PROCEEDINGS OF THE 17th INTERNATIONAL CONFERENCE ON INNOVATION AND MANAGEMENT

December 5-6, 2020

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Chen Xiaofang, Xia De, Huang Ping

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【Summary】

The proceedings include Innovation and Strategic Management; Risk Management and Decision Analysis; Organizational Behavior and Human Resource Management; Marketing Engineering and Service Science; Big Data and Business Intelligence; System Engineering and Knowledge Management; Supply Chain and Operations Management; Public Safety and Emergency Management; Social Governance and Sustainable Development; Miscellaneous.

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Innovation Capability and Performance of Small and Medium Sized Enterprises

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Abstract: Innovation capability is the ability of a firm to transform an idea into a something new which carries an economic value. The economic value would then increase profit and consequently firm performance. The Small and Medium Enterprise (SMEs) sector is well recognized for its contribution to employment, innovation and economic dynamism and is considerate as an engine of growth and an essential part of an innovative economy. The purpose of conducting this study is to examine the relationship between innovation capability and firm performance of SMEs in Sri Lanka. Innovation capability of owners is a root cause for many ancillary problems arising subsequently within SMEs. The findings show that seven important aspects of innovation capability, participants leadership culture, business networking, knowledge & competence capability, technology, product & services, marketing and risk taking are directly and positively associate with SMEs Performance. This study examines multiple aspects of innovation capability as well as investigating the relationship between innovation capability aspect and the SMEs Performance. These finding carry implications for how policy makers can best promote innovation capability to assist SMEs enhance their performance in competitive and innovative economic environments. Further, the model can be empirically tested in future research.
Keywords: Innovation Capability； SMEs Performance； Entrepreneurship； Innovative Economy

1 Introduction

Innovation is recognized as a key driver of economic development (Saunila,2019) in many studies on how best to nurture and maximize business innovation capabilities for sustainable economic development. However, measuring innovation capabilities is complex. Multi-dimensional difficulties arise in the innovation process. Innovation involves a broad and dynamic spectrum of activities related to markets, new products, redesigning, production and so on. Successful innovation comes from the integration of a set of capabilities rather than a single type of capability (Zhang, Jones, & Ricky, 2013). Small and Medium Enterprises (SMEs) plays a vital role in economic development through wealth distribution, creating employment, enhancing technological advancements, reducing poverty and increasing innovations (Arribas & Vila, 2007). The SME sector is recognized as an important strategic sector in Sri Lanka for generating high economic growth and for reducing unemployment, inequity, and poverty. It contributes to 30% of GDP, 30% of manufacturing value added, 35% of the national labour force, and 20% of total export values according to the Asia SME Finance Monitoring Report (2014). Most of the enterprises established in Sri Lanka belong to Micro, Small and Medium size categories. Globalization has changed the business environment and increased competition especially in developing

countries, according to Kassim et al. (2003), because of which SMEs have not only to struggle among themselves but also with larger manufacturing firms. In addition, unlike large companies, small firms lack resources, expertise and impact on the marketplace (Talib, Ali and Idris, 2014). In recent years, innovation capability has become one of the important factors of success in modern economies affecting the development of entrepreneurial ability and competency among small and medium size enterprises. Eniola, Entebang and Sakariyau (2015) defined resources as anything that create strengths and weaknesses for organizations in the form of tangible and intangible assets. As per the resource-based view (RBV), the assets that create sustainable competitive advantages for the organization can be identified as strategic resources. Further, RBV (Barney, 1991) proposed that valuable, rare and inimitable resources as the sources of competitive advantage. According to RBV theorists, organizations should attempt to use existing resources effectively to get maximum advantages from external opportunities. Because of rapid changes in business landscape, innovation capability of entrepreneurs remains as a fascinating issue in both developed and developing economies. innovation capability is essential to start, operate and growth of a business (Kim et al, 2018). SMEs tend to experience difficulties in accessing innovation to facilitate business operations. Thus, innovation capability is an important but scarce resource for SMEs and it is important to manage efficiently and effectively.

This study was designed by considering the importance of Innovation Capability in SMEs context, and aiming at the prevailing research gaps on innovation capability and SMEs performances. The main research question in this study is: How does innovation capability of SMEs in Sri Lanka affect their firm performance? Further, this study aims to contribute the entrepreneurship literature by investigating and examine the impact of innovation capability on firm performance of SMEs in Sri Lanka.

2 Literature Review and Hypotheses

Resource based theories explained organizational resources and capabilities as the prominent determinants of organizational performances and the necessity of higher level of innovation capability to use those assets in order to improve the organizational performances.

Definition of Innovation Capability There are various definitions of innovation capability in the literature. According to Romijn & Albaladejo (2002), innovation capability can be defined as the knowledge and skills required to absorb and develop existing technologies efficiently, in addition to producing new ones. Innovation capability is the ability of a firm to transform an idea into a something new which carries an economic value. Value is something that is relatively worth which determines wealth creation. The economic value would then increase profit and consequently firm performance. However, body of literature has identified different determinants for measurer of innovation capability. Innovation capability has been divided into seven determinants in this study: That is participants leadership culture, knowledge & competence, networking, technology, product & services, marketing capability and risk taking.

Knowledge, competencies and skills are fundamental to innovation as they provide the basis for new ideas and their successful development (Hull & Coombs,2000). Therefore, goal-oriented development and application are extremely important for improving innovation capability (Nonaka & Akeuchi,1995). Participatory leadership culture refers to the overall atmosphere of the organization that supports and motivates innovation and the leadership that facilitates innovation Leadership that fosters innovation enables setting task boundaries, sharing information, obtaining resources, instilling a positive

attitude, and a leadership style that keeps the employees challenged and focused (McDonough, 2000). Another dimension of innovation capability is technology capability. Technology is a prerequisite for new products and production processes; it addresses planning, management and controlling. In this context the capability to identify new technologies, to assess their value and to successfully exploit them are invaluable, Several technological characteristics of an innovation would affect its adoption, including complexity, compatibility, and relative advantage, ease of use, perceived usefulness, information intensity and uncertainty (Klein, Conn, & Sorra, (2001).

Networking capability, another important dimension of IC, can be defined as the interactions with suppliers, customers, industry associations, and competitors, which provide entrepreneurs with the missing external inputs (Lawson & Samson, 2001). Previous research on small firms has emphasized the importance of networking for innovativeness (Adams at al., 2006). According to Weerawardena (2013), marketing capabilities are an indispensable factor based on the innovative capabilities of a company that can generate growth and profit via distinctive innovation capabilities. According to Li et al., (2007), tangible and intangible resources and capabilities are important for marketing operations, including brand, sales, channel and service to provide various marketing services. Accordingly, based on theoretical and empirical justifications following hypothesis a proposed.

H1: Knowledge and competence capability positively effects to the SMEs performance

H2: Participatory leadership culture positively effects to the SMEs performance.

H3: Networking capability positively effects to the SMEs performance.

H4: Technology capability positively effects to the SMEs performance.

H5: Product and services capability positively effects to the SMEs performance

H6: Marketing capability positively effects to the SMEs performance.

H7: Risk taking capability positively effects to the SMEs performance.

The conceptual framework of this study was designed based on the above identified relationships

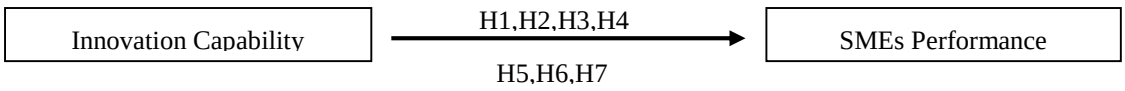

Figure 1 Conceptual Model

3 Methodology

The population of this study was comprised with Small and Medium Scale Enterprises (SMEs) in Sri Lanka. However, 160 SMEs owner managers were selected from the western province using the convenient sampling technique to conduct this study. Western province was selected as it comprises with the highest number of SMEs compared to other provinces. Structured questionnaires were used to collect data and it was comprised with three main sections; Section 1- Demographic factors, Section 2- Innovation Capability, Section3- SMEs Performances. The descriptive statistics and tabulation techniques were used to describe the results. This study uses factor analysis, the factor analysis is used to come up with a small number of interpretable underlying factors out of several variables. Further, linear regressions were used to achieve research objectives. Table 1 illustrates the constructs of the questionnaire.

Table 1 Constructs of the Questionnaire

Content	No. of Items	Source
Innovation Capability		
Knowledge & Competence Capability (KCC)	4	Hull, R., Coombs, R. (2000)
Participants Leadership Culture (PLC)	4	Kallio et al. (2012)
Networking Capability (NC)	5	Adams at al., (2006)
Technology Capability (TC)	4	Romijn, H., Albaladejo, M. (2002)
Product & Services Capability (PSC)	5	Bullinger, H.J., (Hrsg.) (2006)
Marketing Capability (MC)	4	Bullinger, H.J., (Hrsg.) (2006)
Risk Taking (RT)	4	Prajogo and Ahmed (2006)
SMEs Performance (FP)	6	Kropp, Lindsay and Shoham (2006)

4 Analysis and Discussion

A total of 160 completed questionnaires by SMEs owner managers were subjected to analysis. Majority of the sample (65%) is comprised with female entrepreneurs. Age distribution of the sample includes five age categories and the highest number of entrepreneurs is represented by 31 – 35 years age group and as a percentage it was 39 percent. Furthermore, most of the entrepreneurs had completed education up to secondary education (52%). The outcome of the research further showed that 31 percent of entrepreneurs have diplomas and 16 percent of entrepreneurs belong to the category of graduates. Also, 54 percent of the sample had no previous experience before starting their business, and 46 percent of the respondents had a family with an entrepreneurial background. Most the sampled respondents were married. Their ratio is 92 percent. However, 8 percent SMEs owners were bachelors. This reflects that they have started business in the early stage of their lives. This is good reflection of their potentiality run well-established business in the long term.

Table 2 Means, Standard Deviations, Factor Lording and Correlation Coefficient Matrix

Construct and Items	Mean	SD	Factor Lording	CA	FP
Innovation Capability					
Marketing Capability (MC)	4.2740	.48679	.759	.854	.429
Technology Capability (TC)	4.1764	.47774	.816	.746	.225
Participants Leadership Culture (PLC)	4.2397	.46610	.842	.816	.313
Product & Services Capability (PSC)	4.3642	.51717	.777	.766	.316
Networking Capability (NC)	4.3305	.55569	.826	.722	.263
Knowledge & Competence Capability (KCC)	4.4024	.47613	.792	.851	.123
Risk Taking (RT)	4.3402	.54576	.798	.857	.232
SMEs Performance (FP)	4.0700	.46513	.863	.888	-

Note: Standard Deviation (SD), Factor Lording (FL), Cronbach's Alpha (CA), SMEs Performance (FP)

Table 2 portrays the descriptive statistics and reliability analysis was used to establish both the consistency and stability of the research instrument. Cronbach's Alpha value was calculated to test the internal consistency reliability of the instrument. A rule of thumb suggests that the accepted Cronbach alpha value should exceed 0.7. The Table 2 gives a summary of the scores of all the responses to the factors related to innovation capability of SMEs owners in Sri Lanka. All factors exhibit a Cronbach's alpha coefficient of 0.72, indicating that the reliability level of the questionnaire is sound. Hence, all the

variables are retained. However, in this study the KMO test resulted in 0.760, which is at an acceptable level. The process was limited to a seven-factor solution which was rotated by a Varimax with Kaiser Normalization. From the correlation coefficient matrix table, we can see that there is a significantly correlated with dependent variable. market of the business capability has highest correlation coefficient value of r = 0.429, p<0.0005, second important correlation coefficient is shown in product & services capability (0.316). However, all other variables are significant correlated with each other.

Table 3 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.674[a]	.454	.442	.74676980	.454	39.205	7	160	.000

Predictors: (Constant), REGR factor score 7 for analysis 1

Table 3 model summary shows R value for assessing the overall fit of the model. Correlation between the observed values and the predicted values (R) of the model is 0.674. The R Square value in this case is 0.454. This states that the seven independent variables in stated model account for 45.4% variance in the dependent variable (SMEs performance).

Table 4 Coefficients provides information on each predictor variable. These presents the information needed to predict impact of innovation capability on SMEs performance. To test the hypothesis that the all hypothesis of the study was accepted. The constant and innovation capability dimensions contribute significantly to the model.

Table 4 Regression Results

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.005	.044		-.119	.906
Marketing Capability (MC)	.426	.044	.428	9.735	.000
Technology Capability (TC)	.229	.044	.229	5.216	.000
Participants Leadership Culture (PLC)	.317	.044	.316	7.195	.000
Product & Services Capability (PSC)	.318	.044	.319	7.260	.000
Networking Capability (NC)	.263	.044	.265	3.482	.009
Knowledge & Competence Capability (KCC)	.121	.044	.122	2.775	.006
Risk Taking (RT)	.232	.044	.232	3.376	.000

Dependent Variable: REGR factor score 1 for analysis 5

5 Conclusion

This study focused on three objectives all of which were successfully achieved in the study. The first objective of identifying the dimension of innovation capability was achieved with the exploratory factor analysis. The second objective was to examine the existing level of innovation capability of SMEs in Sri Lanka. It was observed that knowledge and competence capability recorded the highest mean value (4.4024) with the lowest records of mean at 4.1764, which is technology capability. The other three

variables varied between 4.4024 and 4.1764. The main objective of this research was to examine the impact of innovation capability on firm performance of SMEs in Sri Lanka. The main objective was successfully achieved though the statistical test results. Where it confirms all variables are evident of having significant relationship with SMEs performances. From theoretical perspective, there is a need for researchers in developing economies to examine the relationship between innovation capability and SMEs performances. Also, the concept of innovation capability is still in the early stage of investigations. As a result, there is no valid measurement scale in order to measure the concept of innovation capability. Thus, future research needs to develop a valid and reliable measurement scale to measure innovation capability a managerial perspective, the findings in this study suggest the need for policy makers in Sri Lanka and other developing economies to more emphasis on improving innovation capability skills of entrepreneurs. Further, policies should be introduced to solve innovation capability barriers of the entrepreneurs. Moreover, while the direct effect of innovation capability on SMEs performances is very important, this study indicates that innovation capability should not be treated in isolation when examining aspects of SMEs Performances.

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Education Innovation in the Era of Big Data

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Abstract: With the development of social economy and the coming of the era of big data, new changes have taken place in all walks of life. The traditional teaching model has not suited the needs of the rapid development of modern society, and education innovative is becoming more and more important in teaching. Based on the retrospect and analysis of the innovation of education, and combining the background of "Internet accelerated speed", this paper analysis the problems that existing in the current educational model. At the same time, we use the technology of web crawler to crawl the ranking data in the webmaster's home website, and combining with the traffic data in Baidu Index website,this paper discusses the direction of education innovation in the next step.
Keywords: The era of big data; Education issues; Education innovation; Education development

1 Introduction

Education is not only the basic way of labor reproduction, but also the main way of training talents for political and economic system, and also an important means of technological innovation. In the era of big data, data is the foundation of everything. More and more enterprises rely on Artificial Intelligence and data-driven decision-making tools. This is a data-centric revolution. Today, in the era of big data era, the application of big data that related with technologies will have a certain impact on all aspects of our lives. With the development of social economy, the students' ability of scientific and technological practice taught under the traditional teaching model is generally poor, and their thinking model is relatively stable. Therefore, educational innovation will also be an indispensable part of this revolution. At the same time, educational innovation has been concerned by scholars at home and abroad, and a series of research results have been produced. Li Biwu（Li Biwu,2015） thinks that Internet plus is not only a new form, but a behavior mode and a movement process under the Internet thinking. Internet plus Internet plus Internet plus education management Internet plus teachers, Internet + curriculum, Internet + teaching and Internet + learning are five aspects. The wave of Internet plus education has swept the whole world, representing the trend of education development. Jin Yuliang(Jin Yuliang,2017) and others hold that the Internet plus education background of Dongguan's "double teacher teaching" mode will promote the sharing of high-quality educational resources and teachers. "Double teacher teaching" mode is the combination of online and offline, public school and private school resources, in order to maximize the use of teaching resources. Generally speaking, there are many scholars at home and abroad who focus on a certain major and carry out targeted education reform analysis. The education reform will greatly promote the further development of teaching, and it will be a great leap forward for the development of students, teachers, schools and even the society.

2 The Development Process of Internet Education

Before 2011, with the popularity of the Internet, the Internet began to provide software downloads

or web access and students can also browse online and do exercises for study. This stage of Internet education is called "multimedia education". In 2012, part of the qualification examinations transferred to the Internet. At the same time, the network knowledge expansion and knowledge spread websites began to develop. After 2013, with the rapid development of computers, mobile phones and the Internet, all kinds of education resources can be downloaded on the website, and online education resources websites began to rise.

