, the results are shown in Table 4:

Table 4 Comprehensive Evaluation Results of Financial Synergy Capability

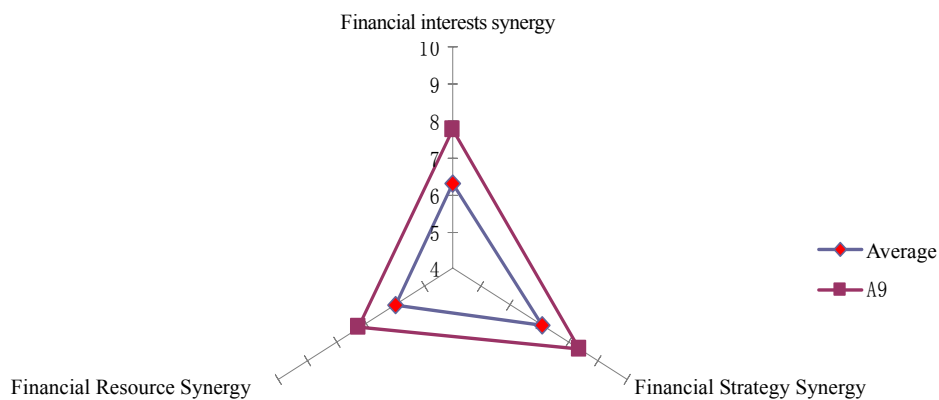
Enterprise Code	Comprehensive Measure Value	$\lambda = 0.7$	Total Scores	Ranking
A9	[0.049 0.063 0.196 0.347 0.345]	IV	7.751	1
A15	[0.082 0.114 0.234 0.284 0.287]	III	7.164	2
A3	[0.106 0.163 0.193 0.298 0.241]	III	6.81	3
A8	[0.094 0.144 0.265 0.265 0.232]	III	6.795	4
A11	[0.100 0.159 0.255 0.282 0.204]	III	6.66	5
A7	[0.114 0.177 0.209 0.274 0.226]	III	6.639	6
A13	[0.111 0.196 0.197 0.288 0.208]	III	6.572	7
A2	[0.137 0.166 0.216 0.256 0.225]	III	6.531	8
A6	[0.134 0.138 0.261 0.269 0.199]	III	6.518	9

A12	[0.095 0.158 0.338 0.232 0.177]	III	6.478	10
A4	[0.135 0.181 0.226 0.265 0.193]	II	6.402	11
A14	[0.146 0.166 0.236 0.270 0.182]	II	6.353	12
A1	[0.099 0.186 0.328 0.226 0.161]	II	6.324	13
A18	[0.148 0.171 0.252 0.271 0.159]	II	6.247	14
A16	[0.118 0.216 0.300 0.220 0.147]	II	6.121	15
A5	[0.119 0.196 0.334 0.214 0.137]	II	6.106	16
A17	[0.169 0.204 0.221 0.234 0.172]	II	6.073	17
A20	[0.185 0.221 0.302 0.153 0.141]	II	5.693	18
A19	[0.215 0.218 0.260 0.192 0.116]	II	5.55	19
A10	[0.195 0.290 0.319 0.126 0.071]	II	5.175	20
Average			6.398	

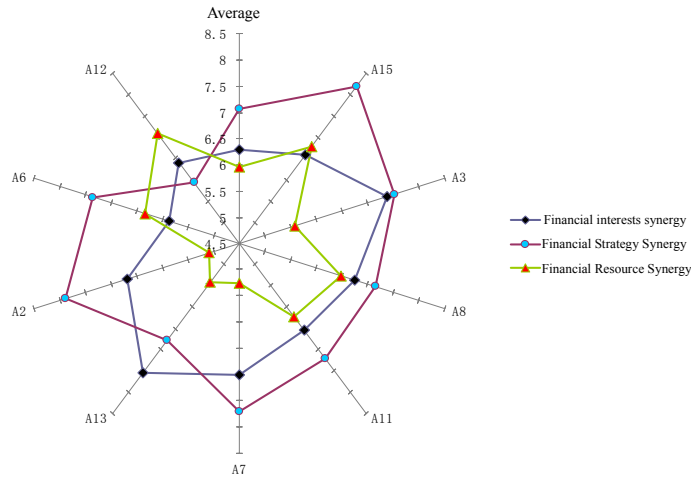
From Table 4, when the $\lambda = 0.7$, in the 20 sample enterprises, one enterprise stays in the good state, which takes up 5%; nine enterprises stay in the medium level, which takes up 45%; ten enterprises stay in the relatively bad level, which takes up 50%. The financial synergy capability of investigated enterprises stay in the mediocre level.



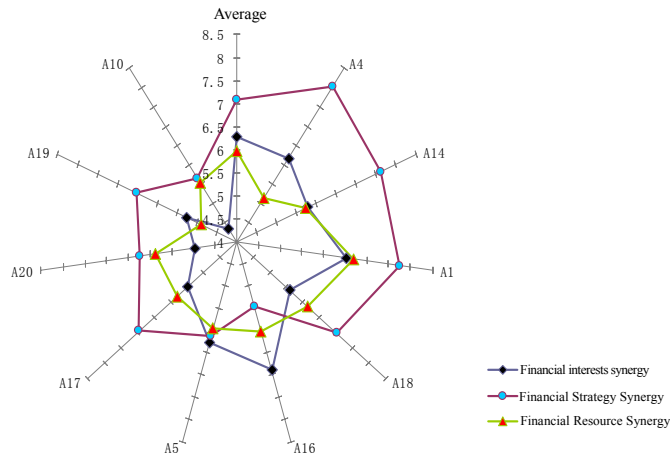
(a) Three-dimensional Average Distribution of 20 Sample Enterprises Financial Synergy



(b) Three-dimensional Average Distribution of Excellent Sample Enterprise (A9)



(c) Financial Synergy Score Distribution of Secondary Sample Enterprises



(d) Financial Synergy Score Distribution of Poor Sample Enterprises

Fig.2(a) shows a sample of 20 enterprises, in the financial synergy three-dimensional index distribution, we can see that the overall financial strategy synergy effect is the strongest, followed by the financial interests synergy effect, the financial resource synergy effect comes last. The mean value in the three-dimensions stays in the middle class (class III), which shows that the financial synergy effect of sample enterprises stays weak, especially the financial resource synergy effect.

Fig.2(b) shows that financial synergy three-dimensional index of enterprise A9 is greater than the sample mean value, if the overall capability of financial synergy get better, the three kinds of financial synergy capability should be improved.

Fig.2(c) shows that the sample enterprises in the medium level (class III), the financial strategy synergy effect is better than financial interests synergy ability and financial resource synergy effect. The same-level enterprises have more differences in single dimension effect. For instance, enterprise A2 shows much better in financial strategy synergy, but the financial resource synergy effect is significantly worse than other sample enterprises. Enterprise A12 is better than other sample enterprises in financial resource synergy effect, but the financial strategy synergy effect is obviously insufficient. Enterprise A13 is better than other sample enterprises, but the financial strategy synergy and financial resource synergy are insufficient. Through the above analysis, most secondary sample enterprises own effect advantage in some areas also some disadvantages, which result in the insufficient financial synergy effect. The conclusion again proves that the promotion of financial synergy effect relies n the promotion of three kinds of effect.

Fig.2(d) shows that the sample enterprises in lower level (class II), its financial synergy effect is better than the financial interests effect and financial resource synergy effect, and the financial interests

synergy resource synergy effect.

Compared Fig.2(c) with Fig.2(d), we can find that the enterprises in lower level, its three kinds of financial synergy effect are all significantly weaker than the medium-level enterprises. According to the above analysis, the financial synergy effect depends on the promotion of its three kinds of capability, some advantages can't achieve the overall financial synergy effect.

5 Conclusion

The paper studies 20 listed enterprises, through the unascertained measure model, the financial strategy synergy effect, financial resource synergy effect and financial interests synergy effect are evaluated and analyzed one by one. Through the empirical analysis, the current overall level of financial synergy effect is relatively low, in the three kinds of effect, financial strategy synergy effect is relatively better, the financial interests synergy effect is worse, the financial resource synergy is the worst. The findings will provide the theoretical basis for the promotion of financial synergy effect.

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Research on Student Management Mode of College System Based on Complete Credit System*

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Abstract: Currently, the complete credit system is an education and teaching management mode being implemented by some universities. How to adapt to this system is a new topic in the current college student management work. Based on the analysis of its characteristics, significance, and the challenge under the system in the university students management work, this paper expounds the basis of student management mode of college system, and elaborates the research on the construction of student management mode of college system under the condition of the complete credit system.

Key words: Complete credit system; College system; Student management

1 Introduction:

Nowadays, in order to meet the development trend of education information, internationalization, popularization, many universities in our country improve the quality and efficiency of higher education, and actively explore the education and teaching management mode under the condition of the complete credit system. The complete credit system is a teaching management mode that is based on course-selecting system, and takes the credits as teach units of measurement, in order to obtain the minimum credits for graduation and get the corresponding degree of teaching management system. It is also a teaching operation mechanism and management mode that centers on students, and teaches students in accordance with their aptitude, individuality and awards the superior, eliminates the inferior.

2 The Characteristics and Implementation Significance of the Complete Credit System

2.1 The characteristics of the complete credit system

2.1.1 Selectable learning content

The complete credit system is based on course-selecting system, and allows students to select relevant professional and curriculum according to their personal career planning, interests and hobbies. At the same time, a large number of selective courses are set up under the complete credit system, which can contribute to the real implementation of course-selecting system, maximize the mobilization of learning initiatives of students, and promote students to play their creation potential.

2.1.2 Flexible learning time

Compared to the learning time, which is clearly formulated by the school year system and the credit system of the school year, the complete credit system has greater flexibility in the learning time. It admits the differences of students in their talent and temperament, interests and hobbies, their learning foundation and diligence. Moreover, it allows students themselves to arrange the learning process, to graduate in advance, to suspend or extend the length of schooling.

2.1.3 Scientific training process

Most students' learning plan and process vary under the complete credit system, and parts of students are confused of setting scientific goals independently. It is also difficult for them to select the best learning plan. So the complete credit system is often accompanied by the tutor system, and implemented the fine guidance and personalized guidance in the training process, which can guide students to arrange their learning plan reasonably.

2.1.4 Flexible ways of assessment

As for the course students select under the complete credit system, if students fail to pass the exam, they must retake the failed courses or choose another test until they pass the exam and obtain equivalent credit. This way allows the educated to adjust themselves to a certain extent according to their own development, which can not only show the importance of credit, but also help students to develop abilities that our society needs.

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2.2 The implementation significance of the complete credit system

2.2.1 To promote the cultivation of creative talents

The complete credit system respects students' individual differences, gives them the right to select the appropriate major, curriculum and learning progress, instead of the rigid arrangement and hard rules under the school year system, which can get the real implementation of teaching students in accordance with their aptitude. At the same time, lots of selective courses set up under the complete credit system can meet the need to promote students' own development, realize the intercommunication of scientific and technological knowledge and humanistic knowledge, optimize their own knowledge structure, in order to better mobilize the enthusiasm of students, stimulate the potential creative ability of students, promote the cultivation of creative talents.

2.2.2 To promote the improvement of teaching quality

The complete credit system gives students the right to select their teachers, which can truly enhance teachers' sense of competition, improve their teaching level, optimize their teaching content and method, update their knowledge structure, and to maximize the potential of teachers, promote the overall quality of teaching. At the same time, the complete credit system concentrates on the target management; help educational administrators to relieve from the complicated affairs, to make rules with a global vision to do the "macro-control", to turn the direct arrangement into "guide", "service", to promote the level of educational administration and teachers' capacity, so as to promote the improvement of teaching quality.

2.2.3 To promote the development of higher education

The complete credit system does not strictly distinguish the grade, and the length of schooling is more flexible, so students have the main right to choose the class time, which gives more people the chance to get higher education, to promote the popularization of higher education. At the same time, the complete credit system identifies credits according to the learning hours, which makes the quantitative standard of students more clearly, and provides a good foundation to strengthen the intercollegiate cooperation, mutual recognition of credits, organizing the teaching community. This method also promotes the sharing and integration of educational resources, and makes schools focus on the development of the advantageous subjects, so as to promote the development of higher education.

3 The Challenge Faced by the Traditional Student Management Mode

3.1 The traditional student management carrier is challenged

Under the mode of school year system, class is a basic carrier of student management. Students in class have the same curriculum and class time, so they become a closely-linked collective, an effective carrier to bear the ideological and political education factors, to perform the management function of school. However, under the condition of the complete credit system, there are different schedules for students in the same class in the traditional sense because of the course-selecting system. Differences in course selection, mobility in class time and space, disperse the original administrative class, weaken the concept of class and make it fuzzy, which is difficult for a class to carry out the tangible hard management, such as to conduct the ideological and political education, and to carry out the extracurricular activities, the construction of learning style and the social practice, so the difficulty in the student management work increases.

3.2 The traditional student management method is challenged

The management method is essential to improve the management effectiveness. The method that the administrative classes make students to take unified rigid management and dominant education under the mode of the school year system becomes the most common, and one of the most important management methods under the traditional management mode. However, under the complete credit system, because of the inconsistent study progress and flexible learning time, the possibility to carry out centralized hard management is greatly reduced, and the effect of the dominant education is very limited, while to different students, using the method of "influencing students by the environment" and "educating them in the shadow" has more effective and important impact on students' recessive education, such as their thought, conception, value, moral, attitude and emotion, so the traditional student management method is challenged.

3.3 The traditional student management concept is challenged

The student management concept is the rational thinking of the student management work. The college student management in China has long persisted the value of social-oriented, adheres to the concept of "management" instead of "service", and carries out a direct, tangible, and even forceful discipline and norms of behavior to students, emphasizes the consistence and unify, ignores or pays no

attention to the subjectivity of students. The complete credit system emphasizes the student-oriented, pays great attention to the students' guidance and service, and inspires the students' learning initiative and creativity, so the traditional student management is challenged. At the same time, under the complete credit system, the phenomenon may appear that some students select courses blindly and have difficulty in learning, which also requires schools to strengthen the construction of supporting system, and provides better service and guidance for students' learning life.

3.4 The traditional student evaluation system is challenged

The traditional student evaluation system is based on the unified teaching plan, which takes the students' achievement as the main target, the unified organization activities as the main content, and the grades and classes as the evaluation mode of students. The complete credit system has broken traditional boundaries in major and grade, allowing students to select courses regardless of their major, grade, and college, and they can expand or reduce their schooling time, which makes the traditional student evaluation system lose its reasons to exist. At the same time, under the complete credit system, the flexible ways of assessment, retaking the failed courses or choosing another test also make the traditional student evaluation system lose to operate. Thus, the unified student evaluation system under the traditional teaching management system is deconstructed, and the traditional student evaluation system is challenged.

4 The Construction of Student Management Mode of College System

The student management mode of college system is a kind of management mode of community life for students. It is based on inheriting the traditional college system in ancient China, and using the foreign residential college system for reference to develop, whose core is to take the student apartments and dormitories as the management platform and the carrier, and to implement general education, to develop students' comprehensive quality. There is a high degree of consistency in goal setting and high association in the target realization between the student management mode of college system and the education and teaching management mode under the complete credit system. Therefore, the student management mode of college system can meet the requirements of college student management under the complete credit system. For the construction of the student management mode of college system under the complete credit system, this paper is mainly explored from the following aspects.

4.1 To regenerate the class construction mode, optimize students' management carrier

The class is an important carrier of the college student management work. The complete credit system disperses the traditional group of class, and the student management carrier is challenged. Therefore, to innovate the class construction mode, and establish a student management carrier that is adapted to the complete credit system, is the foundation to explore the student management mode of college system under the complete credit system.

Under the student management mode of college system, the student work is focused on the college and students' dormitories. Therefore, based on the students' dormitory, following the "principle of proximity" of student accommodation, a certain quantity of students will be arranged into an administrative class, while students that have the same major and a certain professional background will be arranged into the professional class. According to the stability of administrative class and professional class, it is good to choose the relatively stable administrative class as the basic carrier of student management, and develop student management activities like the corresponding daily ideological and political education and Party organizational learning. What's more, the professional class can be the auxiliary carrier of student management, and develop student management activities, such as the corresponding academic competition and professional education, in order to optimize student management carrier under the complete credit system.

4.2 To improve the student information management system, optimize students' management approach

The difficulty in fully mastering the student information increases under the complete credit system. However, to adapt to the requirements of the complete credit system, the requirements of strengthening communication and exchanges between each unit are becoming increasingly strong. Therefore, to establish and improve the student information management system, and to get the acquisition, processing and handling of education management information on students, to transmit and share information through the internet, are important approaches to improve student management to be informational, standardized and scientific.

- 1) Based on the forms of the campus network information platform, student mobile phone

messaging platform, regular public information platform, special information delivery platform, to establish the information exchange platform, strengthen communication among students and transfer information, are to realize the auxiliary function of information transmission. 2) Based on the choice of students' major, curriculum and teachers, and the registration and classification of students' grades, to establish academic registration platform, is to achieve auxiliary function of students' academic guidance, and establish academic security system. 3) Based on the establishment of public network course like students' psychological quality, appearance and behavior, to establish moral integrity platform, is to realize the records of students' moral integrity and promote its function, and form a self-discipline system of the civilized etiquette.

4.3 To reform the student evaluation system, optimize students' management means

Scientific incentive evaluation mechanism is the important means of guiding students' self-management, self-control, and self-development. The complete credit system has fundamentally brought changes about students' achievement assessment standards and methods, and the deconstruction of the traditional student evaluation system. Therefore, to reform student evaluation system, and establish an evaluation mechanism that is adapted to the complete credit system, are the important parts of optimizing students' management means.

1) Improve rules and regulations, optimize evaluation basis. Evaluation basis like "students' comprehensive quality evaluation methods under the complete credit system" and "the scholarship evaluation means" is to be formulated. In the comprehensive quality evaluation, based on the four examination items, that is moral quality, scientific and cultural quality, health quality, and expanding quality, the establishment of a new evaluation system is to guide students to promote their all-round development. In the scholarship evaluation, based on the comprehensive principle of "quality" and "quantity" on study, to optimize of ranking methods, and give corresponding proportion to the total credits and the grade point of learning for students, and award students according to the standard of combination of these two proportions, can guide students to develop individually.

2) Standardize evaluation procedure, optimize evaluation process. According to the actual evaluation content, combining the methods of self-evaluation and peer evaluation, outstanding students' main role in the procedure, and emphasizing the process management, is to make the evaluation become a process for students to summarize their evaluation themselves, improve their mutual study, and cultivate their ability.

5 Conclusions

The complete credit system is the trend of university education and teaching reform in China currently. Combined with the actual situation of college student management, this paper constructs the basic mode of the optimized student management carrier, management mode and management means. It preliminarily explores the implementation approaches of college student management mode in China's universities, which provides the reference for the reform of the credit system and the college student management mode in China's universities.

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Research on the Compensation of the Main Productive Factors in the Income Distribution

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Abstract: Based on the previous studies, this paper objectively analyzed the status of the wealth gap in China. It establishes the econometrics model, and use EVIEWS, STATA and other software to solve the model. Based on the empirical results, this paper discussed the factors which impact the labor compensation in the market. Finally, we proposed some relevant suggestions. Therefore, the research on the compensation of the main productive factors in the income distribution is of theoretical value and social value.

Key words: Labour compensation; Capital compensation; Income distribution; Productive factors

1 Introduction

At the 18th National Congress of the Communist Party of China, the reform of the income distribution was proposed. The National Bureau of Statistics data shows that, in the past few years, the proportion of the consumption in China's GDP has been declining. Although in recent years, some policies have been launched continually to expand the domestic demand, to stimulate the consumption. Actually, these measures by the authorities have yielded some effects; however, there still have some distance from the ideal level. Actually, some scholars have argued that this phenomenon was attributed to the labour compensation's declining, which may significantly affect the consumption capacity (Chen Zongsheng, etc. 2002; Li Shi, 2002). During the period of 1996 to 2007, China's total labour compensation share of GDP fell from 53.4% to 39.7%. The labour compensation share in the primary distribution is low which means that most people cannot enjoy the outcomes of the rapidly soared economic growth. On the other hand, as the income growth ratio lags far behind the growth ratio of the fiscal revenue, making the residences' income share declining and leading to sluggish domestic demand and economic structure imbalance. In fact, at the 17th National Congress of the Communist Party of China, Hu Jintao has put forward the comments about the current income distribution and more attention should be put on this worsening situation, seeking a valid solution path.

Currently, China is in the golden era of economic growth. However, with the overall level of the residences' income is increasing, the income gap is also expanding. If this gap is out of control, the social stability and the health will certainly be affected. Therefore, the research on the compensation of the main productive factors in the income distribution is of theoretical value and social value.

2 Literature Review

It is well known that the current status of the income gap has become the obstacle of the processing of building a harmonious society. Chen Zongsheng and Li Shi (2002) has explored the income distribution, and proposed the famous "Chen Inverted-U Curve". Chen Liming, etc. (2008) described China's wealth gap in the current state of society and discussed how to narrow the wealth gap and enhance people's sense of fairness. Zhang Jinsong, He Xiaolin (2008), Sun Hui (2009) put forward that we should consider the phenomena of inequitable distribution of wealth, and improve the system environment, and also lower the social impact of the wealth gap.

In contrast, the relevant literatures by the foreign authors seem to be more completed. Khan (1998), Coes (2008), Yong (1999) studied this issue from the macro perspective. They thought that the economic reform in China is one of the most important reasons for the rapid economic growth. However, the income distribution is changing at the same time. As a result, China's income distribution pattern has changed and the income gap has expanded. Bian and Zhang (2002) studied this issue from the micro aspect, exploring the city's income gap of different classes in this society in the process of marketing. The results show that the income gap in the monopoly sector and the competitive sector has expanded during the process of planned economic system to marketing economic system

In short, the issue of narrowing the wealth gap and building a harmonious society has been discussed from the evaluating method, factor prices, the distribution theory and other aspects of national policies perspective. This paper analyzes the issue, thus as the allocation of production factors disparity,

wealth gap associated with the dynamics of social harmony, national policy-making and the forth, using quantitative analysis based on the Chinese provincial panel data.

3 Data Description and Variable Settings

In order to make our analysis more convincing, we selected 2000-2009 data from the Chinese Yearbook. To study the compensation of the main productive factors in the income distribution, this paper sets the following variables.

Table 1 The Data Description

Year	Y	X1	X2	X3	X4	X5
2000	49948.07	1696.3	39274.2	32917.7	9371	3849.081
2001	54934.65	1730.73	42183.6	37213.5	10870	4637.663
2002	60099.14	2084.98	51378.2	43499.9	12422	5480.028
2003	67260.69	2599.35	70483.5	55566.6	14040	6208.265
2004	72352.67	3285.68	95539.1	70477.42	16024	7242.599
2005	81888.02	3978.799	116921.8	88773.61	18364	8418.839
2006	93822.83	4334.315	140971.4	109998.2	20856	9815.309
2007	109532.3	5132.689	166740.2	137323.9	24721	12148.07
2008	134578.9	5311.936	179921.5	172828.4	28898	14500.74
2009	170299.7	4623.734	150648.1	224598.8	32244	15234.5

Y: The ratio of labor compensation to GDP to measure the share of labor income;

X1: foreign direct investment to GDP ratio to measure the degree of competition in the market, from an economic point of view we find that the higher the degree of market competition on the market means that capital mobility is strong, so that the weight of capital replacement cost decreased, resulting in reduced labor share;

X2: total imports and exports to GDP ratio to measure the degree of openness of the economy;

X3: fixed asset investment to GDP ratio, a measure of social investment rate, in accordance with the economic point of view as the labor income share will decline in the growth rate of investment;

X4: average wage to GDP ratio is used to measure the level of labor income;

X5: investment in education expenditure to GDP ratio is used to measure the quality of workers' skills.

4 Empirical Analyses

Firstly, we take the unit root test for the time series selected. The unit root test is the test sequence, the existence of a unit root, because of the presence of unit root is non-stationary time series, which will be easier to make the final regression spurious regression phenomenon.

Table 2 The Unit Root Test For X1

	T-Statistic	Prob
Augmented Dickey-Fuller Test Statistic	-1.672774	0.4069
1% Level	-4.582648	
5% Level	-3.320969	
10% Level	-2.801384	

Notes: Null Hypothesis: X1 has a unit root; Exogenous: constant; Lag Length: 1 (automatic based on SIC, MAXLAG=1)

Table 3 The Unit Root Test For X2

	T-Statistic	Prob
Augmented Dickey-Fuller Test Statistic	-3.178748	0.0604
1% Level	-4.582648	
5% Level	-3.320969	
10% Level	-2.801384	

Notes: Null Hypothesis: X2 has a unit root; Exogenous: constant; Lag Length: 1 (automatic based on SIC, MAXLAG=1)

Table 4 The Unit Root Test For X3

	T-Statistic	Prob
Augmented Dickey-Fuller Test Statistic	1.452396	0.9966
1% Level	-4.420595	
5% Level	-3.259808	
10% Level	-2.771129	

Notes: Null Hypothesis: X3 has a unit root; Exogenous: constant; Lag Length: 1 (automatic based on SIC, MAXLAG=1)

Table 5 The Unit Root Test For X4

	T-Statistic	Prob
Augmented Dickey-Fuller Test Statistic	-2.852821	0.0932
1% Level	-4.582648	
5% Level	-3.320969	
10% Level	-2.801384	

Notes: Null Hypothesis: X4 has a unit root; Exogenous: constant; Lag Length: 1 (automatic based on SIC, MAXLAG=1)

Table 6 The Unit Root Test For X5

	T-Statistic	Prob
Augmented Dickey-Fuller Test Statistic	-5.661017	0.0021
1% Level	-4.420595	
5% Level	-3.259808	
10% Level	-2.771129	

Notes: Null Hypothesis: X5 has a unit root; Exogenous: constant; Lag Length: 1 (automatic based on SIC, MAXLAG=1)

Table 7 The Unit Root Test For Y

	T-Statistic	Prob
Augmented Dickey-Fuller Test Statistic	-1.873127	0.3260
1% Level	-4.582648	
5% Level	-3.320069	
10% Level	-2.801384	

Notes: Null Hypothesis: Y has a unit root; Exogenous: constant; Lag Length: 1 (automatic based on SIC, MAXLAG=1)

From the above tables, we can see that each ADF values of X1, X2, X3, X4, X5, Y were -1.672774, -3.178748, 1.452396, -2.852821, -5.661017, and 1.873127. Their absolute value greater than the critical values, so we can not reject the null hypothesis which means they are not stationary time series. Then we conduct a difference to the original sequence. The results show that the differential sequences are stationary.

Then we establish the following model.

$$Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \mu \tag{1}$$

Where α_0 is a constant and μ is the random disturbance.

We enter the command in STATA software code to do the regression analysis. The results are as the following.

Table 8 The Results of the Regression

Number of obs =	10
F(5, 4)	58.8
Prob > F	0.0008
R-squared	0.9866
Adj R-squared	0.9698
Root MSE	0.00684

Table 9 The Results of the Regression

y	Coef.	Std. Err.	t	P>t	[95% Conf.Interval]
x1	-2.364457	6.29392	-0.38	0.726	(-19.83918,15.11027)
x2	-0.1852058	0.1779696	-1.04	0.357	(-0.6793286,0.308917)
x3	0.1330879	0.0656235	2.03	0.112	(-0.0491121,0.3152878)
x4	6.621642	1.697395	3.9	0.018	(1.908917,11.33437)
x5	-8.253739	3.03635	-2.72	0.053	(-16.684,0.1765186)
_cons	0.2673257	0.074274	3.6	0.023	(0.0611082,0.4735433)

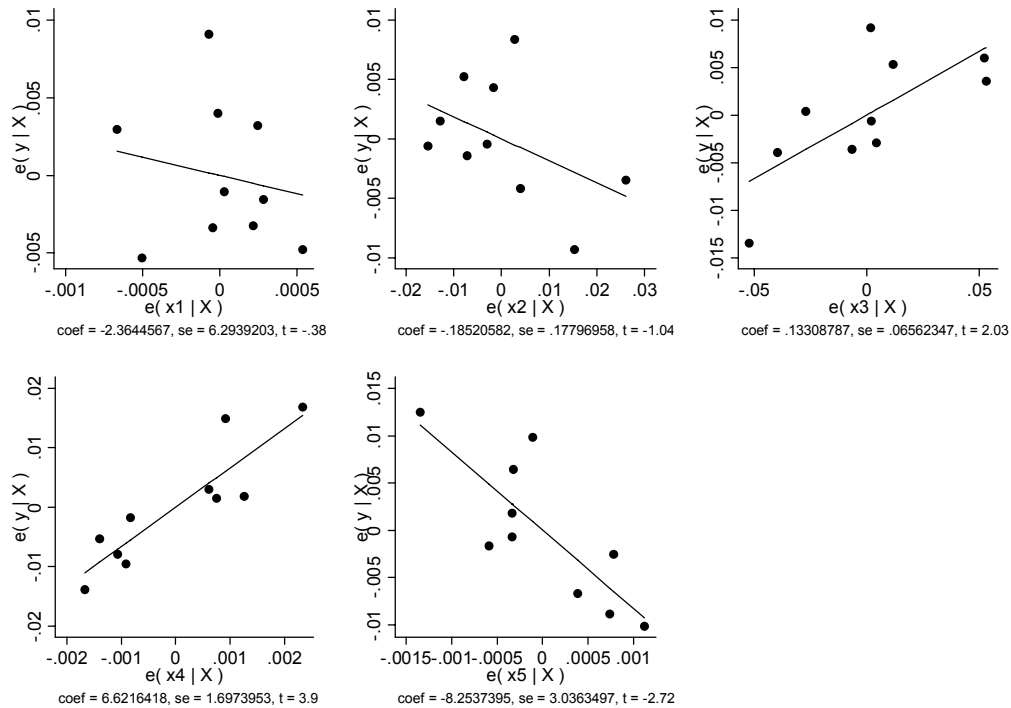


Figure 7 The Results of the Regression

Regression analysis results show that F-value of the model is greater than the critical value and the determine coefficient value is 0.9866 which is significant, indicating that the model fits well. On the other hand, all the variables coefficients passed the t-test, except X1 and X2. The results show that there has a relatively weak correlation between the labour remuneration reducing and the economic development.

5 Conclusions

Through the above empirical analysis, we can draw the following conclusions.

Although Harrison (2002) in the paper of "Has Globalization Eroded Labour's Share? Some Cross-Country Evidence" pointed out that the opening up means that economic liberalization of capital flows, capital replacement costs decline, the capital side more bargaining power, which would lead to labour share decreased. However, according to our empirical results show that degree of market competition and economic development level, these two indicators and China are not significantly related to labour remuneration, indicating that China's market has a certain degree of particularity. At the same time the rate of investment, education funding and other factors can significantly affect the share of labour compensation in China, able to interpret these results in large part to reduce the current status of the domestic labour remuneration.

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On Cultivation of Cross-Cultural Awareness in Interpretation Context*

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Abstract: Interpretation is not only the transfer between two languages, but also a kind of face to face cross-cultural communication. The cross-cultural awareness of the interpreter is of great importance, for cultural considerations determine the accuracy and quality of interpretation. This paper analyzes the need to overcome the barrier of cultural differences in interpretation and highlights strategies adopted in dealing with cultural phenomena so as to enhance the quality of interpretation and to achieve efficient communication. The paper also puts forward teaching methods in the course of interpretation.

Key words: Interpretation; Cross-cultural awareness; Context; Skill training

1 Introduction

Owing to the accelerated process of economic globalization, and in the turn of the century, China increasingly conducts more frequent exchanges and cooperation with other countries in the fields of economy, culture, education and other fields, which provides a broad space for development of translation and interpretation. As a result of the differences in geographic location, social environment, religious beliefs, ways of thinking and living habits, there exist a variety of different geographical and cultural features in different ethnic groups, which result in complicated cultural conflicts. Therefore, the interpreter inevitably faces cross-cultural communication in the presence of language barriers and cultural conflicts. As a communicative messenger, the interpreter, shuttling between two different languages and cultures, is supposed to have a solid basic language skills, be fluent in language, and be acquainted with the unique cultures and ways of thinking in two languages. The interpreter should be familiar with cultural differences in conversion between English and Chinese. Otherwise, he may be trapped in cultural difficulties, which hinders the process of interpretation.

2 The Features of Interpretation Context

2.1 Definition of Interpretation

Interpretation is a very complex dynamic process. Successful interpretation is closely related to bilingual knowledge, cross-cultural communication awareness, level of understanding of the target culture, cognition, reasoning ability, interpreting skills, adaptability and other relevant strategies. Interpretation is the tool to convey and express the thoughts and feelings of humans. Interpretation and translation are similar. But interpretation has its own characteristics, for the interpreter must promptly and independently conduct one mission, which means he or she has no enough time to reflect or scrutinize his or her interpretation, and is impossible to turn to others during interpretation, or refer to the dictionary. This requires that the interpreter should have a solid language skills both in Chinese and in English, according to the appropriate styles of the speech. He or she also should have a good grasp of knowledge and the ability to focus on taking notes. However, the biggest challenge for the interpreter is cultural difference. The same word in one culture may mean totally different things in another culture and cost more effort to be explained. The interpreter's cross-cultural awareness determines his or her ability to handle the interpretation free from the negative impact of cultural differences.

Interpretation is a special communicative process: to understand, to analyze and to convey the implied meaning. It is a positive, complex and creative activity. Through oral expression, interpretation converts the information perceived in one language into another in the form of cross-cultural communicative acts. The information is conveyed through the integrated forms such as the voice and tone, facial expressions and body language.