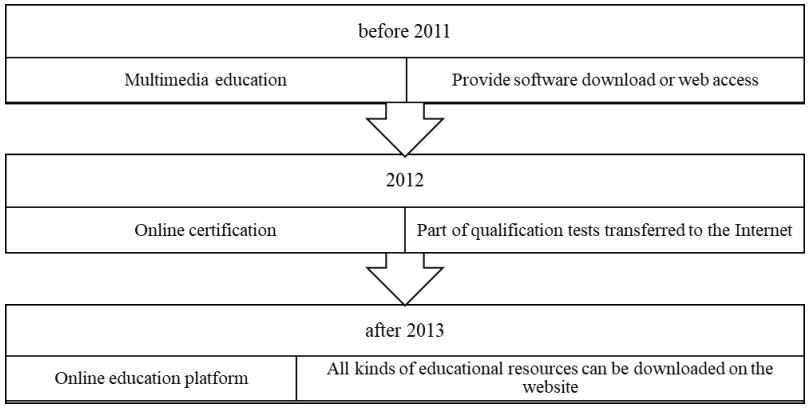

Figure 1 Flowchart

2 Current Education Model

2.1 Exam oriented education

The most important education model in China is still exam oriented education. The teaching method has changed from traditional classroom teaching to online and offline combination. Parents of students can know about their children's learning situation and course progress through learning groups, and students can also communicate and answer questions through learning groups. In the aspect of teaching, it has changed from teacher centered to student-centered, and more and more attention has been paid to the all-round development of students. It is no longer just to evaluate the quality of students by their achievements. The traditional examination oriented education can open a fair and just education mode, create a fair and just competition environment, and let students fully accept the basic knowledge learning. However, due to the one-sided emphasis on the subjects to be tested, the students' cognitive structure, knowledge structure and ability structure are incomplete; focusing on a few students, ignoring the development of most students; single teaching mode and method, stifling the development of students' personality; widening the gap between schools, resulting in the inequality between school development and students' education.

2.2 Open education

Open education enables everyone have right to enjoy education for life. Meanwhile, open education with low entry threshold and open objects; educational concept no restrictions; educational resources open and educational process, which can be carried out under the conditions of distance teaching and face-to-face teaching. Finally, online teaching resources are more and more abundant. at the same time, more and more teachers upload teaching videos to the Internet, so everyone has the opportunity to hear the same course taught by different teachers, and more choices.

Open course models have been in existence for some time, arguably starting with the libraries of

learning objects and materials created and freely distributed on the Internet over the last couple of decades. It could even be argued that public libraries were a form of open education with freely available content. Initially the model was content dominated with the student left to make what they could of the supplied materials. More recently, open courses have evolved where students are able to participate in online communities of similarly interested learners, and even gain recognition for their support of others.(Stephen Marshall,2012)

2.3 Flipped classroom

Different with the traditional classroom teaching model, flipped classroom readjusts the time inside and outside the classroom, transfers the decision-making power of learning from teachers to students, so that students can learn autonomously according to their own learning pace through information technology and digital equipment, and teachers become organizers, instructors and helpers of students' learning. In this teaching mode, the valuable time in the classroom enables students to focus more on active project-based learning, jointly study and solve the challenges of localization or globalization and other real-world problems, so as to obtain a deeper understanding. Teachers no longer occupy the classroom time to teach information, which requires students to complete autonomous learning before class. They can watch video lectures, listen to podcasts, read enhanced e-books, discuss with other students on the network, and check the required materials at any time. Teachers also have more time to communicate with everyone. After class, students plan their own learning content, learning rhythm, style and the way of presenting knowledge. Teachers adopt teaching method and collaborative method to meet the needs of students and promote their personalized learning. The goal is to let students obtain more real learning through practice. However, the current domestic students are not good at questioning and lack of initiative will directly affect the effect of flipped classroom.

2.4 Cultivate creative and innovative talents

Over the past few decades China’s higher education has gone through dramatic growth and multiple rounds of reforms accompanied by a remarkable amount of financial investment, all aiming at developing world-class universities to grow innovative talents. China has been very determined to cultivate creative and innovative talents to respond to the increased demand for the sustained development of its economic development and transforming its labor-intensive economy to an economy that is driven by knowledge and innovation.

2.5 Quality education

Quality education is a kind of education mode which not only emphasizes the learning achievements of the educated, but also aims at improving the quality and ability of the educated in all aspects, so as to make them develop in an all-round way. The fundamental purpose of quality education is to improve the national quality, so that all students can develop in a balanced way, promote the development of students' personality, and focus on cultivating students' creative spirit and practical ability. However, there is no scientific, clear and easy to operate plan on how to implement quality education.

3 Analysis of the Development Trend of Internet Education

3.1 Online education platform website traffic analysis

This paper uses the technology of web crawler to crawl and summarize the industry rankings and

Alexa Rankings of some online education platforms in the webmaster's home website[1] . Due to the Novel Coronavirus Pneumonia epidemic situation, various schools have adopted online teaching. The Alexa top and class ranked of five websites in Table 1 have increased significantly. The reason is novel coronavirus pneumonia is also becoming more and more popular as the popularity of Internet, the coverage of home network is increasing, students access to Internet is more convenient, curriculum resources are beginning to be shared and open, and the influence of new crown pneumonia is increasing.

Table 1 Ranking 1

	www.imooc.com		ke.qq.com		www.xuetangx.com	
	the Alexa top	class ranked	the Alexa top	class ranked	the Alexa top	class ranked
2020-04-19	1879	7	6	13	16587	21
2020-04-12	1933	7	6	15	17117	20
2020-04-05	1945	7	6	12	17117	18
2020-03-29	1931	7	6	11	16570	13
2020-03-22	1937	7	6	13	17343	15
2020-03-15	1952	9	6	15	18068	20
2020-03-08	2033	9	6	14	19438	17

Table 2 Ranking 2

	yuanfudao.com		study.163.com	
	the Alexa top	class ranked	the Alexa top	class ranked
2020-04-19	78181	36	164	52
2020-04-12	90258	33	167	49
2020-04-05	92935	50	172	45
2020-03-29	89848	34	178	47
2020-03-22	102019	60	180	50
2020-03-15	99618	61	186	51
2020-03-08	100012	75	192	48

3.2 Analysis on the attention degree of personalized training

This paper searches the three fields of “quality education”, “individualized education” and “innovation education” simultaneously by the Baidu Index Website[2], and finds that the change rate of the above fields compared with the same period of last year(cent year-on-year) and the link change rate compared with the previous period(Cent month-on-month) have increased. The reason has a lot to do with the fact that domestic education has paid more and more attention to the overall development of students and personalized training in recent two years, which will also be a major direction of teaching in the future.

Table 3 Search Volume

keyword	daily mean values	cent year-on-year	Cent month-on-month

[1] The webmaster's home website: https://top.chinaz.com/
[2] The Baidu Index Website: http://index.baidu.com

quality education	165490	1.58(↑)	1.99(↑)
individualized education	1592	-0.38(↓)	3.05(↑)
innovation education	374	14.05(↑)	-

4 Issues in Current Education Model

For open education, institutions need to demonstrate an active and visible responsiveness to legitimate societal and student expectations that education be cost-effective, flexible and modern. Technology must play a key role here in providing new pedagogical models and options. The value of elements of other models, such as the efficiencies provided by specialist teaching and support staff in the for-profit model, needs to be recognized. The dominance of research in the thinking and planning of institution leaders must be matched with a similar energy and focus on teaching. (Stephen Marshall,2012)

For flipped classroom, the model is beneficial to improving student teachers' technological competence; in general, it is suitable for higher education though it originated from secondary education. Nevertheless, the new model cannot do everything, for instance, it cannot meet the needs of those tasks which require face-to-face direction such as the operation and use of multimedia instruction system, or those where students are difficult to build practice situations. The proper way is a combination of the new model with the traditional teaching. (Ping Zhang,2014)

For determination of training innovative talents, while multiple educational reform initiatives have been adopted and implemented and a large amount of priority funding has been used since 1980s, the country's innovation ability and creativity has not significantly increased. The central control and the College Entrance Examination system are two hurdles and have to be significantly reformed before China can realize its dream of higher education.

5 Results and Discussions

Firstly, Against Novel Coronavirus Pneumonia, based on the era of big data, educational psychology and intelligent science, integrating AI+ big data technology, several online teaching platforms have fully achieved seamless convergence and deep integration of information technology teaching. Online teaching platform helps teachers and students to build "cloud classroom", achieving online "teaching" and "learning", so teachers can teach knowledge and students can learn at home. Many online learning platforms provide teaching video for free, which improves teaching efficiency and achieves good online learning effect. But at the same time, the main problem of online teaching platform is that students' concentration is not enough, because online learning cannot conduct face-to-face communication in the classroom and accurately locate students' abilities, there are often problems and limitations such as one-way evaluation, neglect process evaluation, and simple evaluation forms. website can analyze and process each student's learning states through the technology of the big data.

Secondly, the development of new technology has shaken the foundation of the traditional education system, relieved all the technical restrictions of the existing schools since the industrialization era, and established the foundation of the technical realization of the new education form and school form in the digital and intelligent era. Point at this present situation, the direction of future education will be from passive learning to autonomous learning, from individual learning to communicative learning, and various elements such as schools, teachers, learning and courses will be redefined.

Thirdly, with the rapid development of social economy, there will be more and more demands for all kinds of innovative talents and professional talents. However, there are only a few innovative talents standing on the top of various industries and fields. Therefore, there will have more attention paid for the cultivation of innovative talents and professional talents in the future. At the same time, technology in the era of big data will greatly help analyze the characteristics of students and the abilities of teachers, and promote the individualized training of students and the full use of teachers' resources, thus achieve the goal of personalized teaching.

6 Conclusion

Under the background of big data, "cloud classroom" will be more and more extensive, digital education form will be combined with traditional classroom teaching, and digital campus construction will be gradually improved. But simultaneously, in the face of students' lack of concentration, the major online education websites themselves should also make corresponding strategies, maybe can analyze and process each student's learning states through the technology of the big data. At the same time, with the rapid development of economy, there will be more and more demands for innovative talents and professional talents, and increasingly social pressure for everyone, learners will be more active in learning, so as to realize the learner centered teaching principle. In addition, the overall development of students and the individual cultivation will become an inevitable trend. Therefore, the teacher's assessment indicators may be redefined. In addition to teaching knowledge to students, teachers need to fully understand students, so as to achieve personalized teaching. But it is difficult for a teacher to achieve all-round development in the face of too many students, so the matching teaching between students and teachers may be realized through big data technology.

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Study on the Adaptability of Innovating International Cultivating System Reform in WUT

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Abstract: In recent years, it's a significant topic to discuss how to carry out international education training for local college students in China. Wuhan, the city with the largest number of universities and graduates in central China, lacks of international cultivation education and research background when compared with the cities along the coast. It has been established a new international school, that is the International School of Materials Science and Engineering (ISMSE) in Wuhan University of Technology (WUT) , to explore the adaptability of international education reform on cultivation of top-notch innovative talents during 2015. This work taking ISMSE's internationalized strategy as an example. A survey is conducted on students' satisfaction with innovative model of ISMSE, in particularly in the English teaching aspect. The results show that the international courses can basically guarantee the quality of teaching effectiveness to some extent. This mode will be improved in some aspects in the future such as students' ability of language skill, the effective interaction between teachers and students, and the attraction of course content. It still needs time to fully adapt the international curriculum refom in WUT from the policy way.

Keywords: Innovating international cultivation; Satisfaction survey; Adaptability; WUT

1 Introduction

The world has changed with such a speed that never seen before. Innovation-driven development prevails in all fields of our country, especially in higher education (Altbach and De, 2015). At the National Education Conference, General Secretary Xi Jinping clearly proposed to "expand the educational opening and enhance the influence of China's education in the world", which defined the development pattern of educational opening. The implementation of international cultivation helps to improve students' cross-cultural ability, develop students' international vision, and come in touch with a large number of international forefronts of professional knowledge and skills (UNESCO, 2018). In addition, international education training work can enhance the core competitiveness of the student, and encourage students to achieve all-round development (Zhong , 2019).

When international researchers and research institutions want to seek partnerships in China, they tend to visit Shanghai and Beijing first, rarely considering other cities including Wuhan. Universities in Wuhan are determined to change such situation. These universities have adopted the strategy of going the extra mile for establishing international collaboration. The number of university students in Wuhan city ranks first in the world (Textor 2020). Studying the international training mode would improve the quality of innovation and entrepreneurship talent training, and then provide insights on various types for the national entrepreneurship strategy of Wuhan (Gu, 2011). College graduates with international awareness, vision, communication ability and competitiveness are gradually becoming the backbone of Wuhan colleges and universities to implement the "One Belt And One Road" strategy (Li *et al.*, 2020).

Therefore, studying how to effectively innovate the mode of international collaborative talent training in universities in Wuhan city is worth.

Higher education universities in Wuhan has embarked on the journey of innovation, leveraging their strengths in the pursuit of being front-runners in some particular field (Zhen *et al.,* 2010). Some institutions have planned to further strengthen their competitive advantages inside China and developed the strategy of "going global" with those advantages (Dong, 2001). For instance, China University of Geosciences (CUG) has concentrated on developing its fundamental strength-Earth Science and made great efforts to be globally recognized in this field (Deng *et al.,* 2010). Wuhan University of Technology (WUT) decided to foster international cooperation in 2011 to improve its research capability. The university started by employing junior researchers with rich research experience from abroad. The Vice president of the university stated that setting up a lab for the young researchers at the WUT would enable them to continue contact with their previous mentors and create joint labs with universities overseas. WUT has a total of 26 innovative centers of research with globally recognized laboratories. WUT's strategy makes it more likely to outperform other universities in Beijing and Shanghai. Foreign scientists have brought a new outlook to Wuhan universities and are making China's universities more competitive in the world.

This work takes the ISMSE in WUT as an example and analyze its internationalized talents cultivation strategies, such as establishing internationalized governance and operation system, completing the top-notch innovative talents cultivation, and improving the international curriculum system. Those strategies are very helpful to create an international learning atmosphere. A investigation of students' satisfaction with the international curriculum will be conducted based on above strategies.

2 Implementation of Innovative Talent Training Mode in WUT

2.1 ISMSE of WUT

Driven by the "National innovation driven development strategy" and the great demand for national higher education reformation, ISMSE was selected into the list of "Network of International Centers for Education" plan as one of the 16 international schools all over the country ,which is supported by the State Administration of Foreign Experts Affairs and Ministry of Education of P. R. C. in June 2015. Also, ISMSE is devoted to building a world-leading MSE discipline through optimizing a high-level research and teaching team, constructing an innovative training pilot zone and establishing an innovative talents training system.

2.2 The objectives of internationalized talents cultivation

According to the national innovation driven development strategy, WUT is devoted to building the global influential leader in innovative talent cultivation base and knowledge innovation base in the field of materials sciences, bringing new ideas to international collaborative management system. The specific objectives of top-notch innovative talents cultivation list such as establishing internationalized governance system, importing world-leading expert team, training top-notch innovative talents and cultivating world-class discipline in materials field.

2.3 Establishing governance and operation system with international standards

ISMSE constructed a modern system of governance, which covers the administrative committee, the professor committee, the dean who take full charge of school management and the international third-party conducting evaluation. In terms of their duties, the administrative committee conducts strategic

decision, and the professor committee making academic review and assessment. Also, ISMSE conduct college management mode with international standards and management system of personnel training, which based on the international material education front. In order to maximum guarantee the cultivation environment, selection mechanism such as "selection system of excellent students", "full tutorial system" "inflows - out performance management system" are established. All these provide a solid foundation and financial guarantee to innovate the international collaborative talent training mode (ISMSE, 2020).

2.4 Constructing the top-notch innovative talents cultivation

Home-grown student international cultivation refers to the concept that atmosphere on campus is highly internationalized with internationalized teaching resources, the scientific research resources and cultural resources for local university students (Guo, 2015). ISMSE also encourages students to participate in various international academic and cultural exchange activities, and cultivates the local international awareness, international vision, communication skills and the international competition ability of school students.

For innovating the top-notch innovative talents, ISMSE take the initiative to draw lessons from foreign top universities related professional training standards. This cultivation strengthen the scientific research and innovation ability such as consolidating technology frontier theory, critical thinking ability, team cooperation ability and other comprehensive ability and quality training.

2.5 Improving the international curriculum system

ISMSE values the innovative ability as one of the core capabilities and provides students with a comprehensive curriculum. This curriculum system covers comprehensive knowledge of materials frontier, including materials science, life science, energy science, environmental science, information science and advanced manufacturing science. What is more, ISMSE established high-level international collaborative teaching and research team. Professors from world famous universities make up 2/3 of the teaching team.

In the process of optimizing the international curriculum system for local students and enriching the curriculum content, the original overseas textbooks were actively introduced. International courses, which include co-built courses by renowned Chinese and foreign professors, full-English video courses, full-English open online courses, etc., account for 74% of the total training program courses. ISMSE also attaches importance to students' professional practice, which actively builds practice base, and provides students with opportunities to participate in overseas production practice.

3 Students' satisfaction of the international curriculum are improved

In order to better understand the adaptability of reforming the international curriculum system, a survey is conducted on students' satisfaction. The satisfaction survey consisted of 13 questions for roughly 300 freshmen to junior undergraduates in ISMSE about the full English teaching from 2019 to 2020. The questions of students' satisfaction survey as showed in Table 1.

Table 1 The Questions of Students' Satisfaction Survey in 2019 and 2020

	The questionnaire questions	Objectives of survey
1	Does full-English teaching guarantee the quality of the course?	To understand the teaching process and methods of international courses
2	Does the course content meet the practical needs of students?	
3	Whether the teaching content is comprehensive?	