2.2 Difference between translation and interpretation

Compared with translation, interpretation is with high degree of flexibility. It is also characterized by speedy, on-site, and independent features. Confronted with the unforeseen topics and the unknown cultural background information, the interpreter has to have a higher degree of improvisation capacity,

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raise cross-cultural awareness, and grasp the cultural differences, so that the audience effectively understands the information from another culture. The topics of interpretation cover various fields and interpreters work for people from different social classes, different industries and different educational and cultural backgrounds. Some of the speakers articulate clearly and fluently, and think in a logical way, while others speak in a confusing way with great accent. People communicate with different purposes and motives. Some translation needs strong generalization, and some require detailed translation, with semantic translation as well as with a thorough connotation delivery. Occasions of interpretation are not the same: some are lighthearted, such as tourism, while others are tense, serious and formal, such as conferences. Interpretation is dynamic: the Chinese native speakers and native speakers of English communicate with the help of an interpreter. Interpreters are not communicative himself, but must be close to communication to maximize contextual assumptions in the entire translation process to establish a new context to make real inference of the implied meaning.

Interpreting is the reconstruction of the target language, in which the interpreter actively participate in coordination for the balance between the original language context and target language. The ability to grasp the implications of the source language is the key to successful interpretation. To better understand the original speech, the interpreter, based on the original specific context, must infer the original author's true intentions, and then, create a suitable context for the listener to be able to correctly grasp the speaker's intended meaning. Interpreting attaches importance not only to linguistic context, but also pays attention to situational context and cultural context for the dynamic adaptability. Interpretation is expressed through verbal means, which should be accurate, decent and fluent to reveal and explain the intended meaning of the speaker. The Interpreter, in the process of interpretation, has to overcome many obstacles, which is due to cultural differences and language barriers. In cross-language communication, cultural barriers bring communication difficulties to people of different cultural backgrounds for mutual understanding. The interpreter must take full consideration of the cultural individuality, pay special attention to cultural differences between Chinese and Western countries so as to achieve accurate, smooth and timely translation, in order to promote cross-cultural communication conversation between the two sides on the basis of mutual understanding.

To conclude, its features manifest themselves in the following aspects: a) it is a bilingual impromptu activity, which requires the interpreter to be equipped with a superb impromptu resilience and the ability to express fluently; b) it presents on-site serious atmosphere, which imposes greater psychological pressure on the interpreter, affecting his or her normal performance; c) it is conducted individually by the interpreter, which requires high skills of reading, speaking, listening, writing and translating of the interpreter; e) it embodies the wide breadth of information exchange. There are no boundaries of fields of interpreting, in other words, the range of interpretation encompasses all professional fields.

3 The Importance of Cross-Cultural Awareness in Interpretation

In fact, the success of interpretation is a dynamic interaction between the language knowledge systems and strategies, and any lack of knowledge on the one hand or ignorance of contextual information in communicative scene may affect the accurate understanding of the information, thus affecting the communicative effects. This means that a qualified interpreter must be equipped with rich knowledge of the language and non-language knowledge, and the ability to process nonverbal communicative information, to work independently, and the ability to cope with stress. In cross-cultural communication, people from different cultural and social backgrounds are not just involved in language exchange, but more in a cultural exchange. Different ethnic groups vary in terms of values, ways of thinking and body language. With cross-cultural awareness, the interpreter has the capacity of interpreting in terms of vocabulary, pragmatics, discourse, and texts to successfully complete the cross-cultural communication. Culture is diverse, and the language is varied. Due to cultural and linguistic differences, mutual understanding is not an easy task, as a result, the communication between different cultures often encounter difficulties. The difficulty lies in intercultural communication based on lack of awareness in different cultural values and beliefs. People tend to rely on native language rules, communication habits, and way of thinking to understand and express thought in another language, which lead to false expressions and interpretation.

Cross-cultural awareness is to recognize that translation is cross-cultural exchange of information across languages, and cultural differences, like language differences, are likely to become barriers to communication. During the conversion of the two languages, we must also pay attention to overcoming

obstacles caused by cultural differences, in order to ensure the smooth exchange of information. For interpreters, the cross-cultural awareness means in cross-cultural communication, interpreters consciously or unconsciously form a way of thinking or a cognitive standards and adjustment methods, and are sensitive to cultural elements. Presence of cross-cultural awareness and the level of ability are closely related and are crucial for interpreters. To this end, the interpreter must not only be proficient in source and target languages, but also understand the culture conveyed in the languages, and know how to deal with cultural differences and cultural barriers. Due to lack of cultural awareness, the interpreter may concentrate on the literal or superficial meaning of the speech and neglect cultures in the language, which distorts the intended meaning and leads to misinterpretation.

4 Ways to Enhance Cross-Cultural Awareness

4.1 Acceptance of cultural diversity

Cross-cultural awareness is not through natural acquisition, but through conscious learning of culture. The interpreter is supposed to use all their senses, and to be exposed to different cultures, so as to achieve the highest level of cultural awareness. Different cultures demonstrate themselves in customs, religious beliefs, ways of thinking, ethics, and values. A nation's cultural orientation would be strange, and unfamiliar to another nation. In the cross-cultural communication, if people only recognize their own cultural values and beliefs, and ignore other cultures, negative outcome will inevitably affect communication.

A competent interpreter should try every means to improve sensitivity to cultural differences, try to eliminate barriers in interpretation. By religion, geography and national temperament and other factors, each nation has its own language and culture, ways of thinking and aesthetic taste. If misunderstanding a culture, the interpreter will be trapped by Chinese way of thinking, which leads to negative transfer of language, especially in slangs, proverbs which are rich in cultural characteristics.

It is crucial for interpreters to find about the differences between different cultures and accept them, and are willing to adjust their behavior to suit different cultural patterns and styles while preserving their culture. The interpreter should be able to stand from the perspective of the target language audience and interpret cultural connotation of the source language into target language for the audience to understand the intended meaning. If there is no cross-cultural awareness, understanding is impossible and the interpretation will have no guidelines to follow. Therefore, to cultivate students' cross-cultural communicative activities is simply for the purpose of making students understand the cultural diversity, foster their tolerant attitude, and enhance their sensitivity in cultural differences.

4.2 Integration of cross-cultural awareness with skill training

The essence of interpretation course lies in skill training course, which involves listening skills, presentation skills, and memory skills. Training and practice can enable students to understand the characteristics of interpretation, skill requirements, and consciously and continuously improve these skills. Being aware of the cultural differences between source language and target language is the prerequisite and basis, and how to use appropriate methods to convey the intended meaning to the target language audience is the interpreter's challenge. Direct interpretation requires rapid response requirements and generally does not allow amendments. So in this case, the interpreter has not time to make the choice of translation strategies and has to rely on quick response from the summary of basic rules of daily training and experience.

4.2.1 Reform of classroom teaching method

Unlike traditional speaking and listening lesson, interpretation training focuses on pronunciation, intonation, rhythm, syntax, and techniques involved in public speaking. At the same time, the training material used must be true materials, including audio and video recordings. Students are supposed to be exposed to a lot of different English accents, rather than the standard pronunciation, so as to adapt to real difficulties in future interpretation tasks.

Most students lack subject knowledge and background information, and therefore interpretation teaching must be closely integrated with language as well as culture. Teachers should provide students with a large number of materials concerning economic trade, international relations, industry, agriculture, science, education, and tourism. Interpretation skills are to be adopted to guide students in the accumulation of a large number of related words and expressions, the language skills and in the awareness of cross-cultural communication, so as to blurt out authentic English expression. Interpreters commonly encounter various types of discourse, narrative speech, demonstration speech, introduction speech, etiquette speech, etc. Chinese and English languages have different linguistic features. Being

Familiar with the unique form of different types of speech can greatly improve the students' level of interpretation. The specific teaching method is: at the beginning of the training on etiquette, the teacher is to explain the characteristics and structure of such words and expressions, followed by students' impromptu speeches or scenario simulation.

4.2.2 Practical experience of interpretation

It is crucial to establish translation learning website and expand the scope of translation covering literary and non-literary stylistic materials, while providing foreign web site library, databases, practice library, famous translation, etc., and continue to provide a wide range of resources for the follow-up of new information, update teaching materials, so that translators and interpreters can follow the skill straining phase.

The prospective interpreters can simulate international conferences, business meetings, receptions and other effective ways to enhance their cross-cultural communication skills, including interpreting skills. This requires an appropriate learning environment for interpretation, where students improve knowledge skills and communicative competencies required.

The study is extended to extra-curricular classroom training, encouraging students to look for real opportunity to practice interpreting, or attend international conferences, actively and independently involved in solving a variety of problems and barriers concerning culture in interpretation, which offers learners a chance to understand their level of interpretation, and puts forward a clear direction for improvement. This will not only enrich students' interpretation experience, but also develop students' awareness of the market, and with enterprise's feedback, learners can be familiar with practical translation skills to address gaps and improve personnel training programs.

Teachers should connect with relevant institutions and enterprises to establish a practice base for students. Teachers' on-site guidance is to resolve students' problems encountered in practice. This phase mainly exercises students' ability to improve the quality of interpretation, helps accumulate practical experience, and to lay a solid foundation for future professional interpreters. The teaching content and methods of interpretation should be authentic and meet the needs of the society, make the classroom environment close to the requirements of true tasks, and improve the capacity to process information in complex communicative factors.

Cross-cultural awareness should be integrated with skill training in order to promote effective communication for people from different cultural backgrounds. Interpreters sometimes need some special treatment to cultural factors to fully achieve communicative purposes. Only in the practice can allow students to become more conscious to develop their cross-cultural awareness, so that they can make continuous progress, overcome cultural barriers and respond flexibly to difficulties in interpretation.

5 Conclusion

Owing to differences between Chinese and Western cultures, interpreters should develop cross-cultural awareness and help both the speaker and the audience overcome cultural differences. The interpreter is supposed to constantly improve their ability to master the language, and enrich their knowledge in cultural origins, history, tradition, religion, customs as well as a full range of political, economic and cultural knowledge, which is the fundamental guarantee for cross-cultural communication. Interpretation is a skill, and it is also an art, which requires an interpreter to have more sensitive cross-cultural awareness, to overcome language barriers. Through extensive reading and constant practice, the interpreter is supposed to actively expand their knowledge and accumulate their own cultural knowledge to avoid misinterpretation and ultimately, to achieve the purpose of communication.

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Philosophic Analysis on the Innovation Nature

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Abstract: Currently most innovation studies focus on methodological aspect. Through the study on innovation activities from philosophic angle, the innovation principle innovation nature and innovation principle are disclosed and innovation thinking is expanded. Cross-over study and exploratory study are used to study innovation origin, motive power, innovation nature, and innovation principle. Demand and market competition are regarded as the driving forces of innovation. The innovation is divided into two types: 1. The breakdown process of matter from old nature to new nature; 2. The process of finding the new expression form different from current expression form based on the same nature. The innovation principle is further stated. The disclosure of origin and innovation nature is innovative. The innovation direction is pointed out based on driving force of innovation, and the innovation thinking is pointed out based on the innovation nature.

Key words: Innovation; Philosophy; Principle; Method; Nature

In current world, the whole social economy is troubled by the surplus production capacity. And, the increasing demand of consumers cannot be satisfied. The solution to the conflict is product innovation and technology innovation. Innovation is the basic driving force of social progress and economic development. Innovation becomes the most important evaluation standard for the vitality and competitiveness of a country or an enterprise. Jiang Zemin once said, "Innovation is a soul of a national progress and the endless motive power of national development." Then, what is the innovation? What is the innovation nature? As a philosophic issue, the innovation can be analyzed from the following 4 aspects.

1 Innovation Origin and Motive Power

When people solve a problem, they should master the matter origin and look for the fundamental solution based on the problem origin. Innovation is a unique complex activity integrating with the knowledge and practice of human beings. People's strong desire to explore unknown matters is permanent motive power to promote the innovation. People explore the unknown matters by two ways. Firstly, people identify the objective matters and find new matters when identifying certain matter; and, people explore the causal relationship of objective matters. After explain certain matter, people may doubt or refuse the explanation to the other matter, so they explore and make the innovation with material objective.

Demand is the driving force of innovation. With increasing income, people have demand development far beyond products provided by the society. The permanent demand for material life and spiritual life is the motive power of innovation activities. Plato once said, "The real innovator is the demand." If people do not demand certain matter, they will not create the matter positively. When people realize certain demand, they will begin to think about it and realize it.

Human demand for material life is reflected in the market economic activities. Market is the motive power of innovation. In the market activities, people's pursuit for profits, results in the competition. Competition is the direct motive power of innovation. Driven by realistic market demand, innovations are made constantly. In the potential market, profits are obtained through innovation. Future market is won in advanced based on production innovation. Fundamentally, innovation is the requirement of social development and social competition. The highest competition is the competition with no opponents. The innovation desire and driving force is in fact the demand for material benefit that the enterprise obtains great profit with lowest input by avoiding the competitors and competition loss. The practice of market economic activities is the most important motive power of human innovation activities at present. People have endless pursuit for profits in the market activities.

Innovation is critical for sustainable growth of enterprises. Market competition is the motive power of enterprise innovation. Market demand drives the enterprises to make innovations on product, technology, and operation for survival and development, so innovations become necessary. Meanwhile, market competition promotes the enterprises to carry out better and faster effective innovation activities

than competitors. Under the market economy, social material demand is motivated and the effective supply is realized through price and profit mechanism. Market demand becomes the general guide of all vitality in the enterprise. Discovering and satisfying demand becomes the origin of all innovations.

2 Innovation Meaning and Innovation Nature

Then, what is the innovation? What is the innovation nature? The so-called innovation is the process of creating the new matter different from current matter. Namely, innovation is such a practice process and result that the subject fully displays the subjective initiative to positively transform object based on subject's demand in line with the objective rule of matter development. As a complex and exploratory creative activity, innovation is different from common simple labor, and is not the modification on original content. Instead, seem from its appearance form and nature requirement, innovation the breakthrough discovery, historical revolution, comprehensive innovation, and leap development. Joseph Alois Schumpeter suggested, "the innovation is the establishment of new production function. Namely, the entrepreneur makes new combination of production factors. That is to say, the brand-new combination of production factor and production condition is introduced in the production system."

Fundamentally, there are two kinds of innovations. The first is the breakdown process from old nature to new nature. The innovation nature is shown as follows;

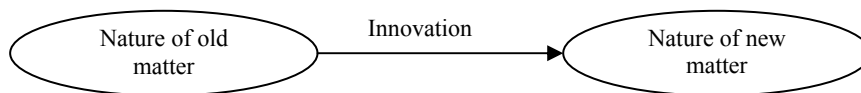


Figure 1 Innovation of the Nature

For example, in the innovation on shoe products, people firstly protect the feet and beatify the feet. Then, the develop shoes with antiskid tooth (snowfield antiskid shoes) and shoes with wheel (Heelys). The innovation on practical kangaroo shoe and jump shoe can be expected. The latter innovation will undoubtedly bring revolutionary reform on human life.

Another innovation refers the process of finding the new expression form different from current expression form based on the same nature. In daily life, most of innovations are the second kind.

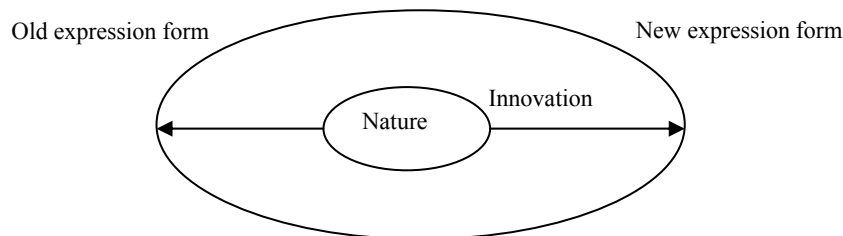


Figure 2 Innovation of Form

Every point in the external circle of Figure2 is the expression form of the same matter. The whole circle reflects that the matter of the same nature has various expression forms. For example, various beautiful styles of shoes are designed based on traditional form to realize the pursuit for beauty.

The sketch map for the innovation nature tells us:

- (1). Endless development of the matter results in endless development of the first innovation.
- (2). The same nature can be reflected in different expression forms, so the form innovation has endless developments.

3 Innovation Principle

The innovation becomes simple with clear understanding of nature. According to the above innovation nature, the following innovation principle is stated:

- (1). The development degree of the matter is judged based on development rule, so the old matter (old nature) is transferred into new matter (new nature). For example, in the reform of enterprise management system, private enterprises in Wenzhou are developed from manual workshop and family management. However, according to the rule, along with the development of enterprise productivity, the shortage of family management is gradually exposed, blocking the development of private enterprises in

Wenzhou. In the modern enterprise management, professional managers are the development direction. Therefore, many private enterprises abandon old modes and systems to look for a new system and adapt to the productivity level.

(2). It is a differentiation process to look for different expression forms in a matter of the same nature. For example, different realization modes are found based on the same objective. Or, different realization forms are found based on the same function. In urban traffic solution, when the busload cannot be expanded, many cities use motor-driven walking street and bike in central region to release the passenger flow.

As mentioned above, innovation has endless extensibility. Then, is the randomness of innovation can be added wantonly? Can the enterprise innovation be developed in all directions? The answer is no. Every matter has its development rule. The innovation in line with development rule can promote the matter to develop in line with ideal direction. Or else, the innovation may block the development and lead to great resource waste. Therefore, the following rules must be complied with in the innovation process.

(1) Specification of objective, determination of objective nature. During the innovation process, firstly, the clear innovation objective is needed. For example, the promotion channel is innovated to increase product sales. New products are developed to satisfy specific customer group for specific product positioning. Meanwhile, the innovation objective should not be vast and empty. Only specific and clear innovation objective can be achieved. Namely, organizers of the innovation must analyze the nature of the matter. In fact, when the objective is specific and clear, the matter can be solved simply.

(2) Among various expression forms of innovation, the expression forms in line with overall development direction are chosen as the innovation result. Besides certain rule of creative thinking, innovation activities also demand clear understanding of development rule of the matter. Innovation is not the objective, but the way to promote matter development. Therefore, the innovation activity should be thought based on development rule of the matter.

(3) Being the innovation result, the expression form should be subject to the objective condition. Innovation is easy, but whether the innovation can be successful depends on whether the innovation result meets the objective environment. Taking Wenzhou Shuoerbo Enterprise for example, when the enterprise carries out product innovation, it integrates the functions including manual motor, radio, lighting, and warning into a device necessary for emergency rescue. Thus, it becomes the device specified by the General Logistics Department and wins many orders for the enterprise. In addition, it plays a positive role in disaster and earthquake rescue. Therefore, the innovation result must satisfy the requirement of objective conditions to avoid the loss of blind innovation.

4 Innovation Capacity and Innovation Thinking

Innovation capacity, creativity for short, is the aggregation of intelligent factors including intelligence and skill as well as non-intelligent factors including motivation, will, and feeling. Its structure is consisted of 3 factors such as innovation consciousness, innovation thinking, and innovation skill.

As a non-intelligent factor, innovation consciousness is the internal motive power system of innovation activities. Many words are used to describe innovation consciousness such as innovation personality, innovation individuality, innovation consciousness, and innovation spirit. Innovation consciousness is critical for the success of innovation activities. Innovation consciousness means the opinion and consciousness of advocating innovation, pursuing innovation, and regarding innovation as honor, which is reflected in strong innovation motivation, firm innovation will, and healthy innovation feeling. Innovation consciousness shows good innovation initiative of innovation subject. Guided by strong innovation consciousness, people can have strong innovation motivation, establish innovation objective, fully express innovation potential, release innovation passion, and carry out innovation activities. Innovation is not only an intelligent characteristic, but also a personal characteristic.

Innovation personality is the internal power system of innovation activity and the key for the success of innovation activity. Innovation personality reflected in strong innovation motivation, firm innovation feeling, constant innovation will, permanent innovation power, and brave innovation behavior. Namely, innovation personality is the foundation for innovation production and implementation. The personal glamor of innovator is included in the whole process from the generation of innovation to the continue innovation process to the verification of innovation result.

The source of innovation consciousness is the thinking of looking for difference. Seen from the

superficial meaning of innovation, innovation includes the objection against the reality or the objection against the existence. All matters are the integrated body of community and personality. The community is connected and transferred with personality. The innovation nature is the search for difference. Namely, the conflict relationship between community and personality is grasped dynamically and the particularity is discovered and studied guided by community. The innovation is realized through personal development and change and opens a new way for matter development. The core of search of difference: sensitive to doubt, brave to doubt. In addition, new diversified thinking with development, creativity, and breakthrough comes out.

Innovation thinking has vast and broad meaning. Broad innovation thinking refers to thinking activities of all kinds in the innovation process, including new thinking or new solution, and thinking mode indirectly in innovation. Narrow innovation thinking refers to thinking form in innovation form, which is also known as innovation thinking mode.

Innovation thinking is the intelligent organ of innovation activity consisted of re-creative thinking and creative thinking. Re-creative thinking is based on current experience and knowledge. In the beginning of innovation activities, innovation thinking is reflected in that the innovation subject uses the common mode based on experience and knowledge directly. In the end of innovation, the innovation thinking of looking for unique mode for expression and verification of innovation process is also very important.

Innovation thinking is the key component of creativity with characteristics of irregularity and initiative. As a capacity, innovation thinking includes innovation imagination, instinct, insight capacity, forecast capacity, and capacity of grasping the opportunity. Instinct and imagination capacity is the most important.

In the innovation thinking, the innovation subject usually cannot realize the whole process of problem solving. Instead, during the most important process, namely, the basic stage of discovering new channel and finding critical component for problem solving, is realized through unconscious thinking activity. Therefore, innovation thinking is instinct and thinking. Thinking result comes out suddenly. Seen from the angle of innovation technology, innovation is a complex process including

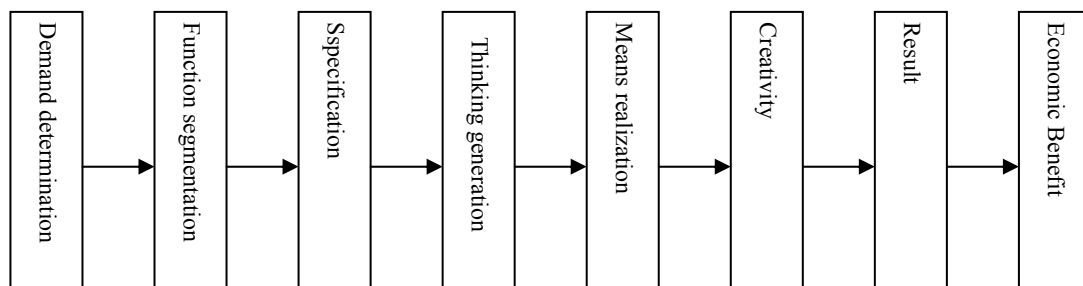


Figure 3 Innovation Process

In the whole innovation process, innovation is just a part. In order to better understand innovation, the innovation model can be determined as:

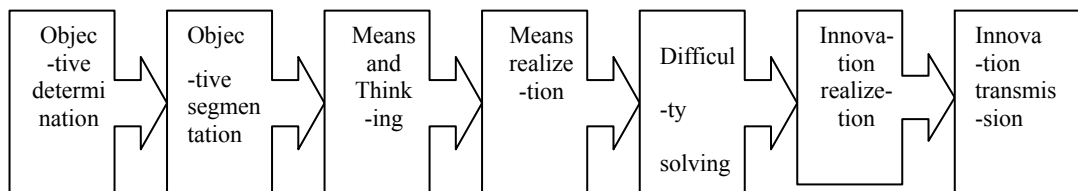


Figure 4 Innovation Thinking Mode

Innovation capacity refers to innovation thinking capacity and innovation practice capacity. Innovation thinking capacity includes 5 basic characteristics: positive search for difference, acute observation, creative imagination, unique knowledge structure, active inspiration and instinct. Innovation practice capacity includes practical operation capacity, organizational management capacity,

innovation development and transfer capacity, and information collection and processing capacity. Innovation skill is the capacity to reflect behavior and skill of innovation subject, and is the work mechanism of innovation activity controlled and limited by innovation intelligence. The innovation capacity is cultivated based on the knowledge of innovation theory and understanding of innovation field, as well as practice and enthusiasm of innovation field.

5 Conclusion

Innovation theory is a dynamic theory with constant development, and is a theory of a vast scope. It also has the basis characteristic of practical nature and vast nature. If we are brave to carry out systematic and long-term innovation theory exploration and practice and cultivate the innovation habit, we can yield twice the result with half the effort. As a result, we can have enthusiasm and power, and achieve the objective of challenging the limit constantly. During the process of going beyond ourselves, we can realize our value and social value and have free life in transformation.

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On the Function Upgrade and the Service Innovation of the University Library

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Abstract: With the development of modern information technology, the function of the university library under the backgrounds of network, digitization, globalization, technology service and expanding readers is updating. the changes are mainly as follows :from tangible paper books to intangible electronic ones, from the service free of charge to paid services, from single audience to the society reader, from the passive service to the active service, from the "mechanical" service to the comprehensive service, from the timer service to the flexible service. Accordingly, the university library service also needs to innovate to meet the needs of the readers, which mainly reflected in the innovations of management services, technology services and information services.

Key words: University library; Function upgrade; Service innovation

1 Introduction

In the age of modern digital information, the modern library is different from the traditional one with paper books, and its function has updated, hence, the modern library service need innovations to further develop its resources and release its potential abilities, which is convenient for scientific research for college teachers and students and the mass, in order to serve the promotion of economic and social development, the improvement of cultural quality and the construction of powerful cultural country.

2 The Background of the University Library Function Update

2.1 The background of the Internet

The university library is an important auxiliary institution of higher learning institutions, where books can be collected, borrowed and exchanged, it is in the service of college teaching, scientific research, personnel training and social services, acting as an information exchange center. Since the 1950 s, with the rapid development of computer science and information technology, the Internet has also rapidly developed and came into thousands of households, thus, human beings enter the information revolution era and the connective network age.

The university library as a traditional information center is faced with more and more severe challenges. Diversified and multi-channel accesses to information resources are gradually weakening the the importance of the library and changing the nature of the library as the only access to information resources. Some books that are only found in the library in the past can now be obtained from the Internet, even some information resources which can not be found in the library can also be found on the Internet. So, an open network environment makes the library's traditional service functions change deeply. And the library service function needs to be updated to meet the challenge.

2.2 The background of digitization

With information technology services expanding, electronic books and electronic information platform constructed, a lot of information is digitally stored and opened. Library information lies in the background of digitization. under this circumstance, the library's service objects are expanding to the public, so the library service function needs t updating.

2.3 The background of globalization

In modern times, capitalism expanded and colonized worldwide, the global economy has been involved in the world economy of capitalism. it is indescribable pain process for the backward Oriental world, it is capitalism's global expansion that promoted the cultural communication and integration in the world, forming a modern trend that backward countries pursued advanced countries wave after wave. Since the second half of the 20th century, due to the acceleration of world economic integration, the world increasingly becomes a global village. Remote geographic distance has disappeared, the information communication is no longer impossible, on the contrary, it can realize in a wink. The background of globalization also give new challenges to service function of the library..

2.4 The background of technical service

With the development of information technology, providing fast and convenient information inquiry, consultation for readers through information needs constantly refined information technology development in order to meet the needs of different readers, meanwhile, it is necessary to meet the requirements of classification and refinement of different readers necessary in the library service function updates. It is according to this requirement that modern information technology services develop.

2.5 The background of expanding readers

With the development of the university library's socialized service system, the readers expand from sole college students at this school to the college students in the same city, and even to college students in another cities and social readers through network technique. The requirements of different groups of readers are different, therefore, the university library services tend to be diversified.

3 The Function Update of the University Library

3.1 The function of the traditional library

Traditional library mainly functions as a tool of borrowing paper books and querying for data for readers. In general, paper books are more convenient for management by registering borrowing and lending books and standardizing the lending program, it generally can be perfect service. The traditional function can't meet the demand of people for information in modern society where science and technology and the network highly developed. Information needs timeliness and update, only timely and a lot of information can provide advanced information for scientific research and promote the further development of scientific research. The function defects of the traditional library require the modern university library to update the function.

3.2 The function update of the modern library

The function update of the modern library is as follows:

First, change from the tangible paper books to intangible electronic books. With booming information in modern society, the paper books can't meet the demands of readers. A large number of information has been transformed into electronic information under the support of the modern computer technology, and more readers choose to read electronic information. Therefore, the library must work hard at purchasing and producing electronic information. This function update puts forward new requirements for the library to survive and library services.

Second, change from the service free of charge to paid services. To get electronic information, the author need to be paid for his writing and production. Therefore, social readers will have to provide payment for reading e-books and electronic information from the university library, This service must be paid. It is this paid service that can more effectively stimulate the enthusiasm of the creators and make them provide more and better information for the society.

Third, change from a single audience to the social readers. With the development of the university library's socialized service system, the single college students and faculty have morphed into more complex social readers. Because of the diversification of public audience, their demands are also varied, this requires that the library must provide the public differentiated services, the homogeneous services are replaced by the diversified and differentiated services.

Fourth, change from passive service to active service. The service objects of the traditional college library are mainly students and the staff, the relatively fixed single reader groups are disadvantageous to the library construction and development, it is lack of initiative and innovation. The traditional library service is in a state of "waiting" for readers, with the development of modern information technology, the reader often actively goes to the library, in most situations, libraries tend to actively offer more information for the readers.

Fifth, change from "mechanical" service to comprehensive service. "Mechanical" service means that the service function of the library changes from providing books to providing more information for the reader, especially providing more information platforms and changes from actively searching information by the readers to actively providing more information search platform by the library.

Sixth, change from regular service to timing service. With life rhythm speeding up in modern society, the modern library must provide services without time limit and meet the demands of readers for information processing at different times, therefore, the modern library information, especially electronic information must meet the demands of readers for 24 hours.

Table 1 Comparison of the Function Between Traditional Library and Modern Library

Traditional library	Modern library
tangible paper books	intangible electronic books
free service	paid services
a single individual	social readers
passive service	active service
mechanical service	comprehensive service
regular service	timing service

4 The Service Innovation of the University Library

In order to meet the needs of function update, the university library should innovate service, give full play to the advantages of books and information resources to serve the readers better.

4.1 Management service innovation

Owing to the modern university library goes beyond the traditional library in service functions, therefore, the modern library needs innovation to improve the work efficiency in the management and service. Management service innovation mainly displays in:

First, librarians must be familiar with the entire work process of the library besides individual work process, sort out dynamic information of book resources, such as books on the shelves, loaned and returned.

Second, the chain of services, service quality, service attitude of librarians must be showed in public for better quality services.

Third, with the rapid development of Internet, relatively single service model of the library is impacted. For example, the application of network technology makes the library get rid of the traditional management mode of information resources, The literature information collection, processing, organization and services are greatly improved by new network technology, radiant developmental, comprehensive service system are also established. At the same time, the efficient service make it possible for colleges and universities to actively contact the public, the service objects also expand from the staff here to the public for literature information. The multi-level and broadening trend of service object must promote the development of university library construction. Therefore, differential service is an important characteristic of modern library development.

4.2 Technical service innovation

Printed literature borrowing and face-to-face service is the basic service mode of the traditional library, and some high-level services such as document information processing, SDI still need librarians. With the advent of the era of network, the application of digital technology provides modern technical service for the library, the library automation system is growing mature. These automation systems with multiple functions include the purchasing& cataloguing, circulation, and periodicals management, and the public information query system provides the library online retrieval and network consulting services, automated service is becoming the foundation of all library services. And, due to the information resources modernization in library management, the user can use search engines and information retrieval tools to inquire documents and information on the internet, timely understanding all kinds of dynamic information in the library. Digital information resources can be transmitted to other places quickly and conveniently through the network. Readers can not only search for booklists, but also search for documents, make an appointment, renew and make a recommendation on the internet, the library needs a technological innovation of service in order that readers can get the information wanted timely and efficiently. At present, the university libraries make a success of technological innovation generally. It mainly reflects in:

First, the information guidance service. The guidance system is plane layout diagram with explanatory note in the traditional university library. The modern guidance system under the network environment generally USES the touch or voice technology. It is intuitive, stereo, acting as interactive “man-machine dialogue”. As a important channels of information, it can not only reveal library service tenet, service content and layout to the readers and users. but also enable the reader to find information and service they want quickly and conveniently, which save a lot of time for the readers.

Second, the public query service. Lending services, circulating services and document retrieval of the traditional library mainly rely on the manual operation, readers usually need three steps including

“getting into the library–inquiring–asking for books”, which is inefficient. Modern computer technology has a strong capacity of sorting index and high-speed processing, providing a convenient technology for the library for multifarious bibliography indexing and directory management, at the same time, with the aid of unified cataloging of bibliographic data, retrieval system network extends unlimitedly, after three steps like “inquiring–getting into the library–asking for books”, readers can retrieve related literature. Many previous manual operations such as library information inquiry and reader information inquiry are replaced by the efficient automation system.

Third, the literature review technology. to find the appropriate literature as requested by readers is basic service work for the university library. Traditionally, the librarians mainly rely on their experience, professional knowledge and abilities, It is difficult to meet the needs of the readers who require “accurate, comprehensive and fast” service. Because of the widespread application of information resources retrieval technology, information inquiry like SDI is getting easier, some service system of full-text retrievals, the readers can search and read simultaneously without getting into “the library”, Fourth, the technical services of electronic documents. The electronic document is an emerging carrier of modern information communication, which develops into current audio-visual one from previous printed document and greatly enrich document resources. It consists of electronic publications, multimedia documents and so one, it is informative, easy to save and carry, it also can review anytime and anywhere. Under the modern network environment, electronic documents double every year, electronic documents has become an important form of document resources in the library today. In order to play the role of the electronic documents better, many libraries have opened the multimedia electronic reading room and the local area network (LAN) CD-ROM database query service, in some library the multimedia CDs play automatically under the network environment. the technical services of electronic documents become an important feature of service innovation in the university library.