4	Whether the teaching methods have been improved?	
5	What kinds of course assessment methods are included into the final scores?	
6	Whether to use textbooks or handouts in a foreign language?	
7	Whether totally marking the assignments in foreign languages?	
8	What is your satisfaction with teacher's oral English?	
9	What is your satisfaction's interaction in class?	To evaluate the teachers' teaching ability of international courses
10	Does the teacher give me timely and valuable feedback on my learning after an assignment or test?	
11	Does the teacher's feedback could help me understand how to improve my learning?	
12	What is your satisfaction with the full English curriculum?	
13	What is your suggestions and comments on full English curriculum in our school?	To understand the problems in the teaching process

The aim of those questions is to improve the teaching quality of international courses. Specifically, the goal of this survey is to understand the teaching operation in class and students' satisfaction when the international curriculum system adopted. This paper would analyze the improved satisfaction and discuss the problems in the teaching process.

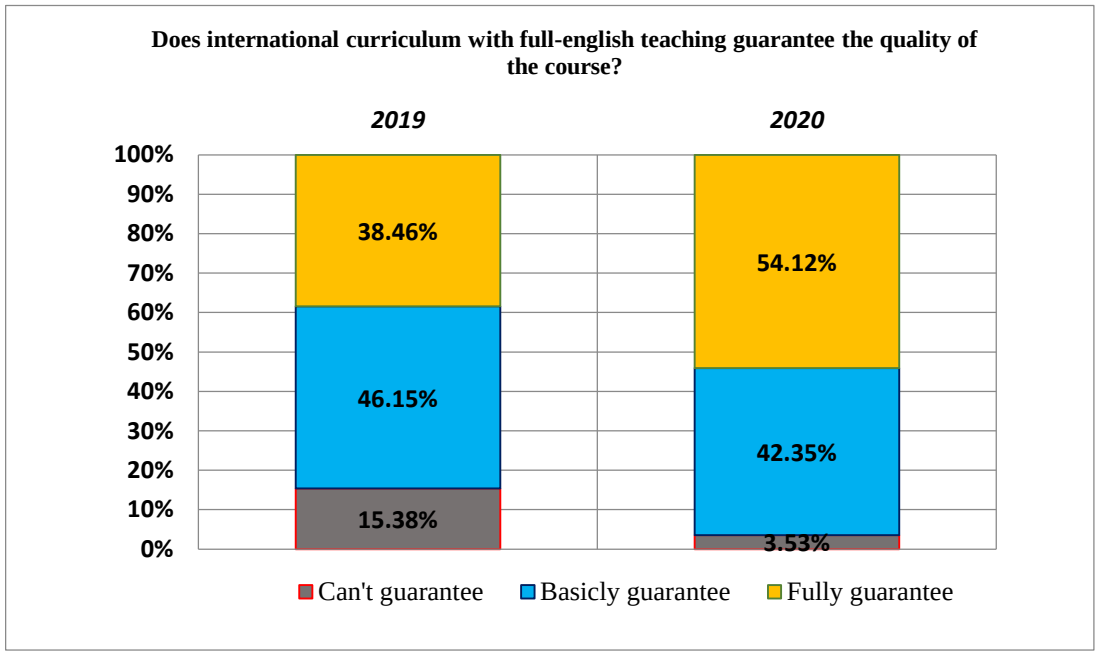

Figure 1 The Trends of Students' Satisfaction from 2019 to 2020

According to the survey, in 2019, only 38% of the student are fully satisfied and around 15% of the students considered that such curriculum cannot guarantee the course quality. In 2020, approximately 55% of the students are fully satisfied, and the number of "cannot guarantee" also decreases apparently.

To best understand the problems in the teaching process, the author also interviewed twenty students who do not satisfied the course in 2020. Results show that this could be closely related to students' ability to absorb English, especially for the freshman. Through talking with the interviewee, this work also find effective interaction between teachers and students in classes, and whether English teaching content was attractive stand out. In the other side, .for the teacher's initiative, even the returnees who are introduced

through talents plan, are not very enthusiastic about offering all-English courses. The main reason is related to the current professional title evaluation system in colleges and universities. Thirdly, the construction of all-English courses needs a long period. If the teaching content fails to be closely related to the actual acceptance ability, it will also restrict the absorption ability of students in the process of international education training to some extent.

Further, the operation of international courses should not only be investigated from students' perspective, but also from the perspective of teachers' teaching satisfaction. A more detailed investigation could be conducted in the future to understand how to update the teaching content, improve teachers' enthusiasm for teaching, and how to ensure the goal of talent cultivation in English courses.

4 Conclusion

As the third biggest center of education, science and research in China, WUT needs to continue improving its international cultivating system. This paper took ISMSE of Wuhan University of Technology as a case study and briefly introduced its measures of cultivating international talents, which is improving the establishment of international curriculum system, establish the school's governance model and talent cultivation management system in line with international standards.

The investigation of the satisfaction of students shows that the innovation of international curriculum cannot fully guarantee the quality of curriculum. Feedback from students show that this is closely related to the teaching method, teaching content and enthusiasm of teachers .At the same time, the reform of the school's international talent training mode needs policy support from various aspects. In this way, it can cultivate talents with international vision and competitiveness and provide talent support for China to carry out the "One Belt And One Road" strategy and realize the great rejuvenation of the Chinese nation.

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Research on Safety Monitoring Index System of Government Data Disclosure

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Abstract: In recent years, the Chinese government has paid more and more attention to the disclosure of government data and has achieved good results. However, due to the wide range of government data, we need to pay attention to the problems and phenomena such as privacy security management, public opinion guidance and so on. It can be said that if the data released by the government is not combined with perfect supervision methods, then the consequences may be incalculable. In this paper, Statistics, Management, Market Research, Natural Language Processing and other related methods are used to put forward the concept of monitoring the public security of government data. The paper evaluates from privacy security management, public opinion monitoring, public satisfaction, data disclosure process security and so on, and finally constructs the government data disclosure security monitoring index system.

Keywords: Government data; Data disclosure; Safety monitoring; Index system

1 Introduction

With the rapid development of modern science and technology, we are in an era of explosive growth of data under the background of the integration of science and technology and society. If we can effectively open up and use data, we can make a huge difference in our world. Government data, as the most authoritative and comprehensive data source, plays an important role in this process.Government data mainly refers to the data collected or generated by the government and its subordinate departments in the administrative process or in the performance of their functions in accordance with relevant laws and regulations. These data are usually summarized by some departments. Let's take COVID-19 in 2020 as an example. The disclosure of data related to the epidemic led by the Chinese governments can help the people to understand the epidemic situation around them in a timely manner to a certain extent, so as to protect them in a timely manner, which lays a certain foundation for winning the crucial battle of epidemic prevention. However, the problems exposed in this process, such as personal privacy data security and improper guidance of public opinion, also deserve our attention.

Focusing on government data disclosure, domestic research mainly focuses on the data transmission and management mechanism that may be encountered in the data disclosure process from the perspective of computer science. For example, Zhu Yan and others mainly focused on institutional management and the computer involved. They constructed the government affairs big data security framework(Zhu Yan, Liu Guowei, Wang Jing, 2019）.Zhou Chao and others used big data security architecture as the research content to build a risk assessment system for big data systems from multiple dimensions(Zhou Chao, Pan Ping, Yang Li, Pan Junyu, 2017); internationally, because the government data disclosure process in other

countries is more mature, the research on government data in recent years has mainly paid attention to how to better play the role of government data in the process of data use. For example, Kenneth J. Knapp and others used information security common body of knowledge to categorize audit findings and identify the key issues from the reoccurring findings in the reports(Knapp K J, Denney G D, Barner M E, 2011). Wang Zhiying and others use information value chain theory and IT affordances theory, building a research model to investigate the underlying mechanism of business analytics affordances enhancing the management of cloud computing data security(Wang Zhiying, Wang Nianxin, Su Xiang, et al, 2020).

2 Challenges of Government Data Disclosure

According to the field survey and the literature analysis, we propose that the government data disclosure is facing three challenges. One is the problem of "Government Data Island". At present, although the government departments have set up many different data platforms, data platforms of various departments have not formed a linkage mechanism, and the platforms are in a relatively isolated state, which is not conducive to the effective utilization and sharing of data. Secondly, the government data lacks a unified standard for hierarchical use. The data published by the data platforms of various departments is only a small part, and a large part of the data is not disclosed due to the lack of data classification and data security concerns. Thirdly, there is a lack of means of public opinion monitoring. At present, some government departments are worried about the impact of public opinion caused by data disclosure, but they have no effective means of public opinion monitoring, which further hinders the effective disclosure of government data.

3 Data Classification

In order to construct the safety monitoring index system of government data disclosure, the government should first deal with the data desensitization and data declassification according to relevant laws and regulations and the actual situation based on the original data collected or generated by the government according to the importance and confidentiality of the data, and then sort out and fuse the data, Form government open data. Finally, the data security audit department of the government classifies the public data according to the classification standard of government open data (the classification example is shown in the table below) and constructs the government data open database. The relevant grading standards come from field investigation and literature analysis.

Table 1 Data Classification

Confidentiality level	I	II	III	IV
Classification name	General data	Desensitization data	Decryption data	Closed data
Classification criteria	Data that does not involve any privacy, confidential content-data,and can be directly disclosed	Data that has been desensitized in accordance with relevant laws and regulations and the actual situation	Data that has been declassified in accordance with relevant laws and regulations	Data involving state secrets and other contents that cannot be disclosed after processing

4 Safety Monitoring System for Government Data Disclosure

Based on the knowledge of related disciplines and the actual situation of government data disclosure, we build a government data disclosure security monitoring system from the perspective of three first-class indicators: data disclosure process security, public opinion monitoring, and public satisfaction.

Table 2 Safety Monitoring System for Government Data Disclosure

	Primary index	Secondary indexes
Safety monitoring index system of government data disclosure	Safety of data disclosure process	Safety of hardware facilities
		Safety of software and technology
		Safety of management
		Safety of data storage
		Safety of data disclosure
		Guarantee of laws and regulations
	Public opinion monitoring	Communication rating
		Emotional tendency
		Depth of public opinion
	Public satisfaction	Government's image
		Expected quality
		Perceived quality
		Perceived value
		Public complaints
		Public satisfaction
		Public trust

4.1 Safety of data disclosure process

The process of data disclosure includes three stages: the generation, storage and disclosure of government data, which involves privacy security, data security and other aspects. In the process of data disclosure, data desensitization, data decryption, digital watermarking and other technologies can ensure the privacy of data to a certain extent, but it can not intuitively show the degree of data privacy security and data privacy protection. The evaluation of data disclosure process is to identify the hidden risk and unstable factors in the operation process of relevant processes and systems, and to provide certain solutions and risk assessment results through quantitative or qualitative statistical research methods, so as to lay a solid foundation for the operation of relevant processes and systems.

The first level index of data disclosure process security is set according to the government's daily work of database management, laws and regulations, and there are six secondary indicators. The first secondary indicator is the safety of hardware facilities, which involves the computer hardware equipment

required in the process of government data disclosure, which can be evaluated from the perspective of equipment safety protection, timely updating of equipment and regular maintenance of equipment; the second secondary indicator is software and technical safety, which involves the software and related technologies used in the process of government data disclosure Technology, can be from the network security, data desensitization and declassification technology, data traceability and other aspects of the development of standards for evaluation; the third level of indicators for management security, can be from the quality of management personnel, database management, the improvement of relevant laws and regulations; the fourth index is data storage security, which can be from access control, data backup, data traceability and other aspects The fifth secondary index is the security of data disclosure, which can be evaluated from the aspects of channel security, data interface security, personnel certification, etc; the sixth secondary indicator is the safety of laws and regulations, which can be evaluated from the applicability, perfection, and timely updating of laws and regulations. The security data sources of data disclosure process mainly include the daily assessment and relevant inspection of the government and data disclosure platform, and it is necessary to take census or sampling survey according to the actual situation.

4.2 Public opinion monitoring

For the data disclosure, it is an important aspect to ensure the accuracy and authenticity of data and the privacy of citizens. However, after the data is published, the possible dissemination of public opinion and the possible impact of public opinion can not be ignored by the government.

At present, Public Opinion Transmission Channels in China mainly include microblog, news and forum. Taking microblog with the largest amount of communication and influence as an example, according to the actual characteristics of microblog and some experience gained from related events, combined with natural language processing and deep learning, from the perspective of communication, this paper constructs the second level index public opinion monitoring under the government data disclosure security monitoring index system.

There are three secondary indicators under public opinion monitoring. The first indicator is communication evaluation, which is measured separately from the microblog subject and the blogger subject. Among them, the microblog subject can be evaluated from the current number of forwarding, likes and comments. The blogger subject can be evaluated from the total number of followers, historical average likes, historical average forwards and historical average comments. The second level indicator is emotional tendency, which we evaluate from the emotional words and expressions. Among them, emotional words can be combined with natural language processing technology to judge the emotion of microblog from the number of positive energy words; expression can be combined with deep learning to judge the emotional and family relationship direction represented by expression; the third secondary indicator is the depth of public opinion, which we evaluate from sensitivity, harmfulness and focus range. Among them, the sensitivity can be judged by the level of data involved (such as the data rating above), the harmfulness can be judged by harming public privacy, harming public security, harming national security, and the scope of attention can be judged by setting standards from the provinces affected by public opinion, geographical location and other aspects; the fourth second level indicator is the diffusion trend, and we can judge from the microblog owner body and diffusion range were evaluated. Among

them, the microblog subjects can evaluate from the unit time forward volume, unit time comment volume, hot search change trend, etc., and the diffusion range can be evaluated from the perspective of the unit time diffusion range of provinces and cities.

The construction of public opinion monitoring indicators can grasp the public opinion guidance caused by data disclosure from the source and process, and provide important reference for government decision-making, so as to make relevant countermeasures in time. The data source of public opinion monitoring can be obtained from the means of network crawler, and can also be directly connected to the corresponding database for data processing in cooperation with relevant companies.

4.3 Public satisfaction

In the entire process of government data disclosure, it is necessary to consider not only the provider, that is, the security of government data, but also the rights of data owners and users. Its rights and interests are first reflected in privacy protection, which can be achieved through technical guarantee and related system monitoring; secondly, it is reflected in the collection and feedback of suggestions and opinions after the public has used the data disclosure platform and used the data.

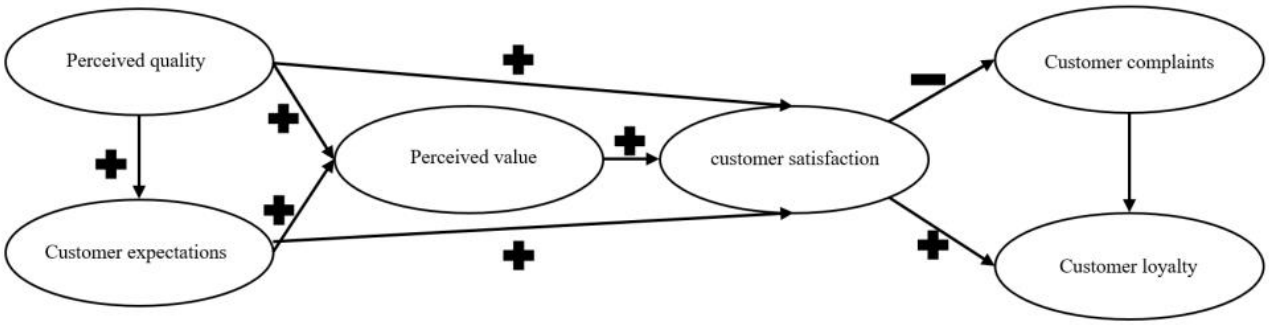

Figure 1 ACSI Model

From the point of view of ACSI model, construct the index system related to public satisfaction, collect the feelings after using the platform, timely make suggestions and problems feedback, find a new model for the quality assurance of relevant platforms and data, and provides theoretical and data support for the government to make decisions and formulate related policies.On the basis of the actual situation and relevant theories, the third level index public satisfaction under the government data disclosure safety monitoring index system is constructed. Public satisfaction is achieved through questionnaire survey, and the data source is mainly the user data collected in the questionnaire survey.

The first secondary indicator is the image of the government. We design questionnaire questions from two perspectives: the credibility of the government's open data and the degree of communication between the government and the public; the second level is expected quality. We design the questionnaire from the perspectives of data reliability and data integrity. Among them, data reliability focuses on the timeliness of data disclosure, data quality, platform service quality, data integrity focuses on the scope of data disclosure, involving data quantity; the third secondary indicator is perceived quality. We design the

questionnaire from the perspectives of platform use and data use. Among them, platform use focuses on data acquisition fluency, platform cleanliness, troubleshooting timeliness and other aspects of evaluation, data use focuses on data integrity, data authenticity, data timeliness; the fourth secondary index is perceived value. We design the questionnaire from two aspects of data value and platform value; the fifth secondary indicator is public complaints. We design the questionnaire from the data complaints and platform complaints. Among them, data complaints can be measured from public complaints about data quality, data quantity or other aspects. Platform complaints can be measured from public complaints about platform processes, platform pages or other aspects; the sixth secondary indicator is public satisfaction. We design the questionnaire from the perspectives of platform satisfaction and data satisfaction. Both of them measure the comparison between the public data disclosure platform and other platforms from the platform itself and data perspectives. The seventh secondary indicator is the public trust. We mainly design the questionnaire from the perspective of the public's willingness to use. It mainly measures the willingness of the public to use the data platform for the first time and choose other data platforms after use.

5 Conclusion

In the world, it has become a consensus to reasonably open data and effectively use data. Through the opening, processing and mining of data to serve the development of the country, social progress has become a trend. In this paper, combined with the knowledge of related disciplines, from three aspects of data disclosure process, public opinion monitoring and public satisfaction, the government data disclosure security monitoring index system is constructed, and some construction ideas are given, which can provide a theoretical support for the relevant government departments to better open data and use data.

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The Influence of Manager's External Relations and Dual Learning Capability on Innovation Performance of Start-up

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Abstract: This paper combines the sample data of university student entrepreneurs, and the empirical analysis results show that: Manager's external relations have a positive impact on the dual learning capability and innovation performance of start-up; the exploitative learning capability has an inverted U-shaped effect on the innovation performance , while the exploration learning capability has a positive impact on the innovation performance of start-up. The conclusion of the study confirms the important role of management relationship and the dual learning capability in improving the innovation performance of start-up, which can provide practical reference for entrepreneurial college students to innovate.

Keywords:Manager's external relations; Dual learning capability; Start-up; Innovation performance

1 Introduction

In recent years, scholars advocate the construction of open innovation ecosystem and emphasize that enterprise innovation management should attach importance to the linkage with external subjects(Mao Guanfeng,2018). With the rapid development of technology and the rapid change of market, the life cycle of products is shortened, the speed of upgrading is accelerated, the innovation behavior relying solely on the enterprise's own R & D activities is constrained, and the enterprise gradually turns to extroverted open innovation(Li Qian,2019).Manager's external Relations provide a space for start-up to develop their business by acquiring market knowledge and technical knowledge through the relationship between enterprise manager and external network agents, as well as various management techniques. At the same time,organizational learning theory holds that organizational learning is an important way to accumulate knowledge, and organizations must constantly learn to cope with the rapidly changing internal and external environment, keep pace with the times, and realize the advantages in advance. March first proposed the general idea of organizational binary learning, and divided into exploration learning and exploitative learning capability according to different learning methods; and empirical research clarified that binary learning methods have a positive promoting effect on innovation performance (March ,1997). start-up needs to have the ability to seek, practice and explore and constantly learn external information suitable for innovation and development, and innovate knowledge and skills, so as to enhance the enterprise's own dual learning capability, and then help the enterprise to carry out effective dual innovation activities to enhance the enterprise's innovation performance(Ma lan et al,2016).This paper combines the relevant literature of innovation research at home and abroad, and finds that scholars basically think that the improvement of dual learning capability is beneficial to enterprise innovation(Lee D et al,2017), but excessive use and dependence on external knowledge and information may make start-up lose the motivation of change.So how should start-up managers effectively use external relationships to support start-up innovation? And how to grasp and use different types of organizational learning capability to achieve good innovation performance? These questions remain to be answered. In order to

explore the above problems, this paper takes the initial enterprise as the research object, and constructs the theoretical model of "Manager's External Relations(MER) — Dual Learning Capbility(DLC) — Innovation Performance of start-up(IP) " to carry out empirical research.

2 Theoretical Analysis and Research Hypothesis

2.1 Manager's external relations and innovation performance of start-up

In the initial period, the foundation of enterprise's innovation and development is weak and the internal innovation resources are scarce, the external relationships can effectively alleviate the constraints of organizational resources, thus promoting the smooth development of enterprise innovation activities. At the same time, start-ups are difficult to obtain economies of scale, so their competitive advantages are mainly reflected in product or service differentiation and cost leading, which require more external support[6].Scholars have found that open relationships contribute to improving the ability of entrepreneurial enterprise to access resources and develop opportunities[7].A survey of 241 Chinese enterprises by Shibin Sheng and other scholars found that manager's business relationship is a strategic resource that helps to obtain market information and sales channels outside the system and whether partners are reliable and trustworthy[8].Political ties can help companies gain access to scarce resources in government[9].Manager's business and political relationships provide an additional resource to start-up, and the more manager can make full use of their external network relationships, the faster they can bring external support such as capital, market, information and so on to start-up innovation, the more they can improve their innovation performance. Therefore, the following assumptions are made:

H1:Manager’s external relations has a positive correlation with the innovation performance of start-up

2.2 Manager's external relations and dual learning capability of start-up

The construction of enterprise's dual learning ability requires the exchange of information, transmission and knowledge through the external relations of manager[10].From the definition of dual learning capability at home and abroad, we can see that there is still no unified definition of the connotation of . This study refers to the view of March that exploratory learning capability is regarded as the ability of enterprises to acquire new knowledge by using external knowledge which is separated from the original knowledge system. Exploitative learning capability is defined as the ability of an organization to learn through proximity search, experience refinement, and selection and reuse of existing practices.

Single learning ability makes enterprise specialization or centralization unable to adapt to the environment of multiple innovation to achieve independent innovation, and the external relationship of managers is conducive to organizations through learning and accumulation to promote the improvement of enterprise dual learning ability[11]. Both exploratory learning ability and exploitative learning ability can not be separated from the collection and integration of external resources[12].External heterogeneity information and knowledge can help entrepreneur to develop new opportunities to promote exploratory capability without sticking to the existing knowledge base. In addition, the introduction of external resources can also help enterprise to learn, imitate or refer to benchmarking enterprise, thus integrating multiple resources to implement self-improvement, that is, to promote the use of learning capability.Therefore, the following assumptions are made:

H2a:Manager's external relations have a positive correlation with the exploratory learning capability

H2b:Manager's external relations have a positive correlation with the exploitative learning capability

2.3 Dual learning capability and innovation performance of start-up

Dual learning capability includes two dimensions: exploratory learning capability and exploitative learning capability[3].Exploratory learning capability focus more on novelty opportunities, such as designing differentiated new products and introducing industry-leading new technologies and so on, these activities help enterprises to achieve breakthrough innovation and development[13].In addition, exploratory learning capability can promote entrepreneurs to reorganize internal resources, thereby enhancing the innovation ability of start-up. However, exploratory learning requires companies to bear higher risks and costs, while start-up has limited resources, lacks the strength to resist high risks, and can not afford the resulting threat of failure[14].Exploration-based organizations with higher learning ability tend to carry out breakthrough innovation activities, while start-up lack experience and may produce problems such as high application conditions of new technologies and inaccurate judgment of customer needs in new markets[15]. Therefore,the following assumption is made:

H3:There is a U-shaped relationship between exploratory learning capability and innovation performance of start-up.

Exploitative learning capability can enable enterprise to improve the application level and value of existing knowledge accumulation more efficiently, thus laying the foundation for developing current technology, products and processes. Chen Kanxiang et al. Scholar noted that the most effective way to promote innovation was to make full use of and improve existing knowledge accumulation[16]. That is, the more frequent the enterprise use learning, the higher the speed and efficiency of using and transforming the existing knowledge, and then improve the enterprise innovation efficiently and quickly. In addition, when enterprise invests resources to promote their exploitable learning capability, employees will be integrated into this culture of continuous improvement and learning, and the enhancement of employees' learning capability and the accumulation of knowledge reserves will effectively promote the occurrence of innovative behavior. However, organizational exploitable learning capability is a conservative and innovative capability[11].It is easy for start-up to lose their motivation for change, and in the long run it is difficult for them to adapt to changes in the external environment. Therefore, the following assumption is proposed:

H4:There is a U-shaped relationship between exploitable learning capability and innovation performance of start-up

The relationship between Manager's External Relations(MER), Dual Learning Capabilities(DLC) (include Exploratory Learning Capability (ELC_1), Exploitative Learning Capability(ELC_2))and Innovation Performance of Start-up(IPS) is shown in Figure 1 below:

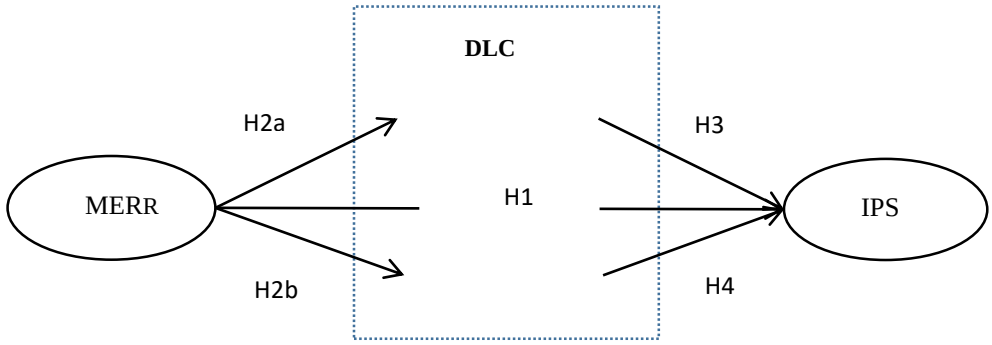

Figure 1 Conceptual Model

3 Research Design

3.1 Data collection

The research object of this paper is the entrepreneurial group of college students, according to the definition of start-up in academic circles. All the sample enterprises were established within 8 years. In the selection of sampling objects, the uniformity of sample distribution was fully considered, a total of 250 questionnaires were distributed ,173 valid questionnaires were recovered, and the effective rate of the questionnaire was 69%. The research object of this paper is start-up small and micro enterprises; from the years of establishment, most enterprises are in the period of creation and growth, of which 133 are established within five years, accounting for 67.2%.

3.2 Variables Research and Measurement

In this study, the variables were measured using the mature scale which has been used in domestic and foreign literature.For the measurement of external relations of manager, this paper mainly refers to Xia Bin and Yang Rui's views. For the measurement of dual organizational learning ability, this paper refers to the research of Du Yueping and Wang Huanhuan[16]. For the measurement of innovation performance of start-up, refer to Wu Songqiang and Wang Tingting's research[17]. The items of measurement are shown in table 1. These variables are further controlled because of the impact of firm size, age, type, environmental dynamics and R & D intensity on innovation performance.

Table 1 Results of Exploratory Factor Analysis and Reliability Test

Variables	Indicators	Factor load	Cronbach values
Manager's External Relations(MER)	Realistic partners that have helped the business	0.721	0.813
	Entrepreneurs met through networking	0.674	
	Number of potential partners through various means	0.768	
Exploratory learning capability(ELC_1)	To transform or subvert existing processes and technologies	0.694	0.802
	Strong new product development capability	0.756	
	Accurately perceive and identify new market needs	0.711	
	To tap into existing market potential	0.753	
Exploitable learning capability(ELC_2)	Will mimic the technology	0.820	0.805
	Improve existing product functionality	0.740	
	New product development is faster than competitors	0.797	
Innovation Performance of Start-up(IPS)	Innovative projects have higher success rates than major competitors	0.734	0.833
	The proportion of new product sales to total sales is increasing	0.681	

3.3 Factor analysis and reliability test

Firstly, statistical software is used SPSS20.0 test the reliability and validity of all indexes and data. The test results of reliability and validity of questionnaire construction are shown in Table 1. all the Cronbach's Alpha values of the four latent variables in this study were above 0.8 and greater than 0.7(as shown in table 1), indicating that the questionnaire had high reliability.It can be seen from Table 2 that the factor load of the index factors in this study is greater than 0.5 between 0.67-0.82, which indicates that the factors selected by each variable are effective, and the results of confirmatory factor analysis show that the fitting indexes of each variable meet the standard requirements, indicating that the scale has good structural validity.

Table 2 Verification Factor Analysis Results

Variables	X^2/df	RMSEA	NFI	CFI	GFI	IFI
MER	2.769	0.065	0.931	0.935	0.944	0.926
DLA	2.896	0.083	0.905	0.914	0.926	0.910
IPS	3.012	0.075	0.913	0.939	0.952	0.923
Standard values	<5	<0.1	>0.9	>0.9	>0.9	>0.9

3.4 Descriptive statistical analysis and correlation test

In this paper, descriptive statistical analysis and correlation analysis between variables are carried out, and the results are shown in Table 3. The correlation between two-phase relation numbers of each variable is significant, which provides a preliminary basis for hypothesis verification.

Table 3 Descriptive Statistics and Correlation Statistics

Variable name	Mean	Standard deviation	MER	ELC_1	ELC_2	IPS
MER	3.343	0.978	1			
ELC_1	3.426	1.141	0.134*	1		
ELC_2	3.520	1.135	0.252**	0.102	1	
IPS	3.308	0.974	0.196*	0.238**	0.155*	1

Note :* indicates p <0.5,** indicates pp <0.01

4 Results of Evidence Analysis

Based on SPSS statistical analysis software, Using stepwise regression analysis, The results are that: Model 1 analysis shows, The influence coefficient of three control variables, namely, student cadre experience, entrepreneurship education experience and promotion of start-up to science and technology industry, is significantly positive. That all of these factors contribute to the innovation performance of start-up, However, the degree of management, the age and size of the start-up did not have a significant impact. In model 2, The external relationship of managers significantly affects the innovation performance of start-up, H1 passed the test. The results confirm the importance of manager relationships for start-up innovation.In model 5, ELA_2^2 has a negative effect on innovation performance (β=-0.170, P β=0.05), we can see that the learning ability has an inverted U-shaped effect on innovation performance; the exploration learning ability has a positive effect on innovation performance (β=0.163, P β=0.05). therefore, the H3 only partially passes the test. This result shows that college students' entrepreneurial experience and innovation ability are not strong, some extent hinders the improvement of innovation performance of start-up . Exploratory learning ability can continuously promote innovation performance, which may be due to the fact that the application of exploratory learning ability by college students

entrepreneurs has not reached the inflection point, so the marginal utility of exploratory learning ability is still positive.In model 7, model 9, indicating that the manager external relationship has a positive effect on the organization's dual learning ability.so, H2 pass the inspection. The results show that the external relationship of managers is conducive to the continuous promotion of organizational dual learning ability.

Table 4 Results of Regression Analysis

Variable name	Model 1 EIP	Model 2 EIP	Model 3EIP	Model 4 EIP	Model 5 EIP	Model 6 ELC_1	Model 7ELC_1	Model 8ELC_2	Model 9 ELC_2
Management degree	-0.019	-0.015	-0.006	-0.008	0.002	0.096	0.080	0.072	0.052
Student cadres	0.126*	0.088	0.069	0.085	0.049	0.082	0.054	0.034	0.039
Entrepreneurship education	0.206*	0.184*	0.154*	0.133*	0.115*	0.220**	0.178**	0.161**	0.154**
Enterprise size	0.094	0.063	0.047	0.050	0.028	0.065	0.045	0.078	0.040
Age of business	0.056	0.036	0.034	0.034	0.022	0.036	0.044	0.055	0.036
Industry	0.171*	0.146*	0.115*	0.134*	0.124*	0.088	0.063	0.093	0.067
MER		0.119**	0.122*	0.137*	0.129*		0.199**		0.125*
ELC_1			0.152*		0.164				
ELC_1^2			-0.074		-0.038				
ELC_2				0.175*	0.141*				
ELC_2^2				-0.202**	-0.165*				
R2	0.145	0.237	0.310	0.304	0.339	0.124	0.256	0.129	0.277
△R2		0.092	0.165	0.159	0.194		0.132		0.148

Note :*,**,*** indicate significant at 5%,1%,0.1%, respectively

5 Conclusion and Inspiration

From the empirical analysis, the results show that manager's external relations has a positive effect on the innovation performance and the dual learning capability of start-up , and the exploitative learning capability has an inverted U-shaped effect on the innovation performance and the exploratory learning capability has a positive effect on the innovation performance of start-up.The results confirm the positive effect of external relationship and dual learning capability on innovation performance .

According to the above research results, this paper puts forward the following management enlightenment:first of all, manager needs to actively seek and establish external relations to ensure that start-up continues to obtain innovative resources to enhance organizational dual ability and enterprise innovation performance. Considering the lack of sufficient evidence or performance to prove the value of their products (or services), entrepreneurs can give priority to developing social networks and then establish business partnerships through key nodes in social networks.Manager's business and political relationships provide an additional resource for start-up, and the more manager can make full use of network relationships, the more they can improve their innovation performance.Secondly, the manager of start-up need to pay attention to the development and utilization of new opportunities to enhance their

dual learning capability. Exploitative learning capability helps to alleviate the short-term survival and competitive pressure of entrepreneurs, and it is also the basis of stable innovation activities of start-up. However, in order to enable enterprise to continue to achieve good innovation performance, we should maintain a moderate exploration and use of learning capability, especially to avoid too focused on the development of exploitable learning capability.

The theoretical contribution of this paper is reflected in two aspects: firstly, based on the open innovation theory, this paper discusses the influence of managers' external relationship and dual learning capability on innovation performance. Secondly, this paper examines the relationship between dual learning capability and innovation performance, and enriches the literature related to dual learning.Some limitations of this study point the way for future research. First of all, although we measure the quality and quantity of innovation as a measure of innovation performance by studying new product development and new product sales, patent is still a key measure of enterprise innovation performance. Secondly, although entrepreneurial college students provide a suitable background to test our hypothesis about relevant research, future research should also study other non-entrepreneurial college students, such as employed re-entrepreneurship groups to enrich the research results of this paper. Despite some limitations, this paper enriches the research on the leading variables of innovation performance, which can be expanded and extended in later studies to new conceptual configurations.