4.3 The information service innovation

Under the modern network environment, readers demand more and more kinds of documents. On the one hand, they need a variety of multimedia documents, including audio-visual materials and various kinds of electronic publications, on the other hand, they need the documents for retrieval, especially the digital document resources. To this end, the types of information services provided by the university library also increase accordingly, such as multimedia electronic reading services, CD-ROM database services, and online retrieval services, document copy and editing and so on. The information services broaden the service field and content of the traditional library. Today, under the network environment, these are very important and are an essential part of the library service.

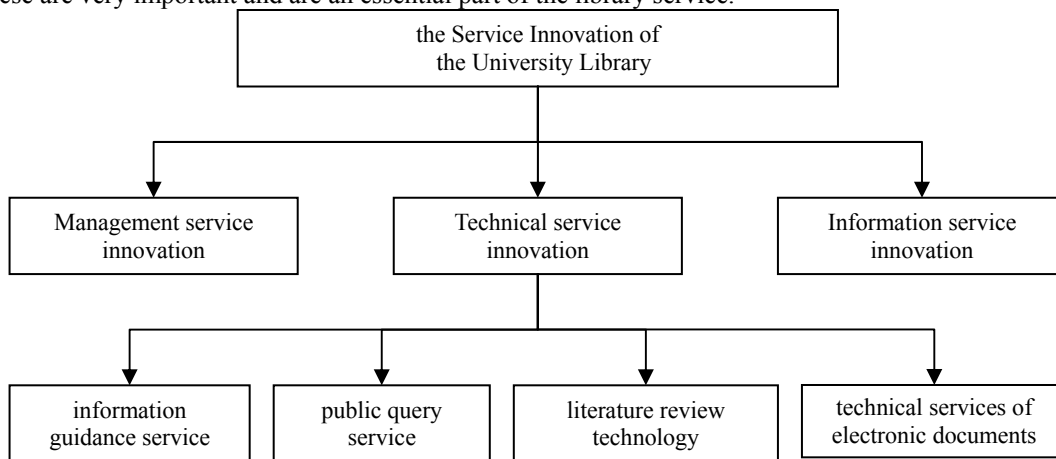


Figure 1 The Service Innovation of the University Library

5 Conclusion

In short, a highly networked modern library doesn't only provide a traditional document service, but provides the service of information resources for users. By tidying up and sorting out a large number of network resources, they can be effectively used by users. All of the information processing and development is part of the new library work under the network environment. Therefore, the university library must make efforts on information service innovation, providing readers convenient. The good

sort of information and smooth guidance services are the important assessment criteria for modern library.

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Study on the Strategy of Ability Promotion Oriented to Chinese Science Popularization Work at the Grass Root Level

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Abstract: Science popularization capability is a comprehensive strength that the scientific wealth such as scientific knowledge, scientific thinking, scientific method and scientific spirit a country or area have had for a long time, is passed to the audience in a certain form and method in order to enhance their scientific literacy. As a wide coverage and influential science popularization work, science popularization at the grass-roots level should be paid more attention to its work capability. This article searches the building model and promoting countermeasures of science popularization at the grass-roots level and establishes the key impact indexes of science popularization capability at the grass- roots level. A new science popularization capability model at the grass-roots level is constructed by the optimization and recombination of the key factors. Practical and concrete countermeasures are put forward according to the new model designed.

Key words: Science popularization at the grass-roots level; Capability building of science popularization; Capability improving model; Capability improving countermeasures

1 Introduction

Based on the deep thinking of the connotation of science popularization activities, the concept of capability building of science popularization is put forward. Science popularization capability is a comprehensive strength that the scientific wealth such as scientific knowledge, scientific thinking, scientific method and scientific spirit human society has possessed for a long time, is passed to the audience through a certain form and method so as to enhance their scientific literacy. The capacity of science popularization work is the embodiment of science popularization capability. It refers to the work capacity shown by the participators including the government, enterprises, schools, mass media, social organizations or individual who is engaged in the science popularization career.

On the basis of above discussion, the capability building of science popularization is defined as a process that science popularization subjects including government, schools, enterprises, mass media, other organizations and individuals, find and identify various factors which will obstacle the progress of science popularization work and solve them so that capability of science popularization can achieve a comprehensive and sustainable development.

Based on the research of building model and promotion countermeasures of science popularization at the grass-root level, a new capability building model is constructed by the optimization of the key factors that influence science popularization capability at the grass-root level. Practical and concrete countermeasures are put forward according to this new model designed.

2 Key Impact Indexes of Science Popularization Capability at the Grass-roots Level

This article is in reference to the paper of Construction of the Indicator System of Regional Science Popularization Capacity written in 2011 by Li Ting, a scholar of Beijing Institute of Technology. The key index system of measuring the capability of science popularization is established based on the actual situation of investigation and interview of Hubei Association for science and technology projects, the characteristics of subjects and objects, the main content and the actual features of science popularization work at the grass- roots level.

Different components of science popularization capability at the grass-roots level play a different role in the building of science popularization at the grass- roots level. The understanding of objects of science popularization at the grass-roots level and the culture of the building of science popularization at the grass-roots level constitute the leading force of science popularization capability at the grass-roots level, deciding the patterns, types and methods of the building of science popularization at the grass-roots level. The penetration of science popularization network at the grass-roots level, the integration of social resources and the synergy of science popularization platform are the core force of

science popularization capability at the grass-roots level and the measures of subjects' science popularization capability. The influence of propaganda channels of science popularization knowledge and the originality of science popularization works become support of science popularization capability at the grass-roots level and determine the breadth and depth of science popularization knowledge spreading. In a word, science popularization capability at the grass-root level means transfer input to output in the support of science popularization support system at the grass-root level.

Therefore, the key index system of science popularization capability at the grass-roots level can be divided into input, output and supporting condition of science popularization at the grass-roots level. The three key indexes can be also divided into science popularization organization and management system at the grass- roots level, the building of science popularization talent team at the grass-roots level, science popularization communication activities at the grass-roots level, science popularization funds at the grass-roots level, science popularization facilities at the grass-roots level and quality and conversion rate of science popularization works at the grass-roots level. Each of the indexes can be further divided. The hierarchical structure is shown in Table 1.

Table 1 Three Hierarchies Index System of Science Popularization Capability at the Grass-Roots Level

The first level index	The second level index	The third level index
input of science popularization at the grass-roots level	science popularization venue facilities at the grass-roots level	comprehensive science and technology activity places
		feature and professional science popularization places
	team building of science popularization at the grass-roots level	science popularization talent team at the grass-roots level
		expert team engaged in science and technology service
		science popularization volunteer team at the grass-roots level
	science popularization funds at the grass-roots level	science popularization special funds at the grass-roots level
diversified social science popularization funds		
output of science popularization at the grass- roots level	science popularization creation at the grass- roots level	laboratory science popularization works at the grass-roots level
		original science popularization works at the grass-roots level
		science popularization products transformation ability at the grass-roots level
	science popularization propaganda activities at the grass-roots level	science popularization propaganda media and channels at the grass-roots level
		science popularization propaganda mode at the grass-roots level
		science popularization organizational structure at the grass- roots level
science popularization propaganda frequency at the grass- roots level	science popularization propaganda frequency at the grass- roots level	
supporting condition of science popularization at the grass-roots level	science popularization organization and management system at the grass- roots level	science popularization work regulation and procedure at the grass- roots level
		supervision mechanism of the building of science popularization at the grass- roots level

3 The Building Model of Science Popularization Capability at the Grass-roots Level

Based on above indexes, a new building model of science popularization capability at the grass-roots level is put forward. This model is on the foundation of science popularization support system at the grass-roots level. Through the building of input and output system of science popularization at the grass-roots level, a benign circle of input to output is achieved which provide a solid foundation for the support system's normal operation. It is shown in detail in Figure 1.

3.1 The Building of science popularization support system at the grass-roots level

As the basis of science popularization capability building model at the grass-roots level, the support

system played an important role in supporting the capability building of science popularization. The building of science popularization organization and management system at the grass-roots level is a prerequisite for the launching of science popularization at the grass-roots level. And the government's macro management provides guidance and support for the launching of science popularization at the grass-roots level. By the integration and optimization of science popularization business and industry at the grass-roots level, science popularization resources integration and optimization work at the grass-roots level encourage the complement and development of them.

The government's macro management to science popularization at the grass roots level embodies in three aspects, including the government's encouragement and guidance, communication and coordination, evaluation and supervision. Encouragement and guidance refers to all kinds of policies and regulations and the corresponding incentive measures made by the government for promoting science popularization work at the grass-roots level to carry out orderly and healthily. Communication and coordination is to coordinate all kinds of works among the subjects of science popularization work at the grass-roots level, promote the exchanges and cooperation, form a joint force, and optimize the effect of science popularization at the grass-roots level. Evaluation and supervision is about to evaluate and supervise science popularization activities at the grass-roots level in order to ensure the effectiveness and scientific-ness of the activities.

3.2 The building of science popularization input system at the grass-roots level

This system includes three subsystems-the building of science popularization facilities at the grass-roots level, the building of science popularization talent team at the grass-roots level, the building of science popularization funds at the grass-roots level. Among them, the building of science popularization funds at the grass-roots level directly decide and affect the strength and effect of the building of the first two systems. The construction funds will be raised through various channels such as special funds and social funds. To optimize the use of science popularization funds, these funds should be managed scientifically.

The building of science popularization team at grass-roots level includes the building of science popularization talent at the grass-roots level, expert team and science popularization volunteer at the grass-roots level. Talent and expert team comprises science and technology workers, science teachers, science popularization creation staff at the grass-roots level, mass media reporters and editors of science and technology, exhibition design and production staff of science popularization venue, management personnel of science popularization activity, scientific theoretical research workers and so on. The facilities include science popularization venues, science popularization bases, urban and rural activity places, science and technology exhibition hall and so on.

3.3 The building of science popularization output system at the grass-roots level

Science popularization output system at the grass-roots level is achieved by the building of science popularization creation and propaganda activity at the grass-roots level. The building of science popularization creation at the grass-roots level is the foundation and support of science popularization propaganda. The building of science popularization propaganda activity at the grass-roots level will directly influence and restrict the propaganda quality and effect of science popularization at the grass-roots level, is the result of science popularization works propaganda at the grass-roots level.

Science popularization works mainly includes the original works and laboratory works. To create works by the core force of science popularization creation at the grass-roots level such as professional science and technology personnel, literary and artistic creator and media creative personnel. The creation works mainly includes teaching products of science popularization works at the grass-roots levels, publications of science popularization works at the grass-roots level, science classes of science popularization at the grass-roots level, science popularization toys at the grass-roots level, science popularization tourist souvenir at the grass-roots level, science popularization network information products at the grass-roots level.

The main part of science popularization propaganda activity construction at the grass-roots level is the building of science popularization propaganda channels. The propaganda channels include mass media, popular science venues, school science classroom, science popularization product sales channels, science popularization organizations and facilities at the grass-roots level and so on. And by the scientific combination of propaganda frequency and mode, the desired communication effect is achieved.

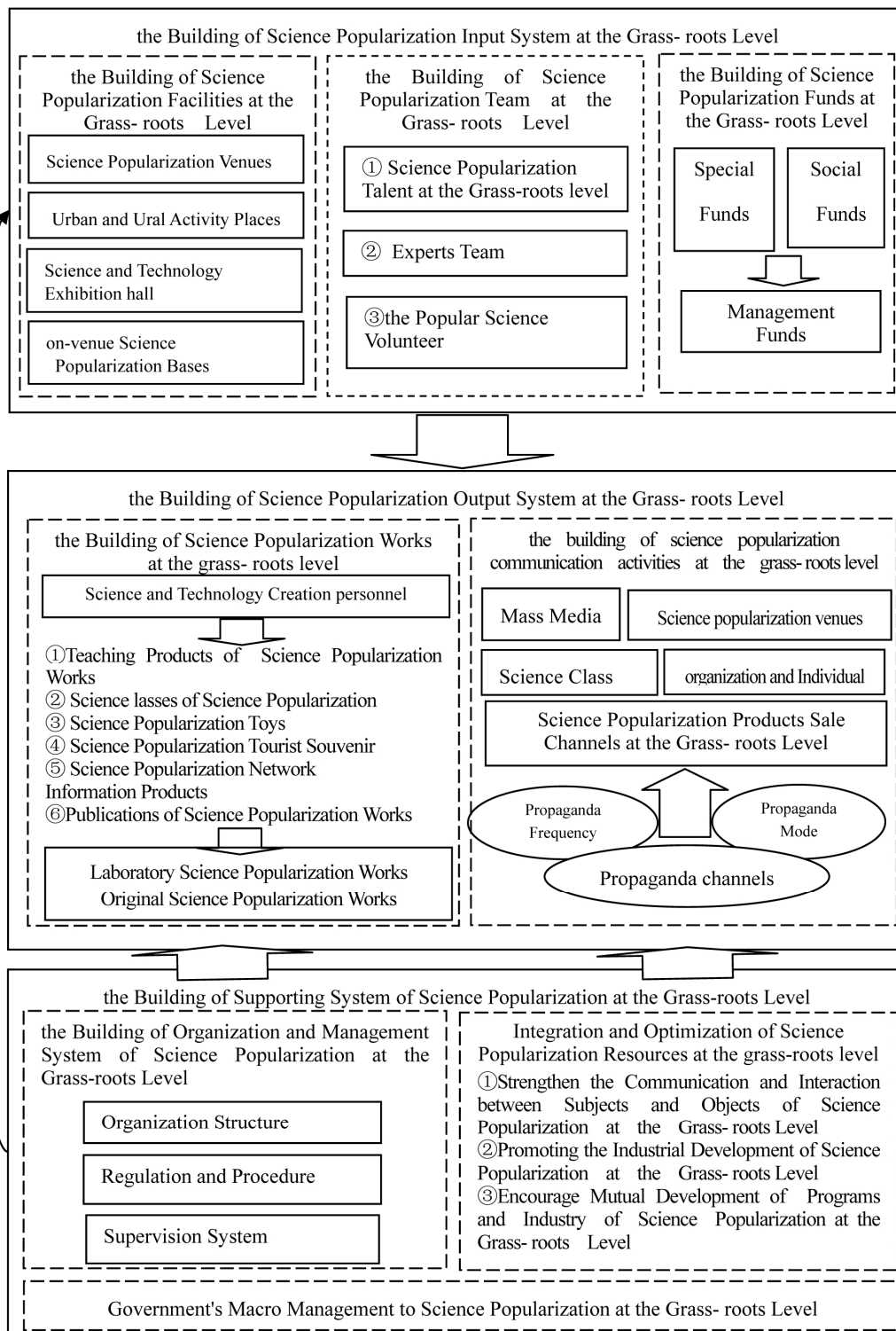


Figure 1 The Building Model of China's Science Popularization Capability at the Grass-Roots Level Based on the Key Effect Factor

4 The Countermeasures Study of Science Popularization Capability Promotion at the Grass-Roots Level in China

4.1 To construct the systematic science popularization organization at the grass-roots level

From transverse view, due to the science popularization at the grass-roots level emerges in all aspects of the society, any organizations and individuals should take an active participate in it. So, transverse functional departments can be divided into government, education institutions, science and technology organization, mass media, businesses, private foundation and other department. Then, according to different science popularization objects, science popularization organization can be divided into juveniles, the rural, urban workers, cadres and civil servants, and special science projects popularization of five key crowds in communities. That is to say, each transverse functional department must give supervision and support to each special science popularization at the grass-roots level. Then every longitudinal science popularization special project should be supervised and supported by each transverse functional part. So systematization between subjects of science popularization and projects is formed. The mutual support of transverse and longitudinal interaction matrix of science popularization organization coordination mechanism have shaped, which is shown in figure2.

Specifically, science popularization actions or plans at the grass-roots level often relate to many departments, need multi-dimensional and multi-level cooperation and coordination among various related departments. Establish the relevant government departments such as science, teaching, culture, hygiene, radio and television, agriculture and so on. Also, Establish the science popularization work reported regular exchange mechanism at the grass-roots level, science popularization major planning activities negotiation cooperation mechanism at the grass-roots level, etc among departments at different levels such as the ministry, the department bureau class, the place class. That is, we should not only emphasize the two-way communications between science popularization subjects in the vertical direction from top to bottom and from bottom to top, but also pay attention to the horizontal communication and contact between science popularization subjects at the grass-roots level.

Organization and coordination mechanism is a process of science popularization systematization including the government, education institutions, science and technology organizations, mass media, and private foundations and other organizations. In recent years, many governments encourage cooperation between science popularization subjects, especially in science institutions and the formal science education institutions. For example, the national science foundation (NSF) encourages science popularization project organizations to employ the primary and secondary school teachers to involve in project work in order to make the relevant science program’s design schemes which are supported by them can be used by primary and middle school students. Besides the enhancement in domestic cooperation between science and technology communication subjects, international exchanges and cooperation between the subjects of science and technology population are also strengthened. With the increasing systematization of science popularization subjects and continuously strengthened cooperation, science communication transforms from the “little science popularization” to “big science popularization”. The so-called “big science popularization” includes traditional science popularization, science education, science and technology news, technology training, technology policy, and scientific communication integration in the sense of science communication.