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Analyzing the Determinants of Innovation in Small Medium Enterprises: A Case of Sri Lanka

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Abstract: This paper has made an endeavour to elucidate the factors that are contributed to innovation of Small and Medium Enterprises (SMEs) in Sri Lanka. To achieve above target, the data were collected from the primary survey conducted in Rathnapura district using Stratified Random sampling method. A database of 94 SMEs is utilized as a sample to analyse the data which was collected from the well-structured questionnaire. Binary logistic regression analysis is applied to deal with over dependent variable as the analysing techniques. Researcher concluded the article by identifying age of the firm, research and development expenditure and managerial intensity are directions for the holding of patens. Access to finance and less usage of technology was identified as the barriers to the innovation of SMEs in Sri Lanka.

Keywords: Factors; Innovation; Binary logistic regression; SMEs, Sri Lanka

1 Introduction

Today world is expecting to drive of growth to create a more inclusive and sustainable development through competitiveness, globalized environment. In order to achieve the economic growth, innovation plays a vital role out of the serval categories. Innovation is highly determining of the capacity of the firm. Innovation capability focuses on the utilization of experience and ideas from distinct origins (Zhang and Harley,2018). SMEs play a vital role to the economy for a developing country like Sri Lanka. SMEs accounts for more than 75% of the total number of enterprises, provides 45% of the employment and contributes to 52% of the Gross Domestic Production (GDP) (CBL, 2017).The main objective of the study is to investigate the influence of external and internal factors on SME innovation with the linking of networking of the selected categories of SMEs. The sub objective of the study is to determine what extent do these determinants differ according to the types strategies and barriers of SME in Sri Lanka.

2 Literature Review

The literature has recognized the importance of innovation as a critical factor of the firm and economic development. SMEs are a major type of company, and it provides 95% to 99% of all businesses, with additional job creation totalling more than 60% to 70% (OECD, 2010). There are many factors that influence outside to innovation of SMEs can be classified into two groups: outside factors at the micro level, which are market-oriented (customers, suppliers, and the industry), and outside factors at the macro level, which have an international context (Distannot, 2018). Innovation is a strategy that companies use to create a competitive advantage, producing things that nobody else can, doing things better than everyone else, or introducing superior, cheaper, and faster services (Nurul and Sarminah, 2016).

Employment, age, profit margin, training intensity, management training, foreign-ownership, employee union-membership, business comparison, networking, export, R&D activity, patent intensity in industry, and market share were the determinates of manufacturing vs non-manufacturing of SMEs (Rogers, 2004). Leadership, organizational culture, external knowledge utilization, competence management, and creativity of employees were the determinates of innovation of (Oura, Zilber and Lopes, 2016). Innovation linked with direct proxies such as R&D expenses and patents (L ööf and Nabavi, 2016). R&D intensity is positively correlated with the probability of reporting innovation, with a larger effect size for product than for process innovations according to the (Baumann and Kritikos, 2016). Considering about technologically developed countries continuously and typically involves with R&D activities whereas the developing or transitional economies have limitation on engaging with R&D project (Acemoglu, Aghion and Zilibotti, 2006). But there is an argument that not all innovations generated by R&D disbursement (Gorodnichenko and Schnitzer,2013). According to the findings of (Hadhri, Arvanitis and M'Henni, 2016) variables like R&D, exportation, partnerships and technology transfer with innovation are often marginalized as important determinants of innovation.

3 Data and Methodology

3.1 Sample

First stage stratified sampling method is used as sampling procedure for the collection of data. Total population of SME divided into different segments based on the type of SMEs. That is production, processes manufacturing and services and after random sampling procedure is applied for the selection of SMEs since each stratum is homogeneous. Initially 118 firms projected to cover the data, however only 94 firms could be finalized with the telephone and online survey.

3.2 Theoretical framework and hypothesis

It is so hard to find out the direct measurement for innovation output among SMEs. Many of the previous literature has focused on R&D and patents as measurements, along with qualitative or subjective measures of innovation. The dependent variable of this study is that patent holders and non-holders. According to the constructed framework, innovation is determining by internal factors as business size is measured by sales, R&D expenditure, industry classification, whereas external factors are awareness of current SMEs project, availability of loan. In this study innovation defined broadly with two factors that is internal and external which linking with network.

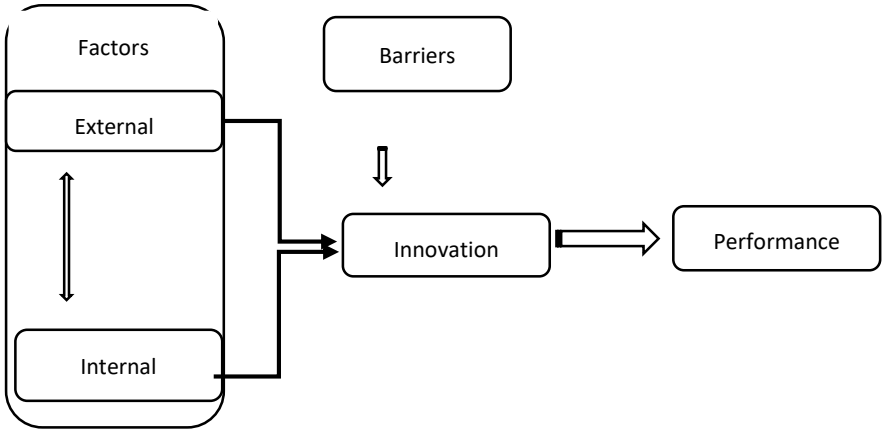

Figure 1 Conceptual Framework for the Research

The next important variable of innovation is that existing networking and collaborating with outside sources. Firm innovation may vary due to the different type of strategies used by the company and the barriers. Internal and external barriers of the firm are the crucial factor which limit the innovation of SMEs. As a first step Chi-square was conducted to identify the association with depended variable from explanatory variables regarding the innovation of SMEs in Sri Lanka under the 0.05 significance level for categorical response data and the common hypothesis were $H_0 =$ selected categorical variables and patens holding of SMEs are independent versus $H_1 =$ selected categorical variables and patens holding of SMEs are dependent. In addition to that for the continues type data Independent two sample t test was carried out.$H_1; \mu_1 - \mu_2 = \delta_0$ versus $H_1; \mu_1 - \mu_2 \neq \delta_0$ where μ_1 and μ_2 are the two population means and δ_0 is the hypothesized difference between the two population means.

The achievement of this research is to find out the possible as well as significant factors and their interactions on to the innovation of SMEs in Sri Lanka. Binary logistic regression method was applied since categorical response data as patent holder among SMEs and non-holder. Logistic regression on model the probability that a subject is credit worthy. For a binary response variable Y an explanatory variable X, let. The logistic regression model is $\pi_{(x)} = p(Y = 1/X = x) = 1 - p(Y = 0/X = x)$. $\pi_{(x)} \frac{\exp(\alpha+\beta x)}{1+\exp(\alpha+\beta x)}$ Equivalently, the log odds, called the logit, has linear relationship. $\text{logit}\pi_x = \log \frac{\pi_x}{1-\pi_x}$

For the equivalent expression of above model uses dummy variables. Let $x_i = 1$ for observations in row i and $x_i = 0$ otherwise, i=1,….,I-1. The model is $\text{Logit}(\pi_i) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_{I-1} x_{I-1}$

4 Results

According to the sample distribution, if the SMEs holding paten their average workforce (62) is higher compare with the SMEs which not have paten. One significant point that can be conclude, that the innovative firms spend more money on R&D (Rs.40752) advertisement (Rs.424296) and investment (Rs71770000) when comparing with the firms don't have patens respectively Rs.40752, Rs.192235 and Rs.18131045.

Chi Square test was conducted to identify the factors regarding the patens from the SMEs in Sri Lanka as a first stage under the 0.05 significance level. Area located in SMEs, foreign investment, networking among university, research firm and project, managerial intensity, training intensity and inter-firm cooperation are associated with the response variable and the remaining three variables, type of ownership, located area and market oriented variables are not showed a considerable relationship with dependent variable. Advertisement cost and investment variables are not associated with dependent variable whereas number of employees, age of the firm, R&D expenditure and sales have initial association with response variable.

Table 1 Fitted Final Model

Steps	Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	Age	.045	.011	16.171	1	.000	1.046
	Constant	-2.24	.410	29.973	1	.000	.106
Step 2	Age	.039	.013	9.342	1	.002	1.039
	Managerial intensity			10.434	2	.005	
	Managerial intensity(1)	1.78	.659	7.357	1	.007	5.971
	Managerial intensity(2)	2.43	1.048	5.397	1	.020	11.42
	Constant	-2.78	.511	29.563	1	.000	.062

Step 3	Age	.035	.014	6.537	1	.011	1.035
	R&D Expenditure	.000	.000	7.573	1	.006	1.000
	Managerial intensity			6.488	2	.039	
	Managerial intensity(1)	1.140	.758	2.263	1	.132	3.127
	Managerial intensity(2)	2.51	1.077	5.460	1	.019	12.37
	Constant	-3.27	.604	29.406	1	.000	.038

Final model to the data is

$$Logit(\pi_{ijklm}) = \beta_0 + \beta_i^{Age} + \beta_j^{Managerial\_intensity} + \beta_k^{R\&D\_Expenditure}$$

According to the table 1 it is illustrated that the p value of parameter 'Age', 'Managerial intensity' and 'R&D Expenditure, are less than 0.05 as an overall parameter value without considering the categories. There is enough evidence to reject null hypothesis that all parameter not significant. moderate managerial intensity' is not significant, then the 'low managerial intensity' parameter is not defined according to the constraint of last level zero. Being a manager in moderate intensity shows 3.127 and high intensity shows 12.379 times the odds of low intensity for the response variable.

Summarizing the idea of SMEs of the study shows that they are facing various obstacles while doing and developing their business. Most frequently cited (more than 82% of SMEs) constraints affecting was access to financial for the development and expansion. In addition to that even though they have some chance to apply for the loan, the procedure is much more complicated or sometime high interest rates. Around 68% respondents highlighted that accessing information and markets are also considerable problem that they are facing. Low level of technology usage among the firm from the less skilled workers and instability of the workforce within the firm were another problem. The inadequacy of skills in product development, packaging, distribution and sales promotion are further areas of weakness. All of those barriers toward to the less interaction of the innovation among the SMEs.

5 Conclusion

SMEs of Sri Lanka is the most important part of the national economy because it covers 52% of total GDP and 45% of national employment. Driving towards innovation ways to improve productivity, compete with the similar products and finally to gain benefits. Identification of determinants of the innovation was the main objective of this study. Out of eleven categorical variables only three variables and among the five of continues variables only two of the variables excluded while doing the analysis in the initial stage. Under the stepwise forward selection procedure, age of the firm, managerial intensity and research and development expenditure were considered as the final model of the survey which leads to the innovation among SMEs. Financial constraints, lack of technology and scarceness of skilled labours of SMEs are the main obstacles. As the recommendation of the study can be suggested that the finding can be used in the development of public policy aimed at supporting and encouraging innovation among SMEs.

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Research on Influencing Factors of Tourism Innovation and Development in Poor Mountainous Areas：Based on ISM

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Abstract: Based on the 5 dimensions of Schumpeter’s innovation theory, this paper uses literature research and expert consultation based on the ISM model to identify and establish 17 factors affecting the development of tourism innovation in impoverished mountainous areas. By comparing the influencing factors pairwise, a dual relationship is established. Figure, construct an adjacency matrix, use MATLAB software to calculate the reachable matrix, divide regions and levels, and construct an ISM model of factors affecting tourism innovation and development in poor mountainous areas. It is divided into three levels: surface influencing factors, middle influencing factors, and deep fundamental influencing factors. system. Analyze the various levels of influencing factors in the model, reveal the mechanism of the influencing factors, and take different degrees of attention to the relevance and dependence of different factors, so as to provide reference for the development of tourism innovation and decision-making in poor mountainous areas .

Keywords: Impoverished mountainous area; Tourism innovation; Influencing factors; ISM model

1 Introduction

In recent years, the tourism industry has demonstrated strong development power(Muda Z.,2019), promoting economic development and stimulating employment, and has become an important support for the development of impoverished mountainous areas(Li Dongna,2019). Tourism, as a cultural and enriching project, has become an important measure and strategic choice for the development of impoverished mountainous areas. It is an important booster for rural economic construction, rural household income growth and rural revitalization (Zhou Yi,2019). However, in the complex tourism environment, the development of tourism in poor mountainous areas is facing threats such as cultural invasion and erosion, tourism homogeneity, and the weakening of the competitiveness of the tourism market, which hinders the flourishing development of tourism in poor mountainous areas. The state's emphasis on the development of tourism in poor mountainous areas has reached a new strategic height. How to innovate and make breakthroughs in tourism in poor mountainous areas from the guidance and regulation of tourism in the early stage will place more emphasis on its innovation and connotative development. The innovative development of tourism has become the only way for the social and economic development of impoverished mountainous areas, and has also become a new direction for future strategic development. tourism innovation has become an inevitable trend in theoretical research(Li, Y., et al.,2017).

Based on the theory of Schumpeter’s innovation(Joseph Schumpeter,2019)and the broad connotation of tourism innovation proposed by Guo Luan(Guo Luan,2011), this paper defines the connotation of tourism innovation in poor mountainous areas as: all innovative activities that serve the development of tourism and form new economic capabilities in poor mountainous areas. It mainly includes the innovative development process of tourism products, tourism development, tourism market,

tourism resources, and tourism organization. By analyzing the research progress of the five dimensions, it is found that domestic scholars' research on tourism innovation in impoverished mountainous areas started successively in 2001(Wang Guoliang,2007). There is an imbalance in the proportion of research in the five dimensions, and there are few data-based model construction and quantitative research. Moreover, there is a lack of research and analysis on the logical relationship between the influencing factors of tourism innovation in poverty-stricken mountainous areas(Liu Ting,2019). Therefore, based on the ISM model, the author clarifies the internal logical relationship of the influencing factors of tourism innovation in poor mountainous areas. significance.

This paper uses the ISM method(Dastyar H.,2018) to quantitatively analyze the logical relationship between the influencing factors of tourism innovation in poor mountainous areas, find out the deepest influencing factors and the mechanism of each influencing factor, and provide a good theoretical reference for tourism innovation in poor mountainous areas.

2 ISM Model of Influencing Factors of Tourism Innovation Development in Poor Mountain

2.1 Establish ISM team

The ISM working group of this study consisted of 1 researcher from Chengdu Academy of Social Sciences, 1 professor and supervisor of master students of Chengdu University of Information Technology, 5 professors in the field of tourism, 2 graduate students of Chengdu University of Information Technology, a total of 9 People carry out follow-up research.

2.2 Establish influencing factors

The ISM team will identify all the direct and indirect, superficial and in-depth factors in the relevant literature that affect tourism innovation in poor mountainous areas. Then the ISM team will discuss in accordance with the principles of comprehensiveness and scientificity and consult relevant experts for optimization and correction, and finally determine The 17 factors affecting the innovative development of tourism in impoverished mountainous areas have been explained (Table 1). The team members make pairwise comparisons among the 17 innovation influencing factors. According to the results of the pairwise comparison, a binary relationship diagram of the 17 influencing factors is obtained, as shown in Figure 1. In the grid graph, use V, A, X to represent the relationship between the influencing factors, where V indicates that the row element in the grid directly affects the column element, A indicates that the column element directly affects the row element, and X indicates The two elements of rows and columns influence each other, and a blank means that there is no influence relationship between rows and columns(Zhou Sanling,2018).

Table 1 Influencing Factors of Tourism Innovation in Poor Mountainous Areas

Serial number	Influencing factors	Factor interpretation
S1	Virtual experience technology	The adoption of VR and other virtual technologies in scenic area exhibitions and tourist experience
S2	New media experience	New media such as online public opinion put new demands on red tourism innovation
S3	Fresh activity of tourism products	Tourism products in poor mountainous areas should have the characteristics of advancing with the times, keeping cordial and fresh
S4	Educational significance of products	Tourism products in poor mountainous areas should have educational significance

S5	Government strategic planning and positioning	Tourism development planning in poor mountainous areas, regional development planning, tourism poverty alleviation project arrangements, rural revitalization strategies, etc.
S6	Government policy support	Policies to support the development of poor mountainous areas, tourism industry policies, etc.
S7	Socio-economic level in poor mountainous areas	The level of socio-economic level in poor mountainous areas determines tourism innovation
S8	Tourism market competition	Macro tourism market changes, industry competition, red regional competition, product competition, etc.
S9	Inter-regional communication and collaboration in poor mountainous areas	Break geographical and administrative restrictions between poor mountainous areas
S10	Tourist feelings	Tourists' identity and perceived value of poor mountainous culture, and nostalgia for tourism
S11	Tourism planning talents in poor mountainous areas	Talents in poverty-stricken mountainous areas, tourism, scenic spot planning services and management
S12	Managers' sense of innovation	Managers dare to take the lead in innovation
S13	Participation awareness of local villagers	The strength of local villagers' participation in tourism development
S14	Government funding support	Support for special funds such as red tourism development funds and project construction
S15	Funding by social groups	Subsidies from tourism enterprises, individuals and tourism organizations
S16	Economic development benefit	Realization of local economic development benefit goals
S17	Cultural heritage	Novelty of inheritance of red culture such as revolutionary spirit, family style and family motto

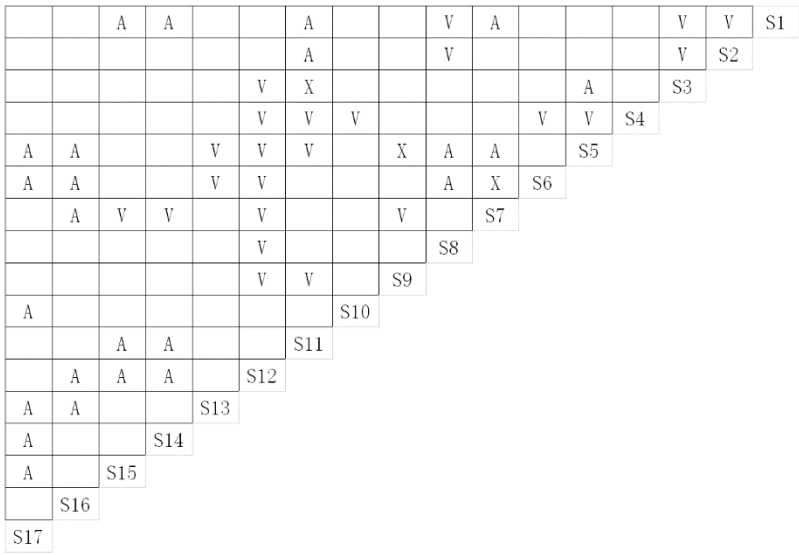

Figure 1 The Binary Relationship of Influencing Factors of Tourism Innovation in Poor Mountainous Areas

2.3 Construct adjacency matrix

Based on the binary relationship of factors affecting tourism innovation in poor mountainous areas (Figure 1), an adjacency matrix A (Figure 2) is established. The matrix consists of 0 and 1, with 17 rows and 17 columns, which are used to express the correlation between influencing factors. When Sij=1, it

indicates that Si has a direct or very strong influence on Sj; when Sij=0, it indicates that Si has no influence or a very weak influence on Sj.

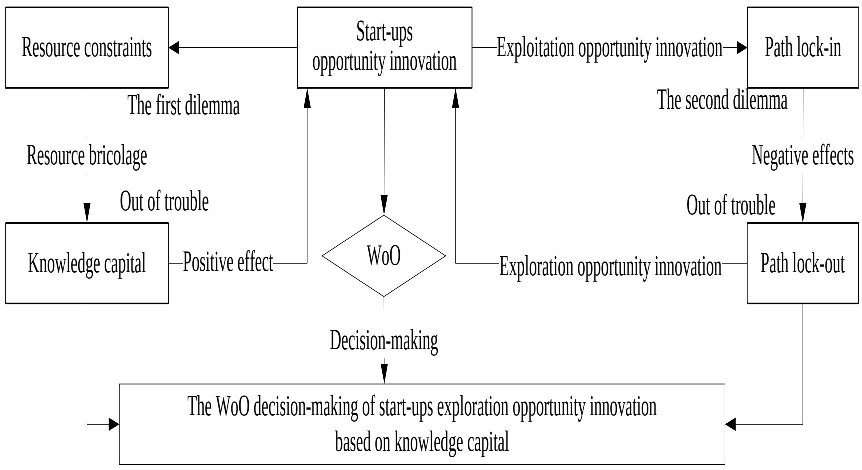

Figure 2 Adjacency Matrix A

2.4 Establish reachable matrix

The reachable matrix (M) is used to express the extent that the influence factors of tourism innovation in poor mountainous areas can reach after a certain length of pathway. On the basis of the adjacency matrix A, the reachable matrix can be obtained by using the operation rules of Boolean algebra(Lu Ning,2011).Reference calculation formula: $M = (A + I)^r$ ， II is the identity matrix. The calculation process is as follows: $(A+I) \neq (A+I)^2 \neq (A+I)^3 \neq \Lambda \neq (A+I)^r \neq (A+I)^{r+1} = (A+I)^n$， Using MATLAB software to calculate r=6, the reachable matrix M is calculated (As shown in Figure 3).

$$M = \begin{bmatrix}
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 \\
1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 1
\end{bmatrix}$$

Figure 3 Reachable Matrix M

2.5 level division

By dividing the reachable matrix M into regions and levels, the cells in the reachable matrix M can be divided into three levels L={L1, L2, L3}. (As shown in table 2)

Table 2 Level Bit Division Process Table

Element Si	Reachable set R(Si)	Antecedent set A(Si)	Common set C(Si)	R(Si)=C(Si)	Level L
1	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
2	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
3	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
4	4	4	4	√	3
5	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
6	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
7	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
8	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
9	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
10	10	10,17	10	√	1
11	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
12	12	1-9,11,12,14-17	12	√	1
13	13	1-9,11,13-17	13	√	1
14	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
15	1-3,5-9,11,14,15	1-9,11,14-17	1-3,5-9,11,14,15	√	2
16	16	16	16	√	3
17	17	17	17	√	3

2.6 ISM model

By analyzing the reachable matrix M and the hierarchical partition table, the first step is to remove the strong connection relationship, represented by S1, and remove all the elements from S2 to S9, S11, S14, and S15; the second step is to remove the leapfrogging relationship, and the leapfrogging " 1" is changed to "0"; the third step is to subtract the unit matrix to obtain the structural model skeleton matrix, as shown in Table 3.

Table 3 Skeleton Matrix

Element	S10	S12	S13	S1	S4	S16	S17
S10	0	0	0	0	0	0	0
S12	0	0	0	0	0	0	0
S13	0	0	0	0	0	0	0
S1	0	1	1	0	0	0	0
S4	0	0	0	1	0	0	0
S16	0	0	0	1	0	0	0
S17	0	0	0	1	0	0	0

Based on the framework matrix and the obtained level relationship, an ISM model（Jadhav, J.R.，2015） of the factors affecting the development of tourism innovation in poor mountainous areas can be constructed (Jiao Aiying,2019). As shown in Figure 4, according to the level structure, it can be divided into three levels, and the first level is determined to be direct The second level is the indirect middle level influencing factors, and the third level is the fundamental in-depth influencing factors. The three levels reflect the intrinsic and essential relationship of the factors affecting the innovative development of tourism in poor mountainous areas.

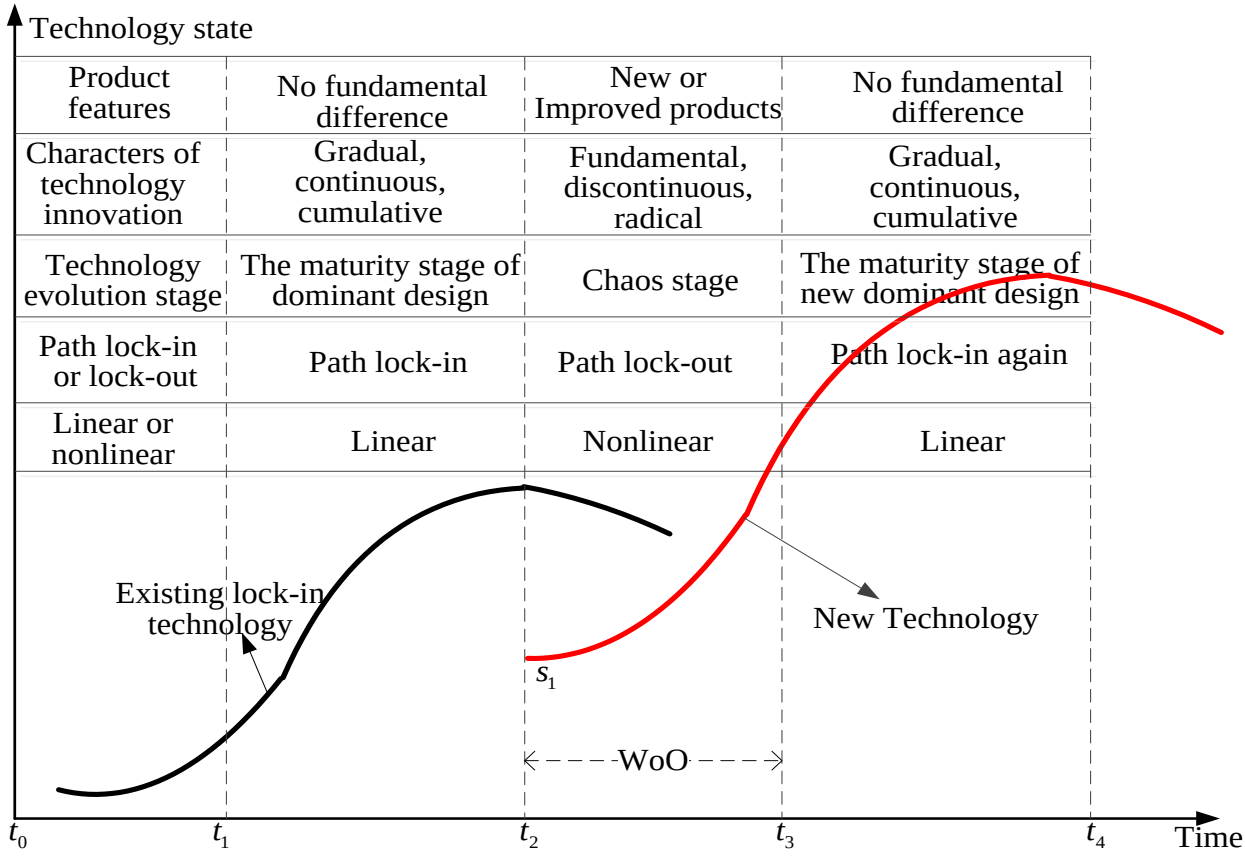

Figure 4 ISM Model of Influencing Factors of Tourism Innovation Development in Poor Mountain

3 Analysis of Influencing Factors of Tourism Innovation in Poor Mountainous Area

Through modeling and analysis, the influencing factors of tourism innovation in poor mountain areas are divided into three levels: surface influencing factors, middle influencing factors and deep fundamental influencing factors. The factors affecting each layer are described as follows:

(1) Surface factors. Including tourist feelings, management innovation consciousness and local villagers' participation consciousness. The innovation of tourism in poor mountain areas is the inexhaustible motive force for the sustainable development of tourism in poor mountain areas, and innovation originates from human consciousness. Tourist feelings are one of the bases of tourism innovation in poor mountain areas, which to some extent affect the effect of tourism product innovation. To a certain extent, the innovation consciousness of managers determines the grasp of development opportunities from the macro level, and managers should have the consciousness of leading and overall situation. To a certain extent, the local villagers' participation in the innovation consciousness determines the progress and development of tourism innovation in poor mountain areas Under the environment of rural revitalization, the participation consciousness of local villagers affects the hematopoiesis ability of villagers to a certain extent, and it is necessary to promote the local villagers to participate in tourism innovation in poor mountain areas.

(2)Middle level influencing factors. It includes virtual experience technology, new media experience

technology, fresh activity of tourism products, government strategic planning and positioning, government policy support, social and economic level of poor mountain areas, tourism market competition, interregional communication and cooperation among poor mountain areas, tourism planning talents, government financial support, and support from social groups. At the level of scenic spots, technology is a powerful guarantee to enhance the competitiveness of tourism in poor mountain areas, the fresh activity of products is an important basis for avoiding the identity of products, and it is the source of enhancing the core attraction of tourism scenic spots in poor mountain areas. Tourism planning talents influence the theory and implementation strategy of tourism innovation development planning It is the specific controller of technology, and the social and economic level of poor mountain area directly affects the level of technology introduction and personnel introduction. Tourism market competition includes macro tourism market changes, industry competition, regional competition in poor mountain areas, product competition and so on, which affects the development of tourism innovation in poor mountain areas and provides market environment guarantee for the development of rural economy. The degree of close communication between poor mountain regions is helpful to overcome the potential obstacles of tourism innovation. The planning and orientation of government level is the standard of the general direction and general policy of tourism innovation in poor mountain areas. The government financial support is the effective material guarantee of tourism innovation, and the government policy support is the poor mountain Regional tourism innovation provides a strong policy guarantee, and the support of social organizations can mobilize all social forces to participate in the tourism innovation in poor mountain areas, which is a strong guarantee for tourism poverty alleviation and rural revitalization, and conforms to the current general direction of tourism in the whole region.

(3)Deep underlying factors. Including product education significance, economic development benefits, cultural heritage. The significance of product education affects the depth of tourists' education baptism, and then affects the tourist impression of poor mountain areas and the feeling and inheritance of mountain culture. From the benefit point of view, cultural heritage is an important purpose of tourism development in poor mountain areas, and whether cultural heritage can be effectively reflected is an important basis for testing the effect of tourism innovation and development in poor mountain areas. The benefit of economic development is the fundamental purpose of tourism innovation in poor mountain areas, and the benefit of economic development fundamentally affects the effective development of tourism innovation in poor mountain areas.

4 Conclusion

The innovative development of tourism in impoverished mountainous areas has always been a concern of scholars, and there are few quantitative studies on the factors affecting the innovative development of tourism in impoverished mountainous areas. The author identified a large number of relevant documents one by one, and optimized and revised them by experts, and identified 17 factors affecting the innovative development of tourism in poor mountainous areas. Using the ISM model, the 17 influencing factors are divided into three levels, and the surface factors, middle factors, and deep fundamental factors that affect the development of tourism innovation in poor mountainous areas are obtained. In-depth analysis of the influencing factors reveals the role of factors affecting tourism innovation in poor mountainous areas The mechanism enriches the research content and research horizons of the factors affecting the development of tourism innovation in poor mountainous areas, which

has methodological significance for the development of tourism innovation in poor mountainous areas, and also expands and enriches the application fields of the theory of explanatory structure models.

Future research can further analyze the influencing factors of the innovative development of tourism in poor mountainous areas in combination with practical factors, and study the internal logical relationships of the influencing factors, so as to take different degrees of attention to the correlation and dependence between different factors, so as to help the poor. The mountainous area provides reference for formulating tourism innovation development plans and decision-making.

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Green Transformational Leadership and Green Innovation: The Mediating Role of Green Ability

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Abstract: The past few decades' global issue showed inadequate debate of the impact of leadership style in sustainability and innovation. This study examined how green transformational leadership influence to green innovation through green ability of human resources in construction industry with the help of resources-based theory and ability-motivation –opportunity theory using systematic quantitative research approach under structural equation modeling. Total 305 respondents from different construction company through questionnaire. We found in result that green transformational leadership directly influence to green innovation and green ability. We also found that green ability plays partially mediating role between green transformational leadership and green innovation. It can be concluded with this study that organization have green leadership ability to the project team members and having good innovation for the environment.

Keywords: Green transformational leadership; Green innovation; Sustainability; SEM approach

1 Introduction

Existent literature on organizational sustainability more focused on manufacturing sector (Gunasekaran and Spalanzani, 2012) whereas service sector like construction industry that produce huge portion of toxic materials which harm to environment impact which is remain to study. However, increasing priority by stakeholder and global leaders on environment sustainability has become main role of business and engage in green innovation by different green leaders(Singh et al., 2020). It means organizations are trusting on intangible framework to address the complexity of environment sustainability(Cui et al., 2019). Previous studies have confirmed that human resources across leadership and green behavior positively significant on innovation (Chaudhry et al., 2019). Green innovation defines in different ways like that green innovation is related with product or services which contain the innovation in technologies such as energy saving, pollution prevention, waste recycling, green product design or corporate environmental management (Seman et al., 2019). In other definition, green innovation is an outcome which enables to an organization to utilized and get maximum opportunities which must implement globally for protect the world (Zhang et al., 2019).

We speculate that green leadership and their ability encompass in emergent organization internal proficiencies and competences that are essential for innovation. We posit that top to bottom level of employee in construction should gain the green transformational leadership and green ability to support internal competencies for green innovation(Chen, 2008). Based on resources-based theory (Alvarez and Busenitz, 2001) and ability motivation opportunities (Hughes, 2007) theory our study tried to find the answers of two relevant research question namely, (a). How Green Transformational Leadership affects Green Innovation in construction industry? and (b). Does Green Ability mediate in the relationship between Green Transformational Leadership and Green Innovation? Ability of green behavior also play vital role for green innovation.

This study concentration on the relationship between green transformational leadership and green innovation through mediating effects of green ability. This study based on Nepali construction industry who is struggling to maintain the environment sustainability and others resources. The systematic quantitative approach has adopted in this study. The questionnaire has adopted form different previous studies and modified according to present study. All the data was collected from project managers and engineers or top level managerial employees of construction companies in Nepal.

The remainder of the paper is arranged wherein next section is Literature review and research framework. Section 3 and section 4 deals with research methodology and hypothesis testing followed by discussion and conclusion in section 5.