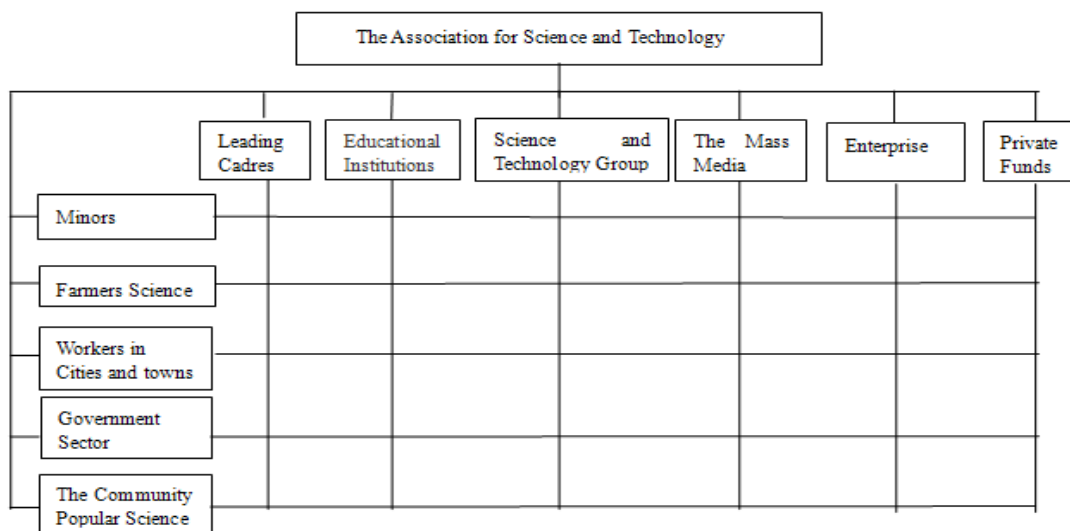


Figure 2 The Matrix Organization Management System of Science Popularization Work at the Grass-Roots Level

4.2 Establish the girding science popularization talent team at the grass-roots level

Due to the wide range of the science popularization objects at the grass-roots level, at present our country has expanded scientific objects to the ascension of civic scientific literacy. As a result, the requirements to science popularization team are also higher. Different objects and regions have different features. And the support and organization assurance team they need is different. If only to generalize, it will be hard to achieve the desired effect. Introduction of grid management thought will be more convenient to provide service for science popularization objects at the grass-roots level, break the isolated situation between functional departments, realize dynamic control and coordination of resources, improve the efficiency of management, and achieve fine management.

Speaking from the content, the building of science popularization team at the grass-roots level mainly includes three aspects which are educational background structure, experience, age structure of science popularization team, the quantity, type, and personnel quality of experts science and technology service team, the stable volunteers and staff number, type, and quality of science popularization at the grass-roots level.

Using the grid theory to analyze and build science popularization team at the grass-roots level, the key premise is to have a clear standard. And the specific points in the process of the implementation of science popularization work at the grass-roots level are the characteristics of area and population. That is to say, "civic scientific literacy action" should be carried out in various regions for different people across the country. To make the team more implemented and effective the objects should be divided by region and science popularization subjects.

Specifically, a grid construction of science popularization team at the grass-roots level is based on the objects of the science popularization at the grass-roots level and geography in our country administrative areas (according to the situation of dividing administrative regions considering the actual needs). Under the guidance of the fine management and the efficiency of science popularization improving, the whole scientific regions will be divided into a small region or a type of science popularization object. The division number of the grid cell is equal to the number of area multiply by the number of science popularization object type. Then, in each grid cell, a specified science team is responsible for it. Divide all of the scientific objects into the various girding cell to realize the precise localization of management object.

Science popularization activities at the grass-roots level often need to spread the different science and technology information in different regions, among different groups, through different ways, using various means which determines the different division of science popularization team including knowledge producers and disseminator. Then, the pattern of the government guide and the whole society participate in is formed by the establishing of a multi-level, wide distribution, complete function, reasonable division organization network.

To ensure good implementation of the girding construction of science popularization team at the grass-roots level must have a strong guarantee system. That is to say, the talent training mechanism must be carried out. For example emphasize diversified input mechanism of the building of science popularization at the grass-roots level, innovate talents training and assessment mechanism of science popularization at the grass-roots level, improve the personnel training mechanism of science popularization at the grass-roots level, establish the supervision and evaluation mechanism of science popularization talent team construction at the grass-roots level.

4.3 Strengthen the building of science popularization places at the grass-roots level

We should increase and improve the function of science popularization in the process of public facilities building of science popularization at a grass-roots level. We should promote science popularization facilities building, and strengthen regulation and guidance to various types of building of science popularization infrastructure. Under the premise of raising money in multiple channels and sufficient research, we should build a batch of science popularization venues which are rational layout, scientific management, operational norms, and meet the requirements. It can form a coordinated development pattern between comprehensive venues and professional venues through integrating science venues and facilities, optimizing usage rate of infrastructure and conversion rate of project research and development, establishing science venues open, flow, collaborative operation mechanism, constructing science popularization resource innovative and sharing platform.

4.4 Encourage diversity science popularization creation

More and more original excellent science popularization works appear constantly because of the encouragement of science popularization creation. To promote the whole society to participate in science popularization creation, we should not only guide all aspects of the social power such as the

literature, art, education, media to devote to science popularization creation, but also encourage scientific researchers to transform their achievements into works, and vigorously develop new types of science popularization exhibition and teaching products. At the same time, the quality of science popularization works should be guaranteed. Encourage and guide the various labs and centers at the provincial level such as scientific research institutions, universities, science and technology enterprises and other social forces to take an active part in science popularization creation. Launch design and development activities of the science popularization exhibits and teaching products. Encourage scientific researchers to transform their achievement into works. Establish an effective incentive mechanism to provide support and reward for good science popularization works.

4.5 Widen the input channel of science popularization funds at the grass-roots level

Widen the input channel of science popularization funds at the grass-roots level. Regard the government funding as leverage. Encourage and attract societies and enterprises to invest and donate in science popularization work, gradually form a marketed pattern of science popularization investment. Increase public investment of infrastructure construction and operation funds for public welfare science popularization, and drive private organizations and companies to make donation to science popularization activities and science popularization organizations. A diversified fund raising mechanism is formed which gives priority to private organizations and corporate donations and regards market-oriented operation mechanism as complementary by combining with market-oriented operation mechanism. Encourage social forces to participate in science popularization infrastructure construction and operation service. Finally, the three source structure financing mechanism-government funding, private institutions and enterprises donation, market-oriented operation is formed.

4.6 Innovate science popularization propagation path

According to the practice of science popularization construction at home and abroad at the grass-roots level, there are two main types of propagation path-the government-oriented top-down science promotion mode and the citizen-oriented bottom-up promotion mode. In the two paths, the status and requirement of government and audience in the building of science popularization at the grass-roots level is different. Although the core role of the government and audience in the two paths is respectively emphasized, the utility of science popularization is inefficient as a result of the one-way propagation of science popularization knowledge. So we should establish a triangle of government - society - audience in science popularization propagation at the grass-roots level to change the audience's participation mode from passive to active, make public science literacy from known science popularization to acquire science popularization, finally to use science. Emphasize the interaction feedback two-way propaganda, pay attention to interact with the public, enable the public to understand the scientific process and the nature of science.

At the same time, improve the mass media's propagation strength by strengthening the building of science popularization propagation system. Make full use of the three nets fusion new situation, comprehensive newspapers, journals, multi-media, and the mass media such as television, radio, internet, to set up a science popularization project, column, page, or channels for science popularization propaganda at the grass-roots level, and improve the quality and level by increase its air time and layout. On the basis of theoretical support, continuously broaden dissemination channels, optimize transmission carrier, perfect science popularization propaganda system at the grass-roots level, form a Interactive and circular propaganda system between the subject and audience, the audience and the audience.

5 Conclusions

Science popularization in grass-roots level aims to comprehensively promote the individual's scientific and cultural quality, to overcome the tendency of emphasizing natural science and belittling social science, to popularize scientific and cultural knowledge in order to make people to understand science knowledge, enrich their social science knowledge, pay attention to human dignity and value, make people focus on their own survival and development requirements and the pursuit of happiness. Guide people to respect nature, respect the objective law, and realize the harmonious development of man and nature. Science popularization work at the grass-roots level is a far-reaching social engineering and significant strategic task for our country. However, science popularization capability at the grass-roots level is a broad and abstract concept containing in the practice of science popularization work at the grass-roots level. This article is to explore the epistemology of the capability building of science popularization at the grass-roots level. In the course of science popularization capability promotion work, it must be supported by the science popularization

organization system, through the building of input of science popularization, to get the effective output and achieve the building and promotion of science popularization capability at the grass-roots level. Science and technology group, the mass media, universities, research institutes, enterprises and private foundations should play a positive role in science popularization with the integration of various social resources and the guidance of the government. Break through the traditional, rigid and old form and content of science popularization works at the grass-roots level to make them lively and interesting. Improve the influence and sociality of science popularization works at the grass-roots level by exploring new propagation path.

Looking forward to the future, science popularization work should be carried out from point to plane gradually, especially need to highlight the interaction of individual and society and to gradually form professional science popularization power and science popularization professional activities at the grass-roots level. Let science popularization career at the grass-roots level socialize. Let science popularization career at the grass-roots level of the people, for the people and by the people. Finally, the sustainable development of science popularization career can be ensured.

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Construction of a Clean and Honest Administration Culture from the Perspective of Socialist Cultural Development

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Abstract: This article aims at the influence from the cultural development of human's spiritual beliefs, values and so its development as a breakthrough point. On the basis of the status and importance of the honest government culture of University, puts forward personnel training positions, shoulders the advocating and promoting the construction of honest government culture historical responsibility. The development of university culture is an important part of the harmonious and healthy development of the country. University teachers are the main force in the construction of clean and honest, and they are the examples of strengthening their own moral self-cultivation, the theory research with the ideological reality of the students and the psychological demand combined; becoming model and example of their students to promote clean government culture by "to be a model for others and make oneself an example" morality, to cultivate the students to be honest and clean government culture advocates.

Key words: Clean and honest culture; Innovation; campus culture; Anti-corrupt quality

1 Introduction

From the scope of the whole globe, in some countries the situation is good, except for the influence of system, legal system, system. One of the important reasons is they form an honest government culture that the whole community recognized and the people accepted and followed. The successful cultural construction of Singapore is because of advocating the idea "integrity—the foundation of a country "as a very important aspect.

The word "Cultural management", first appeared in the book "enterprise culture—the company life rituals and ceremonies" which wrote by American management scientist Terence Deal and Alan Kennedy in 1982. It pointed out "we want to instill a new corporate life rules to our readers in this way: culture is power."^[1] Effect of culture refers to a nation's spiritual beliefs, values, social systems and its development potential and the appeal of the summary. The eighteenth National Congress of the CPC stressed, "culture is the lifeblood of a nation, is the spiritual home of the people", which "plays the leading role of cultivating people, servicing the society and promoting the development of culture". Culture is the necessary way to revive the national prosperity and keep national sustainable development. History and reality have proved that any developing countries will lose its spiritual force if it has no the leading scientific culture system. The famous philosopher and anthropologist Randman pointed out: the cultural creation has broader and more profound connotation than we ever believed^[2]. The culture is a nation's blood, is the spiritual home of the people. Although invisible, it has a profound impact on everyone all the time, just like air. It is a kind of spiritual power, is the symbol of social civilization and progress of science and technology, is the vitality of the harmonious development of the country. It is and will liberating and developing people's spiritual world, stimulating people's creative ability. The formation and development of the cultural can affect a nation's character and promote a national spirit connotation, develop the potential and innovation of a nation. Throughout the world the strength of competition, in addition to the scientific spirit and economic strength, is the culture and national spirit national contest. The development of culture is the main factor to promote the development of the society, the culture of the Chinese nation and the era program of Chinese socialist modernization.

2 The Status and Role of the Clean and Honest Culture

For in-depth understanding of the current situation of the honesty education of the university students, University Students' Honesty Education issued "investigation questionnaire", a total of 160 questionnaires were issued, and ultimately recovered 159 valid questionnaires, the recovery rate was 99.4%, by analyzing the questionnaires, the survey results with high reliability. In the respondents, 61% undergraduates, postgraduates accounted for 39%; the Communist Party activists accounted for 27.7%, accounted for 18.2%, the Communist Youth League member 48.4% people, accounted for 4.4%; the questionnaire adopts radio and multi form of combination, including college students' honesty education

on knowledge and attitude etc.

Table 1 The Correct Understanding of Honesty Education.

know;	degree of satisfaction	The act of contempt	Not in
91.7%	73.7%	50.4%	94.1%

Table 2 The Degree of Understanding of the Phenomenon of Current College Students Honesty.

Dishonesty	The phenomenon of students cadres canvassing	No attention	Pretending not to see
33.9%	51.1%	58.7%	3.8%

Table 3 Understanding of Developing the Honesty Education of the University

Very necessary	cannot be designated as; not deserve the name of ;	no need for	No effect
86.9%	7.9%	9%	2.2%

Table 4 Publicity and Education Form.

The ideological and Political Course	Debate competition;	speech contest;	The works of painting and calligraphy
26.5%	21.87%	15.7%	16.7%

2.1 Honest culture is the advanced culture of the times

The Chinese nation has abundant culture resources. Clean and honest spirit is the baseline of the country and the officials with the people should discipline themselves. All these concepts constitute the basic connotation of Chinese traditional thought of clean government culture. As early as the Western Zhou Dynasty, “Clean and honest spirit” has become a kind of moral and thinking to govern the nation. The Western Zhou Dynasty evaluated the officials’ superiority or inferiority on the investigation of clean and honest spirit. Since then, the political thought of the dynasties followed was “morality is the first while clean is most important”, as an important measurement of governing the country. This thought in Chinese traditional culture, has the positive significance to the construction of clean government culture today. Adhering to the honest government culture contains philosophy of life to guide people to develop good quality and admire the clean and honest morality, which is a kind of social influence, anti-corruption education playing basic roles in the way of combating corruption and maintaining the important ruling purity state guarantee.

2.2 Construction of a clean and honest administration culture is an important part of the development of Chinese culture

College is an effective role in spreading the advanced socialist culture, concept, promoting the socialist core value system to lead the socialist concept of honor and disgrace with important position in the heritage of civilization, shaping national character and national spirit. It undertakes the task to enhance the ideological and moral qualities and scientific and cultural qualities, so as to promote the development of science and technology, social progress, cultural innovation mechanism. University brought together a large number of experts who have outstanding commitment to the cultural heritage and cultural innovation. Through their hard working, University Culture plays a leading role in the whole process of social cultural and ideological progress. So, to strengthen the construction of university culture following the “cultural ideas of inheritance innovation, all-round development” so as to mining the law of culture development is the need of promoting socialist cultural development and prosperity. And also, is the need of enhancing the national cultural soft power and the important function of the new higher education.

The University clean and honest administration culture can give full play to the education function of honesty education, strengthen the construction of spiritual civilization and moral civilization construction with new ideas and new spirit to enrich the existing cultural achievements, combine the profound thought and culture of mass education with campus culture to integrate the development of the new and old culture. Let the students inherit and carry forward the " socialist core value of prosperity, democracy, civilization, harmony, freedom, equality, justice, rule by law, patriotism, dedication, integrity, friendly" concept based on the comprehensive development and continuously improve the students’ self-discipline, honesty, integrity, justice, dedicated to the clean and honest concept deeply

rooted in the hearts of the students ,to foster the new talented person “strong willed, political, moral quality” to adapt to the need of development of a new era.

3 The Construction of College credibility Culture and the Spirit of Innovation

Innovation is the soul of a nation’s progress, is an inexhaustible motive force for national prosperity, and is also the source of the eternal vitality of a political party. ^[3] Kang Youwei had a famous saying: Anything is strong, fresh, lively, and fluent when it is young while is weak, rotten, dull, and lagged when old.^[4] The spirit of innovation is the courage to abandon the old things and create the new ideas and new things. Spirit, is the new spiritual foundation the humanity pursues and source of power to new things.

3.1 The theory study team should become the vanguard of incorrupt cultural construction

A University should construct a research team to carry out clean theory research. Based on the theoretical foundation of cultural construction of honest and clean government, to improve the system of cultural theory plays an important role in promoting the construction of a clean government culture era. The information of theory rich in resources, human resources makes the research subjects at home and abroad to carry out academic communication channels, various platforms and other aspects of the advantages to develop the theoretical research in colleges and universities. Colleges and universities should adhere to the theoretical research as an important support and guidance to improve the anti-corruption construction scientific level, encourage the theory study to carry out by the relevant subject teachers.