2 Literature review and research Framework

We draw upon the resources-based view(RBV) and ability-motivation opportunity (AMO) theory to examined the green transformational leadership and green innovation in the context of construction sector in Nepal. In this study we define green transformational leadership as leadership behavior which encourages higher performance in green performance, provide clear vision, inspiration, motivation to the employees including their need toward achievement of environmental goals of the organization (Mittal and Dhar, 2016). GTL motivates employee to make access the good knowledge, self-motivates and engage in green process and product innovation(Yong et al., 2019). Green Ability is as environmental plan for an organization's long term capability for handling material, component or system requirement in innovative way. Prior research indicates that green ability has a positive effect on green innovation ability (Gupta and Barua, 2017). Because leaders by green nature facilitates transaction by creating an environment of flexibility and innovation, green ability has significant effect on firm's performance. Therefore, previous scholars have suggested for further research on green ability mediates between green transformational leadership and green innovation (Song and Yu, 2018). Leadership is an important resource for environment management in the organization. There are many types of leadership, among them transformational leadership enhance innovative climate, motivating and encouraging to team members and identify vision of leaders that affects innovation and performance (Liu and Zhao, 2019).
Green innovation refers to any product and services which make environment friendly by using different kind of green resources such as green raw material, less of toxic materials, reduce the consumption of water, electricity etc. several studies revealed that any organization which have green innovation are more successful and have good market image(Seman et al., 2019) and have good overall performance. Some studies have suggested that GTL have positively influenced technological and product innovation(Akgün et al., 2014). With the same review of past studies on GTL and innovation relate with technological and product innovation, the GTL have not more literature on process innovation(Chen and Chang, 2013). Thus, we predict that human power can contribute for green concept in the world and green leadership for the purpose of motivating and giving opportunity to green human for green innovation. Hence, we propose that:

H1: Green Transformational Leadership positively influence on Green Innovation.
H2: Green Transformational Leadership has positively influence on Green Ability.
H3: Green Ability has positive influence on Green Innovation.
H4: Green Ability play mediates between Green Transformational Leadership and Green Innovation.

Based on literature review and gaps identified, following research model have developed for this study (Figure 1).

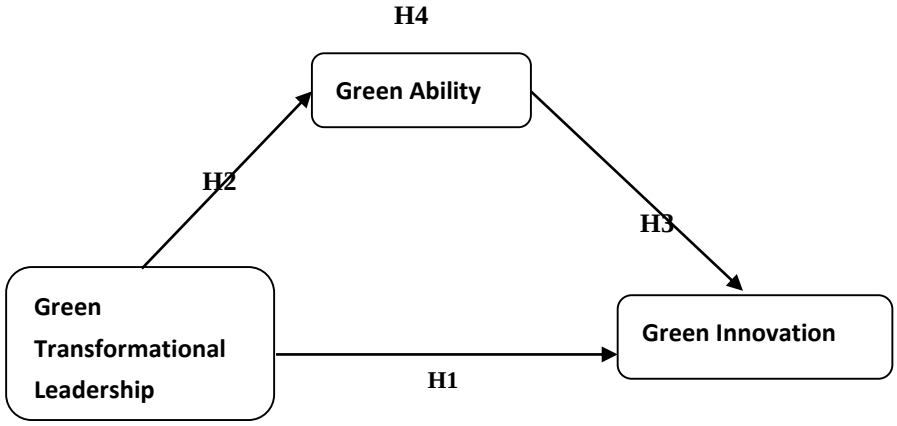

Figure 1 Conceptual Model

3 Research Methodology

3.1 Participants

Data were collected from middle and higher level of employee in construction industry of Nepal with the help of cross-sectional timeframe. We used primary method of data collection as well as online survey. Convenience sampling technique also use in this study due to very busy nature of business and people. We sent 335 questionnaires and out of these 320 data were respond, 15 data were drop due to missing data and other issue and 305 data were selected for final analysis which yields 91% respond rate. With the view of position, 52.46% were engineer, 9.84% were director, 0.33% were owner, 17.05% were assistant project manager and 20.33% were participated project manager. With the view of type of project, building project was 40.98%, industrial project was 13.77%, infrastructure project was 33.44%, transportation project was 6.89% and water structure project was 4.92%. 27.54% were 1to5 years experiences, 28.52% were 6to10 years experienced, 20.33% were 11to15 years experienced, 15.08% were 16to20 years experienced and 8.52% were above 20 years experienced. 37.38% of the participants fall within age of 21to 30 years, 30.16% fall within age of 31to40 years, 25.57% fall within age of 41to50 years and 8.52% were above 50 years old. Respondents are also relating with field of operation, 67.21% of the respondent form engineering operation, 30.82% from Construction and 1.97% were Architecture.

3.2 Measurements

This study adopted previous studies for measure the construct to ensure reliability and content validity. Green Transformational Leadership(GTL), Green Ability(GA) and Green Innovation(GI) are three variables adopted. GTL is adopted form (Chen et al., 2014) which consist 6 items. The reliability test also conducted according to guidelines (Santos, 1999). Cronbach's Alpha for GTL is (α=0.87). Similarly GA adopted from (Singh et al., 2020) which is also consist 6 items. Cronbach's Alpha for GA is (α=0.91) and GI also adopted from (Singh et al., 2020) with 6 items and Cronbach's Alpha for GI is (α=0.90). All items are measured on five Likert scale (1= Strong Disagree and 5= Strongly Agree).

4 Data Analysis and Hypothesis Testing

The Statistical package for social science (SPSS), PROCESS by Hayes and Excel were used to carry out to achieve the objective of research. The questionnaire coded and kept into the software. The reliable test and multiple regressions used to find the relations between variables.

Exploratory Factor Analysis was conducted for knowing correlation between variable. We found all the skewness between +1 and -1 which fixed for normally distributed. Also, the Durbin Watson value was close to 2 which confirmed not to have auto corrected. We also tested one factor for CMB and result was 31.28% which is below cut off rate 50%. We also measured Kaiser-Meyer-Olkin (KMO) for adequacy and KMO value was above 0.6 which is acceptable.

For Regression analysis, we used model 4 in PROCESS by Hayes. We have tested all direct hypothesis and indirect hypothesis based on structural equation model (SEM) in this study. Testing for direct effects. Table 1 and table 2 shows that H1 (GI←GTL), H2 (GA←GTL) and H3 (GI←GA) are supported (β= 0.37; t= 7; p<0.000); (β= 0.36; t= 6.70; p<0.000); and (β= 0.28; t= 5.27; p<0.000) respectively. Hence, the results show that green transformational leadership (GTL) positively and significantly influence the green innovation and green ability as well as green ability influence to green innovation.

Table 1 Mediation Effects of Green Transformational Leadership on Green Innovation

Outcomes	Predictors	R^2	F	β	LLCI	ULCI	t value
GI (Direct effect)	GTL	0.28	59.33	0.37	0.263	0.47	7.00
	GA			0.28	0.173	0.38	5.27
GA (Direct Effects)	GTL	0.13	44.87	0.36	0.25	0.46	6.70
GI (Total Effects)	GTL	0.22	83.48	0.46	0.36	0.56	9.14
							BootSE
GI (Indirect Effects)	GTL			0.10	0.06	0.15	0.02

Similarly, Table 1 and table 2 illustrates that H4 (GI←GA←GTL) which is partial supported (β=0.10; t= 0.02; p< 0.000). it means Green Ability (GA) partial mediates between Green Transformational Leadership (GTL) and Green Innovation (GI). This study also calculated total effects (R2= 0.22) with β= 0.46; t= 9.14 and P<0.000.

Table 2 Hypothesis Decision

Hypothesis	Path Relation	Estimate	p	Decision
H1	GI ← GTL	0.37	0.000	Supported
H2	GA ← GTL	0.36	0.000	Supported
H3	GI ← GA	0.28	0.000	Supported
H4	GI←GA←GTL	0.10	0.000	Partial Supported

5 Discussion and Conclusions

The study investigates about green transformational leadership, green ability and green innovation. Our study support and advance the past studies wherein green transformational leadership positively influence green innovation, green transformational leadership positively influence to green ability(Song and Yu, 2018). The finding of our study also advance literature wherein green ability influence to green innovation and green ability play mediates role between green transformational leadership(Bahzar, 2019). Furthermore, the results of our hypothesis supports positively significant.

The results of our study have main three implications. First, this study contributes to spread the RBV and AMO theory to understand the relationship between green transformational leadership and green

innovation. Second, leadership and green behavior play critical role to explore human capabilities. Thus our finding suggest that the organization should use GTL to enhance green innovation with the help of ability of green leaders. Third, we found that green innovation positively influenced environment performance so that we suggest firm should embed green leadership practice in organization which can do by attracting developed employee, retain the green employees for green innovation and improve environmental performance and gain competitive advantage.

Our study has limitation and we presented this limitation as future study as well. First, we consider the sample form only service sector in Nepal that is construction industry in Nepal. in future this study should extend the area of research sample. Second, this study does not have any moderating role in the conceptual research model so that in future study should cover the moderating such as environment belief.

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Research on the Influence of Capital Structure on R&D Investment: A Case of ICT Equipment Manufacturing

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Abstract: Insufficient innovation ability is still common problems of Chinese enterprises. In order to improve R&D capabilities, companies are paying more and more attention to R&D investment, so the impact of research capital structure on R&D investment has far-reaching significance. This article takes the manufacturing of ICT equipment industry as an example, selects the panel data of 68 listed companies in this industry from 2015 to 2019, by using correlation analysis and multiple regression analysis, the paper concludes that R&D investment has a negative correlation with the capital structure of the previous period and puts forward suggestions.

Keywords: R&D investment; Capital structure; ICT equipment; Empirical research

1 Introduction

Since China's economy entered the new normal, technological innovation has become an increasingly important force to promote the survival and development of enterprises. Technological innovation also needs financial support for R&D investment, so R&D investment has become an issue that companies are paying more and more attention to. Because R&D investment is an important part of an enterprise's investment activities, it is bound to be constrained by capital structure.

This article selects the panel data of 68 listed companies in the industry from 2015 to 2019, uses multiple regression an There are many domestic and foreign studies on the relationship between capital structure and R&D investment, and its main research conclusions are divided into three types: (1) Shareholders of debt ridden companies have the motivation of under investment, and technology intensive enterprises use conservative debt policies to alleviate the debt excess [1] (Taehyun Kim, 2019). Companies with a higher understanding of future investment volatility keep their debt level and cash level at a low level, so as to provide funds for uncertain future investment [2] (Mona yaghoub, 2019).Many scholars have done empirical research and come to the same conclusion : Capital structure has a negative impact on R&D investment [3] (Rao Ping,2018). The higher the R&D investment, in order to avoid higher capital costs and financial risks, they usually reduce debt financing and tend to internal financing and external equity financing [4] (Zhang Xuehui,Peng Jianwei,2019). (2) There is a positive correlation between capital structure and R&D investment. India's highly leveraged enterprises do make R&D investment, indicating that the debt ratio is positively correlated with R&D Investment [5] (Gupta a,2019). Ownership structure was positively correlated with technological innovation and enterprise performance [6](Qin Dezhi, Shao Huimin, Su Linchun,2019). (3) There is a nonlinear relationship between capital structure and R&D investment. Leverage had no significant impact on investment decisions [7] (Alcock J, Steiner E,2016). The R&D investment threshold has the characteristics of U-shaped relationship when capital restriction is introduced, and the investment threshold will be reduced if the debt is increased and the capital limit is reduced. However, after reaching a certain minimum value, the enterprise's attitude towards R&D investment has changed considering the high possibility of default [8] (Daniela bragoli and

Flavia cortellezzi, 2020). There was an inverted U-shaped relationship between the capital structure of enterprises, patent output and R&D Investment [9] (Wu Yao,Shen Kunrong,2020).To sum up, most scholars believe that a high corporate debt ratio will increase the company's operating risk and agency costs, thereby reducing R&D investment.

Since the manufacturing of ICT equipment is a typical high-tech enterprise, the impact of its capital structure on R&D investment is particularly significant. This paper selects the panel data of 68 listed companies in the industry from 2015 to 2019, uses multiple regression analysis to study the impact of capital structure on R&D investment, and puts forward relevant suggestions according to the research results.

2 Literature Review and Theoretical Analysis

The trade-off theory holds that the optimal capital structure point balances the relationship between debt benefits and financial risks. Using the trade-off theory for analysis, high debt ratios will increase the risk of companies' financial crisis, and R&D investment has a higher investment risk. Therefore, in order for companies to operate safely, high debt ratios will hinder the increase of R&D investment.

Brahmadev panda and N.M. leepsa (2019) combed the agency cost theory. They believed that the separation of ownership and control rights, different risk preferences, information asymmetry and moral hazard were the causes of agency costs [10]. From the agency cost theory, it can be concluded that because R&D investment is a high-risk project, if successful, shareholders can obtain high returns, and creditors can only obtain lower interest income; if it fails, creditors may lost their principal. Therefore, creditors will demand a higher risk reward, which will increase the agency cost of the enterprise, and instead inhibit investment in R&D.

To sum up, the hypothesis is put forward: there is a negative correlation between corporate debt and R&D investment.

3 Research Design

3.1 Sample selection and data source

This paper selects the financial data of 68 listed companies in the manufacturing of ICT equipment industries for 2015-2019 as samples. The reason for this choice is as follows: First, as a typical high-tech industry, the R&D investment intensity of this industry is significantly higher than the national average, and the impact of capital structure on R&D investment is also more obvious. Second, listed companies are generally large in scale, have comprehensive financial data disclosure, and have a certain status in the industry. They are representative. Third, this paper selects panel data from 2015 to 2019 to compensate for the lag that may exist in the impact of capital structure on R&D investment, making the data more objective and fair. In the data selection, in order to ensure the consistency of the data, this article also excludes companies with abnormal operations, listed companies with insufficient financial data, and companies listed in 2015 and later, and companies that delisted before 2019. After screening according to the above methods, 68 qualified sample companies and 340 sample data in 4 years were obtained. Spss22.0 and Eviews 9.0 were used to analyze the data, And the data in this article comes from the RESSET financial research library system.

3.2 Variable design

This paper considers that R&D investment is an absolute value, so the intensity of R&D investment

is used as an explanatory variable; considering the lag of R&D investment, the investment activities are more determined by the capital structure of the previous period, so this paper chooses the capital structure of the previous period as Explanatory variables. Based on the research experience of Liu Shouxian (2006) and other scholars, this paper selects the asset liability ratio of the previous period to measure [11]; in addition, according to relevant research experience, choose enterprise size, growth level, equity concentration as control variables. Variable definitions are shown in the following table:

Table 1 Explanation of Variables of the Empirical Model

Variable type	Variable name	Variable code	Definition
Explained variable	R&D investment	RD	R&D investment intensity = R&D expenditure/operating income
Explanatory variables	The capital structure of the previous period	LEV_M1	The asset-liability ratio of the previous period = total liabilities of the previous period / total assets of the previous period
Control variable	Enterprise scale	SIZE	Natural log of total assets
	Growth level	GROW	operating growth rate = (operating income of the current period-operating income of the previous period) / operating income of the previous period
	Equity concentration	SHARE	The largest shareholder's shareholding ratio

3.3 Model setting

In order to study the impact of capital structure on R&D investment, this paper uses R&D investment as the explanatory variable, capital structure as the explanatory variable, and enterprise size, growth level, operating capacity, and profitability as the control variables. The model is as follows:

$$RD=c+ß_0 LEV\text{-}M1+ß_1 SIZE+ß_2 GROW+ ß_3 SHARE$$

In this model, RD represents the intensity of R&D investment, LEV-M1 represents the asset-liability ratio of the previous period, SIZE represents the size of the enterprise, GROW represents the growth level of the enterprise, and SHARE represents the shareholding ratio of the largest shareholder.

4 Empirical Results and Analysis

4.1 Descriptive statistical analysis

This article has performed a descriptive analysis and has a basic understanding of the mean, maximum, minimum, and standard deviation. The results are shown in the following table:

Table 2 Descriptive Analysis Table of Variables

Variable symbol	Mean Median	Maximum value	Minimum value	Standard deviation
RD	8.05	88.56	0.11	8.94
LEV_M1	42.92	96.17	5.17	19.53
SIZE	22.36	27.15	19.64	1.23
GROW	13.75	326.06	-62.50	32.17
SHARE	0.29	0.80	0.03	0.14

From the table, the maximum value of R&D investment intensity (RD) is 88.56 and the minimum value is 0.11, which is a large gap. It shows that the R&D intensity of different companies is quite different. However, the average R$D intensity is 8.05, which is much higher than the national average, indicating that the R&D intensity of the manufacturing of ICT equipment industries as a whole is relatively high. The maximum value of LEV_M1 is 96.17 and the minimum value is 5.17, which is quite different. But the average value is within 50%, which is conducive to the smooth operation and development of the enterprise. The maximum and minimum values of the enterprise size are similar and both are greater than 20, indicating that the selected sample enterprises are large and similar. The average value of equity concentration is relatively concentrated, but the difference between the maximum and minimum values is large. Growth levels vary widely, but the mean is positive, indicating that the overall situation of the industry is on the rise.

4.2 Correlation analysis

On the basis of descriptive analysis, this paper has carried out correlation analysis. Through the correlation of two variables, roughly describe the correlation between variables. The results are as follows:

Table 3 Variable Correlation Analysis Table

	RD	LEV_M1	SIZE	GROW	SHARE
RD	1				
LEV_M1	-0.11	1			
SIZE	-0.09**	0.31	1		
GROW	-0.02***	0.05**	0.15	1	
SHARE	-0.09**	-0.22	0.07**	0.02***	1

*** is a significant correlation at the 1% level, ** is a significant correlation at the 5% level, and *is a significant correlation at the 10% level.