3.1.1 The comprehensive development of the research project

It is necessary to mining the depth of the cultural connotation and refining the honest government culture theory. Marx historical materialism tells us: “the society change must result social consciousness change, but it is a long and tortuous process”. China is a country with the deep and traditional culture of unremitting self-improvement, social commitment, honesty and self-discipline, true patriotism. These real social virtues have already deeply moistened the deep inner peace of sons and daughters. Colleges and universities should carry out the work and the construction of clean government culture, thinking mode and behavior identity consciousness from the honest government culture of philosophy of science, theory summary and the refinement of incorrupt cultural construction, make the essence of construction of a clean and honest administration and incorrupt government culture influence and spread widely in the whole society, gradually completed from practice to theory of sublimation, the formation of the overall construction of a clean and honest administration with the cultural advantages, coordinated development, guiding role for the whole society with the development of anti-corruption work. Strengthen the summary of the current anti-corruption and clean government culture activities experience, refined theory; pay attention to the study on the culture carrier, with rich forms and incorrupt cultural construction of social culture, the thought and art of combining; mining traditional culture the thought of incorruptible culture, inherit and carry forward the culture; accelerate the absorption and the introduction of foreign excellent culture of honest and clean government thought, accelerate the introduction and absorption to enrich our culture content.

3.1.2 Enrich the research method further

Study on the honest government culture to the latest achievements of subject focused on political science, sociology, ethics, psychology and so on, seriously study the party literature, in-depth analysis of typical cases, special attention should be paid to the problem of data analysis, expand the research object of the honest government culture. To grasp the party’s work style and promote the healthy development of the school as a leader, to explore the new situation, new problems in the construction of anti-corruption from the combination of theory and practice; carry out different levels, academic deliberate activity from multiple perspectives, draw the honest government culture material from the practical experience, on the idea of culture, the culture of clean government the characteristics, construction of a clean and honest administration mode of in-depth study, scientific thought and puts forward the effective countermeasures in accordance with China’s basic national conditions. To pay attention to the use of modern scientific research with Chinese current anti-corruption faces a series of contradictions and problems of analysis and conclusion, to seek truth from facts, providing strong support for the construction of a clean and honest administration.

3.2 Ideological and political course teachers to be incorrupt cultural construction seeder

The culture of honest and clean government and the education should be put into all aspects of professional learning, penetrating into every aspect of teaching, scientific research and social service.

The course has a function of education. The teachers should be clean and honest culture education resources to explore various courses, strengthen the education imparting professional knowledge in the process, to enable students to learn scientific and cultural knowledge in the process, strengthen the cultivation of consciousness, improve self-discipline consciousness.

3.2.1 To improve the quality of College Teachers' integrity

The rise and fall of the country lies in the education, and the rise and fall of education depend on the teachers in the system. The university teachers are the essence of "advanced culture and science and technology civilization pioneer, who shoulders the important mission of sacred duty and foster ideals, morality, culture, discipline socialist successors. A good teacher with deep thinking, life attitude, knowledge breadth and height is the learning behavior model of the student lifelong. As communicators, incorrupt cultural construction practitioners and promoters, teachers should make oneself an example continue to strengthen their own moral self-cultivation, improve their ideological and political quality and professional quality, strive to have both ability and political integrity, rigorous learning dedication, honesty and self-discipline of moral character to promote clean government culture model and example by " be a model for others, make oneself an example " morality, for students' moral development course guidelines, to educate and guide the teachers to set up the correct academic view, teaching view and dedication, rigorous learning, fame and fortune, adhere to academic self-discipline, enhance the academic responsibility, to the image of occupation morality affects students noble clean.

3.2.2 To guide teachers to carry out the initiative clean education

Firstly, it is necessary to pay attention to the combination of the ideological and political education and honesty education. The clean and honest government culture of the campus is an important content of strengthening and improving the ideological and political education work in school, is also the important content of improving college students' Ideological and moral quality. The construction of a clean and honest government culture is a kind of psychological environment construction which influences character by environment permeating in people's ideology, so as to form the healthy psychological mechanism, leading the compliance and corruption of morals norm system attitude. Teachers should make full use of the ideological and political courses, the Party school training, students' organizations, students' Party branch, the development of Party members and other training way to expand the coverage and influence of the education, to educate and guide students to pursue the positive and scientific culture, to help the students realize the long-term nature, complexity, difficulty of anti-corruption struggle. The teachers should make the clean honest cultural and ideological education extend to the construction course of community construction, the model class, the students' dormitory culture, daily life, excellent personal assessment. Also, the teachers should let clean seed take root in the hearts of the students, make everyone to "emulate those better than himself. If not, examine himself". If the students have a good clean and honest quality, they can take the initiative to do the honest cultural practice after their graduation. They can affect the people around them by their own words and deeds, and then drive the forming of unit clean atmosphere, promoting the whole society.

Secondly, it is necessary to pay attention to the ideological and theoretical education combined with the honest character. The purpose of construction of a clean and honest government culture is to make every member of the society act according to the ethics and value norms. Ideological and theoretical education is a part of the culture of clean and honest government. Further strengthening and improving the ideological education of college students is the important content of the development of socialist advanced culture, is the powerful measure to maintain the harmonious development of the country, and is the spiritual impetus to make the student grow health. Thoroughly implementation of the socialist core values and the concept of honor and disgrace always pay attention to students' ideological trend, the thought political lesson in moral, cultural quality, integrity education. It should strengthen the combination patriotism, the theme of the national spirit education, moral standard moral education and the aim of quality education for all-round development. It should open psychological intrinsic behavior of their active thinking, creation, efforts at the same time of the construction style of teaching, studying and class. It should strengthen students' self-respect, self-examination, self-warning, self-encouragement, honest moral virtues, establish probity values of "everyone advocates, praises, lauds the incorruption", enhance students' self-discipline and immunity ability against corruption.

The third is the student's education and legal system education combined. Abide by the law is the basic law of every citizen should abide by the quality, honesty is one of the students have the. College students are an important group in the society, is in the personality of the "period", easy to one-sided pursuit or others from morality behavior. To strengthen the cultural construction of University Campus Law, stimulate students' hearts lofty moral emotion with the socialist core values, legal education for

college students with socialist concept of honor and disgrace, purification college pure soul with a clean government culture advanced, combined with the side and honest and clean government warning education, to understand the law, law-abiding atmosphere, learn to restrain myself discipline, legal rules and regulations to work; actively construct the legal consciousness of modern college students, time will “know for, do not know to stop” in mind, for the construction of Chinese democracy, legal system, equal, harmonious socialism has far-reaching practical significance.

3.3 College students should be honest and clean government cultural construction workers

To make “Honor Incorruption and Shame Corruption” become the spirit and culture of an era, and make it as the ethics standard and conscious action of the whole society, is the mission of incorrupt culture. Mr Cai Yuanpei once said: “To know tomorrow’s society, please look at today’s campus first.” Colleges are important educational positions and also important ideological and cultural fronts.

College’s core mission is to cultivate talents, which is the most direct and fundamental way to inherit humanity outstanding culture. Honest thoughts doesn’t mean honest culture. College students are imaginative, innovative and active, and to carry out incorrupt education on them are of great importance for them to remain diligent, pragmatic, indifferent to fame and fortune, selfless in the complex social environment when they step into the society. It is also very critical for them to cultivate noble thoughts and beliefs, to keep honest, to establish rigorous learning attitude. Colleges should make full use of ideological and political course, school training, student organizations, student party branch, party member development and other training ways to expand anti-corruption education coverage and influence, so that clean seeds can take root in the minds of college students. Colleges should also strive to improve students’ honesty and quality, so they will be the best incorrupt cultural practitioner after graduation and their words and actions will be able to affect the people around them, then the clean atmosphere can be formed in their companies or organizations, which will promote social righteousness. All these will be able to lay a good cultural foundation to push forward the incorrupt culture construction steadily.

3.4 The school discipline inspection commission should become the cultural construction of lubricant

The 15th Party Congress determined the anti-corruption leadership system and working mechanism, that is, “unified leadership by the party, together efforts made by the governments and the party, coordinated by the discipline inspection departments, relying on the people’s support and participation”, which defines the organization and coordination responsibilities of the discipline inspection departments in the anti-corruption work. On July 11, 2005, the Discipline Inspection Standing Committee of the CPC Central Commission discussed and adopted that the regulations “The requirements on the discipline inspection departments to assist the party committees in anti-corruption work requirements (Trial)” shall come into force from July, 26, 2005, which defines the main task of the discipline inspection departments as organization and coordination. Incorrupt cultural construction is an effective carrier and an important platform to create a harmonious campus. It is a system engineering, that’s to say, the discipline inspection department coordinates the whole work, pushing forward the incorrupt culture into the campus, making multi-channel incorrupt culture education using various ways, which will infiltrate the incorrupt culture into the campus, classrooms and dormitories; on the other hand, the discipline inspection departments should try to enhance the attraction, influence and participation of the incorrupt culture education, so that college students can experience it in practice, and percept it in life. College discipline inspection organs should play a lubricant role in enhancing inter-departmental communication and coordination in accordance with the overall deployment and requirements by the party committees and the higher discipline inspection organs. Colleges should include the incorrupt culture construction into their reform and development plans; Colleges should make studies on new situations and solve new problems timely; They should also coordinate different forces to promote the healthy and harmonious development of the college incorrupt culture construction.

4 Results

University is an important base for training talents, heritage of civilization, the construction of advanced culture. It shoulders the important task of training qualified builders and reliable successors of socialism. The implementation of the education of comprehensive university, is an important part of the whole society to the anti-corruption education, is the inevitable requirement for reinforcing the ideological and moral construction of students, the honest culture is to create a complete the guide, inevitable requirement of harmonious society and civilization.

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Analysis of China's Response to the 2008-2009 Global Financial Crisis

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Abstract: This paper focuses on China's situation and responses during the 2008-2009 global financial crisis by analyzing statistics covering several aspects. Contents cover the financial crisis's influence on China and why harmed China's economy. Chinese government's responses: pro-active fiscal policy, monetary easing policy, as well as their immediate effects are analyzed respectively. The long-term effects of these policies are also included. In addition, the debate on whether China should be blamed for the crisis is also analyzed, together with suggestions for China's future development.

Key words: China; Financial crisis; Fiscal policy; Monetary policy

1 Introduction

Since the beginning of the 2008-2009 Global Financial Crisis, many researches were conducted on by different scholars around the world. Topics include the U.S. and Europe's performances during the Financial Crisis, their governments' responses, their expected aftermath and so on. In-depth analyses of the formation of the Global Financial Crisis were also a heated research topic. Western scholars including Frederic S. Mishkin, Coenen, Robert Hall, Philip R. Lane et al all came up with remarkable papers, however, only few paid their attention to East Asia countries, especially China. As for Chinese scholars, theoretical analysis researches were conducted far more than quantitative research.

2 The Influence of the Financial Crisis on China

Since the end of 2007, despite the fact that China's total expenditure was still increasing, foreign investment and export started to decrease gradually. China's economy growth of coastal regions started to slow down, marking the beginning of China being influenced by the Global Financial Crisis. Shanghai, Zhejiang Fujian and Hainan province experienced an average decrease of 3.65% in GDP growth¹. At the mean time, price and trading volume of housing market started to decrease national wide for the first time since 2003. During October 2008, due to the influence of the plummet of the Dow Jones Industrial Average, Shanghai Stock Exchange Composite Index was dragged to its trough of 1664.93 points from 6,124 points. The influence of Global Financial Crisis trigger by the bankruptcy of Lehman Brothers started to show more effects on China: large Chinese financial institutions, whose shares were held by Lehman Brothers or were holding Lehman Brothers' bonds, were severely influenced. Chinese investors' confidence was influence and therefore resulted in further contraction in domestic investment.

Before 2007, China maintained a stable GDP annual growth rate of double digits for over a decade. However, the GDP growth rate dropped from 14.2% in 2007 to 9.6% in 2008². After that, China's GDP growth rate maintained a downward sloping tendency for the following 3 years. The GDP growth rates were 9.2%, 10.4% and 9.3% respectively³. During the third quarter of 2012, the GDP growth rate was only 7.4%, lowest of the past 3 years. From the data above, we can see that the effect last much longer than expected.

Figure 1 shows the 4 components of real GDP. We can see that a sharp drop in Net Export started in mid-2008 terminated China's Golden age of trade, which started from 2002 (Weidong Liu, Clifton W. Pannell and Hongguang Liu, 2009) and the decreasing tendency maintained for the following 3 years. China's Export value decrease from 1.43 trillion us dollar to 1.20 trillion U.S. dollar² and trade surplus in 2009 was 111 billion U.S. dollar less than that of 2008³.

¹ Data Source: Average GDP of 25 provinces decreased 2.02%, showed problem in National economy. People's Daily, 2009

² Data Source: World Bank.

³ Data Source: National Bureau of Statistics of China Yearly report.

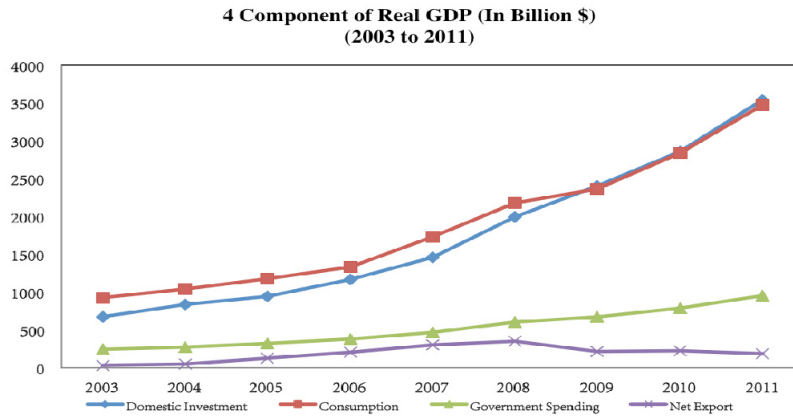


Figure 1 Four Components of GDP's Changingtendency from 2003 to 2011

Similar to the U.S China's job market was also influenced (Weidong Liu, Clifton W. Pannell and Hongguang Liu, 2009). Many jobs provided by export-oriented enterprises disappeared due to the bankruptcy of a huge amount of small to medium-size non-public enterprises. In 2008, 67,000 Small and Medium-size non-public enterprise filed bankruptcy¹. As for the textile industry, a representative of labor-intensive industry, over 10,000 enterprises filed bankruptcy and the remaining two-third faced reforming. Until September of 2008, around 1600 Taipei companies and 3000 Hong Kong companies left Dongguan (a city in Guangdong Province), which made up one-fourth of total Taiwan companies and one-third of the total Hong Kong companies within the region². Jobs positions provided by both local companies and companies outside Mainland China decreased, causing the entire industry and investment cash flow to shrink.

China's inflation level was influenced by the financial crisis as well. From 2007 to 2008, there was a sharp rise in inflation rate from 1.46% to 4.75% and then to 5.86%. However, in 2009, the inflation rate become negative, and then in 2010, jumped back to 3.31%. The fluctuation of inflation rate made it difficult for business organizations to predict future incomes and therefore undermined business confidence during the period.



Figure 2 China's CPI Change in Annual %, 2003 to 2011

Although China was affected by the financial crisis through several aspects, comparing with other developed economies, the damage was not too severe. First is because that, due to the reason that some foreign investors believe CNY would continue appreciating against dollar and maintain a relative high level of savings interest rate (Ronald McKinnon, Gunther Schnabl, 2009), China still managed to attract increasing foreign investment during the financial crisis. Foreign investment solved part of the liquidity

¹ Data Source: Small and Medium-size Enterprise Administration Report. State Development and Reform Commission of China, 2008 (In Chinese)

² Data Source: Guangdong Province investigation report. Guangdong Province Information Investigation Center, 2007

problem in Chinese market, especially among companies that had strong reliance on cash flow. Second is that China's diversification of its trade partners⁴ and reduction of the Export/GDP ratio since mid-2000s also helped China from further loss⁴. Third is that, the limited usage and regulations on financial derivative and securitizations helped China minimize its loss in the finance industry.

3 Reason why China was Influenced by the Global Financial Crisis

First of all, China's economic growth pattern has serious structural problems that prevent China from a long-term sustainability growth. For example, the lack of protection for technology innovations and the heavy reliance on natural resource consumption are all visible problems. Among all possible problems, the most severe one is the imbalance GDP growth reliance among export, foreign investment and domestic consumption. This imbalance leads to a double reliance on the global economy and a weak linkage between GDP and domestic consumption (S. Breslin, 2011).

Second, the integrated effect of macro regulations China applied during the mid 2000s was problematic. Policies include the new labor law that increase the labor cost in China dramatically and the rapid appreciation of CNY in a short period of time. Contractionary monetary policy and rapid increase of cost of imported goods influenced China's two economic cycles. The first one is the high savings rate – high investment – high trade surplus together with income distribution and domestic expenditure cycle. The other one is: huge demand of houses triggers the development of real estate industry chain and increases government's income reliance on land rent. Regulations that influenced these 2 cycles led a deceleration of China's economic development, a decrease in fiscal revenue, business profit and expenditure. All those influence made China more vulnerable to the change of global financial environment (Qingyun Li, 2010).

4 China's Policy Response to the Global Financial Crisis

After the influence of global financial crisis started to affect China's economy, Chinese government took immediate actions. Pro-active fiscal policy and so-called moderate easing monetary policy were introduced and applied simultaneously.

The main target for the fiscal policy was to expand the domestic demand. Chinese government switched the macroeconomic regulation tone from 'Inflation Control' to 'Maintain Stable Growth'. Also, the government expressed its willingness to encourage industrial reformation and focus more on people's livelihood while trying to deal with the financial crisis. Chinese government introduced the 'Ten National Policies' and the 4 trillion CNY (598 billion US dollar¹) stimulus package. The stimulus package was equal to 16% of China's 2007 total GDP and expected to be fully invested by the end of 2010 to boost the domestic demand. The 'Ten Policies' mainly focused on the construction of government-subsided housing; rural infrastructures; fundamental facilities including railways, highways, airports; development of medical care system and tax cut. The effect to the stimulus package was very obvious. Five months after the announcement of the stimulus package, domestic fixed asset investment increased by 26.5%. The number of new construction projects increased by 87.5% and the investment in railway transportation construction increase by 210.1% than the previous year³. Also, many regional government started to initiate 'Local Financing Program' to stimulate local economy development. The tax cut on consumers boosted the car market in China in 2009. The sales reached 13.6 million cars, ranked number one in the global car market³. Tax cut on companies released the burden of around 500 billion CNY on small to medium-size enterprises (Qingyun Li, 2010).

Project	Estimated Fund
Government-subsided housing and the low-rent housing project	400 billion
Rural infrastructure construction	370 billion
Fundamental transportation facility construction	1500 billion
Develop the medical care system and education system	150 billion
Ecological environment protection program	210 billion
Innovation and reformation of industrial structure	370 billion
Post-disaster reconstruction of Wenchuan earthquake	1000 billion

Figure 3 Detail of the Stimulus Package

¹ CNY/USD exchange rate applied: 2010 October exchange rate

In order to protect peoples' living condition, Chinese government also introduced some other supporting policies. The most important one was the 'appliance and electronics rebates for consumers in the countryside'. Chinese government would provide 13% of retail price as subsidize (among which 80% come from the central government and 20% come from the regional government) for residents in the countryside if they buy electronics after December of 2008. Until September 2012, a total of 76.5 Billion CNY subsidize was provided by the Chinese government and 275 million pieces of electronics were sold and achieved a total sales of 659.76 billion CNY¹. 200,000 local sales spots were built across country and provided 60,000 new jobs. As for the stimulus in the industry, during 2009-2011 the sale of refrigerator increase by 11.9%, 20% and 2.9% respectively and many companies increased their production capacity (Luolin Wang, 2010).

As for the so-called moderate easing monetary policy, Chinese government set the goal of increasing the M2 by 17% and increasing 5 Trillion of CNY new loans (Qingyun Li, 2010). The first action to achieve this goal was to decrease the interest rate to inject liquidity into the banking system. In November of 2008, the Central Bank of People's Republic of China announced the biggest cut in loan and deposit rates for recent 10 years. The 1-year savings interest rate was cut from 4.14% to 3.87% and the 1-year loan interest rate was cut from 6.21% to 6.12%. After that, the Central Bank decreased the loan and deposit rate for another 4 times. By December of 2008, the 1-year savings interest rate was 2.25% and the 1-year loan savings rate was 4.86%. Besides, the Central Bank decreased the deposit-reserve ratio for 4 times since 2008 September, which was the first time after 1999. Finally the deposit-reserve ratio for large financial institutions was decreased from 17.5% to 15.5% and was decreased from 17.5% to 13.5% for small to medium-size financial institutions. One of the effects of the loan and deposit rate cut was to eliminate the sense of crisis for residents and non-public enterprises; the other effect was to eliminate the potential of deflation caused by the outflow of US dollar.

The second action was to increase the loan scale in order to inject liquidity into enterprises. The Chinese government expected that sharp decrease in export demand and household consumption will dry up the cash of small to medium-size enterprises, which will ultimately lead to a decrease in real economy. In order to avoid this situation, the Chinese government worked as a guarantor. With the back up promised by the government, commercial banks are more willing to increase their loan scales which will lead to an increase in upper stream investment (Commercial banks in China enjoy a government guarantee of deposits, even though there is no official deposit insurance⁷).

The third action was to devalue CNY. This action was applied to cancel out the negative effect of the above two policies. During 2007 to 2009, China was holding as much as 2.3991 trillion dollar U.S. Treasury note. In order to prevent the loss of U.S. dollar devaluation, CNY had to devalue together with U.S. dollar².



Figure 4 Amount of U.S. Bond Hold by China, in 100 Million \$, 2008.01 to 2009.09

5 Side Effects of China's Response to the Financial Crisis

Although Chinese Government tried hard to eliminate the side effects of the above policy and monetary responses, side effects still existed. The so-called moderate loose monetary policy resulted in

¹ Data Source: Ministry of Commerce, Statistical report

² Data Source: Xinhua Net

excessive increase in monetary supply. Starting from 2009, the growth rate for monetary supply was 25.52%, 28.46% and 29.31% respectively. Compared to 16.74% of monetary supply growth rate in 2007, while China was having the highest growth rate of GDP as 13%, those numbers seemed a little bit too high for merely an 8% of GDP growth rate for 2009³.

The change of loan scale caused excessive credit expansion. Starting from 2009, the growth rate increased from 20% in March to 30% in June, which was far higher than the government's policy. Meanwhile, the structure of credit loans also had a problem. The ratio of medium to long-term loan was too high, and it was not helpful for industrial restructuring. Large amount of credit loans flowed to repeated constructions and worsened the over capacity problem².

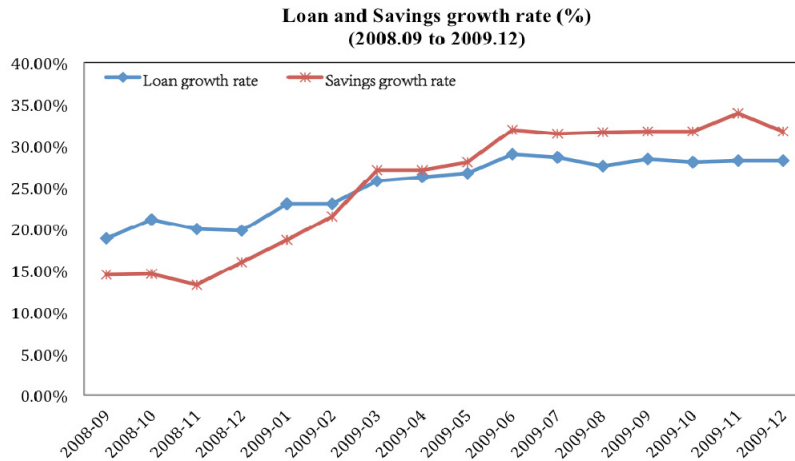


Figure 5 Loan Growth Rate and Savings Growth Rate in Monthly %, 2008.09 to 2009.12

There was also a sharp increase in real estate price from March of 2009 due to the effect of the stimulus package and until now the tendency is still continuing. The rise of housing price had three features: fast, country wide and speculative. During November of 2009, housing price increased 15.7% on average among 70 Cities in China¹, differed from previous situations of rising only in first-tier cities only. Irrational investment and speculation contributed a lot to the rise of housing price. The housing price increased the uneven distribution of income (Y. Deng, R. Morck, J. Wu et al, 2011). The reason that led to this situation was Central government's direct control over major banks and largest non-financial enterprises (State-owned enterprises). Large amount of supporting funds lend to those institutions formed an increase in investment plans involving lands and real estates and thus caused the rocketing price rise in land and housing market (Ronald McKinnon, Gunther Schnabl, 2009).

6 Should China be Blamed for the Global Financial Crisis?

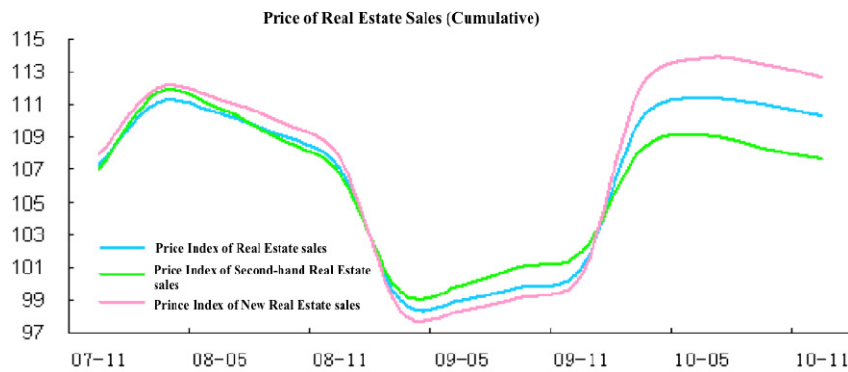


Figure 6 Price of Real Estate Sales, 2007.11 to 2010. 11

One of the popular views among western scholars is that China should be responsible for the

¹ Data Source: Real estate industry analysis report. China Statistic Database, 2009

Global Financial Crisis. Among those opinions, the undervaluation of CNY was mentioned repeatedly. Those scholars hold the opinion that CNY's undervalue caused China's huge trade surplus to the rest of the world (Martin Wolf, 2008). Therefore, China should be responsible to the formation of U.S.'s huge trade deficit. They believe that China's trade situation stroke U.S.'s industrial market, labor market and caused the economy difficulty in the U.S. and then triggered the Global Financial Crisis. Nobel Laureate, Professor Paul Krugman claimed that China should be responsible to the 1.4 million unemployed and the 1.3 trillion U.S. dollar budget deficit in the U.S. (Paul Krugman, 2010).

However, this is not what the statistics show. First of all, there was no concrete conclusion that whether CNY was undervalued or not. According to the Big Mac¹ index announced by Economist in 2008, the real exchange rate of CNY/USD should be 3.5, it seems that CNY was indeed undervalued. However, according to the World Bank's data in the same year, China's Price Level Index² was 55% of the U.S. and ranked 116 in the world, higher than the ranking of China's GDP per capita, showing that China's price level surplus China's economy development level, therefore CNY was not undervalued. Thus, with different measurement existed, it is hard to conclude that the CNY was indeed undervalued and that directly caused the Financial Crisis (Weiping Huang, Kai Ding, 2010). Also, there is no reason for other economies to pressure China to appreciate CNY with the harm of China's own good to deal with the aftermath of global economy imbalance.

Second, even if we assume that CNY was undervalued, exchange rate's impact on the global trade situation is rather limited. Even if China appreciated CNY due to U.S.'s pressure, there wouldn't be much improvement of the global trade situation. Take the U.S. dollar as an example: from 2005 to 2008, CNY appreciated against U.S. dollar for over 20%, however, U.S.'s trade deficit against China increase 20 billion U.S. on yearly basis³. On the contrary, in the year of 2009, CNY remained relatively stable towards U.S. dollar, but U.S.'s trade deficit against China decreased by 42 billion U.S. dollar¹². In fact, China's high level of trade surplus was due to the combination of China's high savings rate and low domestic investment rate, rather than the exchange rate. This is also the reason why China became creditor country for many other countries. An appreciation of creditor country would result in decrease in oversea investment and causing a further turbulence situation in the global financial environment. What the U.S. and China should do is maintain a stable exchange rate between USD and CNY and decrease the amount hot money inflow to China. At the meantime, if investors lower their expectations on appreciation on CNY, private investment would flow from China to the U.S. market, resulting in a win-win situation (Xiaochuan Zhou, 2009).

Third, China's trade surplus has nothing to do with U.S.'s huge trade deficit, not to mention striking the U.S.'s industrial market and labor market. The U.S. has already maintained a large trade deficit with other major trading district for over 30 years and the tendency is still increasing¹². Meanwhile, China only started to run a trade surplus for the recent few years. Also, comparing to other trade partners of China, U.S. experienced the least influence of all due to the "Chinamerica" relationship (Yongding Yu, 2009). Therefore, there is no evidence can support the idea that China's trade surplus triggered the U.S. trade situation and Global Financial Crisis.

The fact is that the real reason that caused U.S.'s huge trade deficit is due to its huge budget deficit. According to the twin deficit definition that derived based on the national accounting model of the economy (Yongding Yu, 2007):

$$Y = C + I + G + NX \quad (1)$$

$$Y - C - T = S \quad (2)$$

$$S = G - T + NX + I \quad (3)$$

Simplifies and get:

$$(S - I) + (T - G) = NX \quad (4)$$

As for the U.S. situation, $(T - G)$ is negative, which means an existing budget deficit. While Y and S remain fixed, if the deficit increases, it implies that either investment I must fall or NX must fall, causing a trade deficit. So that we can conclude that U.S. maintaining such a huge trade deficit is caused by U.S. its self's huge budget deficit.

In fact, the Financial Crisis that started in the U.S. and spread to Europe was rooted by endogenous factors; exogenous factors are only influencing factor. The nature for the formation of the financial crisis is due to U.S.'s production, consumption and policy problems: huge amount of resources flowed into

¹ Data Source: Historical Data from Economists

² Price Level Index = PPP / Exchange rate

³ Data Source: United States Census Bureau, Department of Commerce.

virtual economy; the law of economy growth that based on “die proportionale koordinierte Entwicklung” was violated; long term application of low interest rate loose monetary policy since the economy bubble burst in 2001, provided the soil for existence of housing and asset bubble; large budget deficit and excessive government spending (Carmen M. Reinhart, Kenneth S. Rogoff, 2011); expansion credit in financial market and the complex chain that linked banks, insurance company, credit rating institutions (Frederic S. Mishkin, 2011). Thus, we can see that those endogenous factors are the real cause of the U.S. Financial Crisis, and that China is responsible is untenable.

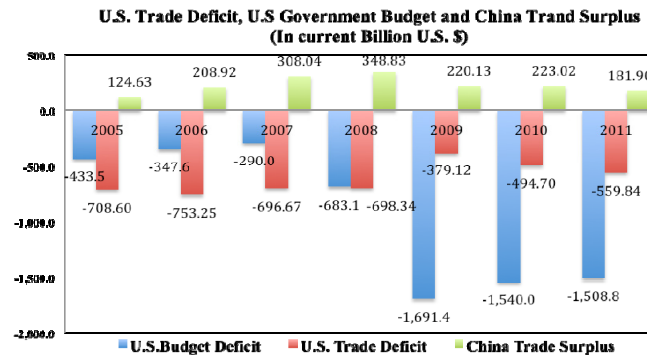


Figure 7 U.S.'s Trade Deficit, Budget Deficit and China's Trade Surplus, in Billion \$, 2003 to 2011

7 Aftermath and Suggestion for China's Duture Development

The impact of the stimulation package is very long lasting, for example, the inflation and excessive cash in the market, and China should be prepared for the aftermath. Although the stimulus package was focused on the infrastructure aspect, it still reduced China's investment efficiency. Also the period of infrastructure investment cycle is long, which means that it will take a long time before China can get the entire fruit of the stimulus package. Also, the local governments' aggressive financing policy might cause unexpected results of China's future development and the central government should pay more attention to this sector. Finally, China has to be careful with the current monetary policy for it is too loose. As a developing country, China still needs to maintain a relatively high interest rate for future development (Yongding Yu, 2009).

Besides taking care of the followed up effects, China also need to discover new ways to restructure its strategy and economic trajectory for future growth. The most important problem in China's model of development is that it is easy to speed up the economy growth but hard to slow down and control (S. Breslin, 2011). What China could do in the future is to reduce the reliance on foreign investment and export. China should depend more on domestic demand, and depend less on oversea funding to achieve a more balanced situation between investment, consumption and trade. Also as the world's second largest developing economy, China should invest more instead of saving more. In addition, China should reduce the mismatch between the economy status and the twin surpluses: current account surplus and budget surplus (Yongding Yu, 2007). The twin surpluses situation indicates that even though China has obtained capitalinflow through foreign investment, the capital failed to be used in technology development and other aspects. In fact, these capitals flowed back to the U.S. government bond market due Chinese government's policy, instead of investing in goods that can raise the productivity and living standard of Chinese people (Dornbusch, Rudiger and F. L. C. H. Helmers, 1988). Furthermore, Chinese government should encourage and support technology innovations to speed up industrial reforming and reduce technology reliance on developed countries. This should be the root and key concept that China bears in mind.

8 Conclusion

The 2008–2009 global financial crisis has influenced China in many aspects. During the period, Chinese government took immediate responses and tried hard to keep the level of harm under controllable level by using fiscal policies and monetary policies. The effect of Chinese's governments responses were remarkable, however, problems of the structure of China's economic development also emerged. The imbalance among domestic consumption, foreign investment and trade and the twin surplus made China vulnerable against global market change. The negative side effect of the global financial crisis on China is still not over yet and there are still many things requiring the Chinese

government to take care of.

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