The table above makes a correlation analysis of two variables: R&D investment (RD), previous asset structure (LEV_M1), enterprise size (SIZE), equity concentration (SHARE), and growth level (GROW). Among them, the correlation coefficient between the capital structure and R & D investment in the previous period is -0.11, which shows a negative correlation, but it is not significant. Considering that this part only carries on the rough two factor correlation analysis, and does not control the enterprise scale and other related variables, the results may not be significant, so further regression research is needed to draw more accurate conclusions.

4.3 Multiple regression analysis

Based on the above analysis, this article also used Eviews9.0 software for multiple regression analysis. The regression results are as follows:

Table 4 Results of Multiple Regression Analysis

variable	coefficient	t-statistic	Prob.
c	118.02	5.15	0.00
LEV-1	-0.09	-2.19	0.03
SIZE	-4.51	-4.52	0.00
GROW	-0.06	-5.92	0.00
SHARE	-15.29	-1.81	0.07
Adjusted R-squared		0.80	

F-statistic	15.54**

** is a significant correlation at the 5% level.

It can also be seen from the above table that the adjusted R^2 is 0.80 and the fit is greater than 0.6, indicating that the model can better express the impact of the previous period's capital structure, enterprise size, and equity level on R&D investment. The regression coefficient of the capital structure of the previous period was 0.09 and was significant at the level of 5%. It shows that the R&D investment and the asset structure of the previous period have a significant negative correlation, that is, the lower the asset-liability ratio of the previous period, the more R&D investment in the current period, which is consistent with the results of most literature studies.

The regression coefficient of enterprise size is -4.51, which shows a significant negative correlation, which is contrary to the mainstream conclusion. The reason may be that this article uses R&D investment/operating income to measure, and the business size promotes the operating income more than the R&D investment, which results in a negative correlation between the enterprise size and the R&D investment intensity.

The regression coefficient of growth level is -0.06, which is inversely related to R&D investment. This is related to the lag of R&D investment. Due to the long R&D investment cycle, it may be negatively related to the growth level of the company.

The regression coefficient of equity concentration is -15.29, showing a significant negative correlation. This shows that the more concentrated the equity, the more unfavorable for the increase in R&D investment. The reason may be that the larger the shareholding ratio of the largest shareholder, the more decisive for the enterprise. And personal decisions may cause companies to pay more attention to short-term benefits and ignore the long-term benefits of R&D investment.

5 Conclusions

From the government's point of view, the government should improve the stock exchange market, promote the disclosure and disclosure of information, and promote the equity financing of enterprises; implement preferential tax policies and financial support to promote the increase of R&D investment: establish a patent protection system and improve relevant legal construction To protect the R&D achievements of the enterprise.

From the perspective of the enterprise, the enterprise should optimize the capital structure and promote the innovation and development of the enterprise; strengthen communication with investors, and reduce the agency cost of funds due to asymmetry of information as much as possible, so as to provide guarantee for the funds of R&D activities

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A Case Study on the Formation and Evolution of Entrepreneurial Ecosystem from the Perspective of Regional Cultural Gene Arrangement

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Abstract: In this paper, the existing research is summarized on the basis of using vertical single case study method, choose the wuhan optical valley, east lake high-tech zone) as the research object, the collection of data, to deeply understand the case itself and overview, highlight the cultural factors in accordance with the time line to show the formation process of business ecosystem. In order to reveal the internal relations and laws in the evolution process, the path analysis of entrepreneurial ecosystem is carried out according to the idea of "element composition -- evolutionary growth -- value creation". This paper focuses on the impact of the introduction of cultural gene elements on chu Shang's return to entrepreneurship, summarizes the inter-subjectivity characteristics in the evolution of entrepreneurial ecosystem, and then evaluates its value according to relevant data and materials.
Keywords: Regional culture; Evolutionary mechanism; Case studies; Optical valley

1 Introduction

With the extensive and in-depth development of entrepreneurship activities around the world, entrepreneurship research has also entered a deeper stage. People pay more attention to the entrepreneurship environment and relevant subjects, and entrepreneurship ecosystem has become a cutting-edge hot issue in the field of entrepreneurship research at home and abroad. Since China put forward and promoted the concept of "mass entrepreneurship and innovation", the research literature on entrepreneurship ecosystem in China has increased significantly. The proposition of entrepreneurial ecosystem has its profound theoretical basis, which is directly manifested in the substitution of ecological theoretical thinking into the field of entrepreneurship, the application of business ecosystem theory to study its essence, and the implementation of stakeholder theory in the research and operation mechanism. At present, scholars mainly study the incubation environment of the entrepreneurial ecosystem, the interaction and symbiosis of internal subjects, and the functions and functions of the entrepreneurial ecosystem. Some achievements have been made and some relevant theoretical models have been proposed.

1.1 Research on the structure of entrepreneurial ecosystem

Countries such as peng (peng,2016) according to the 2013 world economic BBS on the investigation and analysis of more than 1000 entrepreneurs, summed up the "eight pillar model", you can contact with the market, human capital and financial support are the three most important factors that affect entrepreneurial activity, and points out that entrepreneurship ecosystem by cultural factors, universities, research institutions, mentors eight elements such as the main body supported(Xiang Guopeng et al,2016)[1]. Isenberg (Isenberg,2011) proposed that the entrepreneurial ecosystem includes six elements such as government policies, financial institutions and entrepreneurial culture, which is also known as the "six-field model"[2]. In addition, Koltai et al. (Koltai et al,2013) found that the success of new ventures should not only emphasize the construction of complete environmental factors, but also enhance the

ability of entrepreneurs and strengthen the awareness of active participation of relevant service organizations. They pointed out that the entrepreneurial ecosystem is a network organization around entrepreneurs, consisting of six key elements and six active "participants" interaction (6+6 model)[3].

1.2 Research on the mechanism of entrepreneurial ecosystem

The operating mechanism has dynamic mechanism, equilibrium regulation mechanism, symbiosis mechanism and resource integration mechanism (Wang Zhong et al., 2014)[4]. The driving force of regional science and technology entrepreneurship ecosystem comes from the government pulling power, the self-driving force of science and technology entrepreneurs and the social driving force (Liu Zhifeng, 2010)[5]. The construction of dynamic mechanism must also adapt to the changes of social environment to ensure the comprehensive structure and function of mechanism (Zhao Tao et al., 2011)[6]. The risk prevention and control mechanism of the operation of entrepreneurial ecosystem is of great importance, which is of great significance to reduce or even avoid the internal and external threats of the system. Different forms of risks may exist in the commercial ecosystem at different stages of development, which can be prevented and controlled through platform construction, institutional construction and risk governance framework (Zhong Gengsheng et al., 2010)[7].

1.3 Assessment of entrepreneurial ecosystem

The Organization for Economic Cooperation and Development (OECD) proposes a progressive assessment model, which evaluates the determinants of entrepreneurial ecosystems, entrepreneurial performance and the social effects of entrepreneurship, and provides indicators for the construction and improvement of entrepreneurial ecosystems. Vogel (2013) constructed a three-level evaluation framework and pointed out that the effectiveness of the entrepreneurial ecosystem was analyzed at three levels, namely micro-entrepreneurs, meso organizations and macro-communities[8].

2 Research Design

2.1 Method design

An exploratory longitudinal single case study was used in this study. Compared with large sample empirical studies, case studies can be closer to theoretical constructs (Siggelkow, 2007)[9]. By describing the situation and presenting the true original appearance of things, longitudinal cases are used to show the process of phenomena changing with the change of time, so as to reveal the relationship between complex phenomena and data hidden behind. In particular, single case studies are more suitable for refining the theories and laws of complex phenomena. The purpose of this study is to analyze the formation and evolution mechanism of the entrepreneurial ecosystem of Wuhan Optical Valley from the perspective of regional cultural gene arrangement, and to reveal the internal laws.

2.2 Case selection and collection of relevant data

Based on the methods and principles of theoretical sampling, this study finally selects Wuhan Optical Valley (East Lake High-tech Zone) as the object of case study.In this study, "Optical Valley", "East Lake High-tech Zone", "Chu Shang culture" and other keywords were selected. Relevant materials were obtained through the Internet and relevant books, and news reports and written records on Chu Shang's return to entrepreneurship and the optical Valley entrepreneurial ecosystem were searched. To ensure accuracy and representation of information, combined with the regional characteristics of "chu shang culture", this paper chooses the data in addition to from national websites, newspapers, and some use of regional electronic newspapers, websites, such as the Yangtze river daily, chutian metropolis daily,

kwangmyong, chu, the world network, of chaste tree hunan etc., as well as the Yangtze river publishing house publication. In order to ensure the reliability of the data, a large-scale and comprehensive reading of relevant data was conducted in the study to familiarize with the source, time, background and central idea of the data to ensure the authenticity, accuracy and integrity of the data. The specific data sources are shown in Table 1, and the research process is shown in Figure 1.

Table 1 Data Sources

The title	provenance
Chu merchants are enthusiastic about returning to start their own businesses. The investment of chu merchants from other places has exceeded 90 billion yuan this year.	Hubei Daily, December 18, 2014
Chu business conference site announced 70 outstanding, outstanding Chu business list, these people in the valley of light!	Sohu, December 20, 2019
Chairman of Hubei Chamber of Commerce gathered in East Lake to discuss the development plan of Chu Shang	Chu Shang Tianxia, November 17, 2017
Gather global resources to build a world-renowned "Valley of Light"	Today's Optical Valley, June 2012

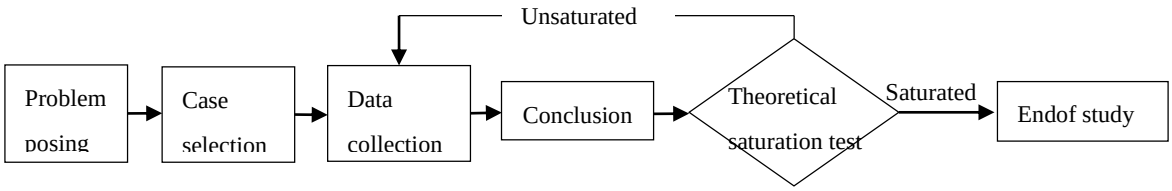

Figure 1 Research Flow

3 Case Description

3.1 Regional culture

The level of entrepreneurship in a country or region is affected by many factors, among which regional culture plays the most prominent role, including local cultural customs and traditions, core values and religious beliefs (Li Chang, 2014; Zhong Wei (2012)[10][11]. The area covered by Chu Merchant culture is mainly centered in Hubei province, including the cultural system with the regional cultural characteristics of "Chu" formed by the development of social culture and commercial culture in neighboring provinces (Wang Haibin and Wang Hong, 2014)[12]. Chu and Shang culture, as a typical representative of regional culture in China, plays an important role in Hubei province. Under the far-reaching influence of Chu and Shang culture, optical Valley, which is called "Gemini" of independent innovation together with Zhong guan cun, has formed a regional culture characterized by high intelligence -- Optical Valley culture.

3.2 Overview of formation and evolution of Optical Valley entrepreneurial ecosystem

3.2.1 Aggregation stage of basic elements (1970s to early 1990s)

In the early stage of the formation of optical Valley entrepreneurial ecosystem, it experienced a long period of basic elements gathering stage. From the perspective of historical factors, Hubei province is an important national old industrial base and the birthplace of modern industry. Hubei province has a superior geographical location, with "thoroughfare of nine provinces", "the province of a thousand lakes"

traffic location advantages. These factors provide "hard" external resources for the establishment of Optical Valley ecosystem.

Wuhan has the third largest number of universities in China, and the largest number of college students in China. In addition, the establishment of research institutes in the field of optoelectronics laid a scientific and technological foundation for the emergence of entrepreneurial enterprises in the future. In 1971, the former Huazhong Institute of Technology took the lead in setting up the Laser Teaching and research Section among universities in China, and in 1974, the state established the Wuhan Institute of Posts and Telecommunications. In addition, many other universities and research institutes in Wuhan have carried out personnel training and research work in the field of optoelectronics. All these have laid a "soft" internal resource foundation for the Optical Valley (also known as The East Lake High-tech Zone) to become a national independent innovation demonstration zone based on the optoelectronics industry.

3.2.2 Formation and cultivation stage (from 1991 to 2015)

In March 1991, the State Council approved The East Lake New Technology Development Zone as a national high-tech zone, and its policy advantages were initially highlighted. At the same time, with the support of Hubei province and Wuhan City, a large number of technical personnel from research institutes and university teachers came to the high-tech zone to start businesses. A group of intellectual elites such as Chen Yilong, Xie Shengming and Ai Luming started their business here, and a group of well-known enterprises such as Kai di, Red Peach, Ren Fu Technology, Hua Chong Technology, Chang Fei, Fiber home Technology and San Te took root here. In May 2000, relying on the East Lake High-tech Zone, the grand project of "Wuhan · Optical Valley of China" was officially launched. Entrepreneurs of the high-tech zone held high the banner of scientific and technological innovation and set off a new upsurge of "second entrepreneurship".

3.2.3 Maturity and development stage (2016-present)

In 2016, Donghu High-tech Development Zone was approved as one of the first national demonstration bases for mass entrepreneurship and innovation, and was also approved as Wuhan Area of China (Hubei) Pilot Free Trade Zone. In recent years, Wuhan east lake high-tech zone to do "the valley", vigorously promote double gen services, according to the construction of market-oriented, enterprise operation mechanism, accelerate the development of the space, and creates the space into a mass of entrepreneurship, widely centers of innovation and the important places for entrepreneurs, achieved good results, the formation of a number of distinctive double gen service mode. After years of exploration, The East Lake High-tech Zone has summarized the "four-level jump" mode for the transformation of scientific and technological achievements, and realized the four-level transformation of "research and development on campus -- incubation around universities -- industrialization of university science and technology parks -- scale of high-tech industrial zones", with the mass innovation Spaces such as university science and technology parks as the main carriers. The formation and development process of optical Valley entrepreneurial ecosystem and its relationship with regional culture are shown in Figure 2.

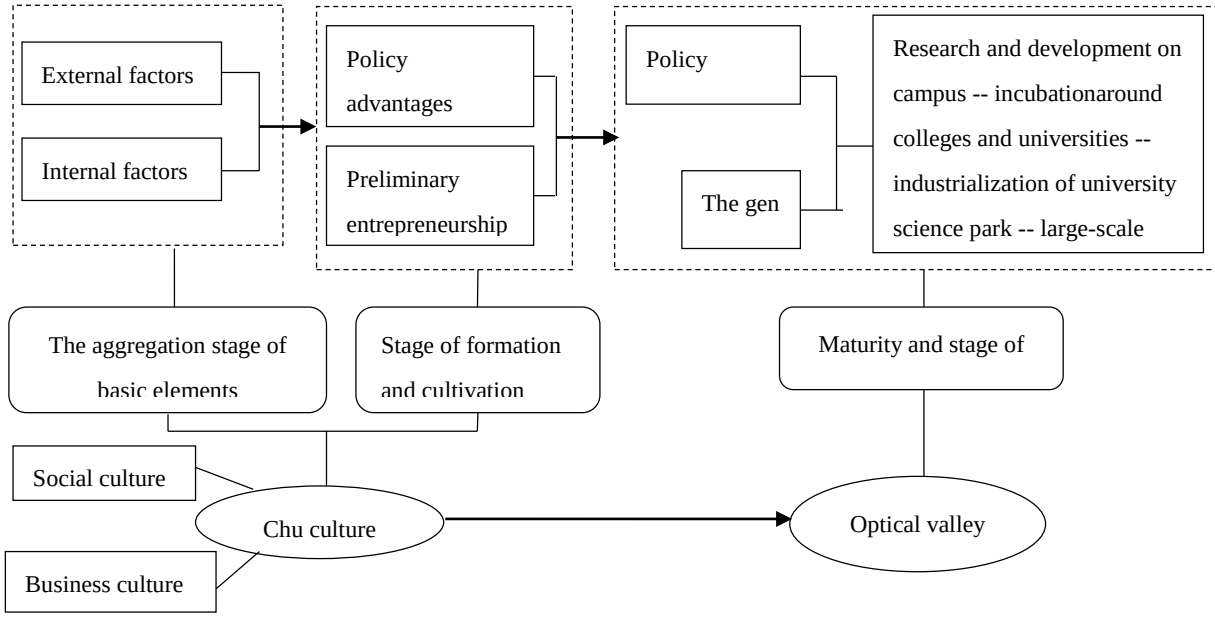

Figure 2 Formation and Evolution of Optical Valley Entrepreneurial Ecosystem

3.3 Advantages and characteristics of Optical Valley

This study selects Optical Valley as a case, which is based on the comprehensive consideration of the existing advantages and characteristics of optical Valley. First, at present, "Wuhan · Optical Valley of China" has formed a high-tech industrial innovation system integrating production, learning and research, which is a typical representative of the entrepreneurial ecosystem. The East Lake High-tech Zone has built 53 incubators (accelerators), 64 mass innovation Spaces, with an incubation area of 4.5 million square meters, more than 4,000 incubated enterprises, more than 3,800 graduated enterprises, and more than 500 entrepreneurial service agencies. Secondly, the cultural inheritance of Chu Merchants promotes chu merchants to return to entrepreneurship. There are numerous Chu merchants gathered in Optical Valley, such as Huang Li, Wang Xincheng, Chen Shaojie, etc. In addition, well-known Chu merchants such as Lei Jun and Xue Min are also closely related to Optical Valley. Optical Valley, an emerging entrepreneurial ecosystem, has relatively obvious regional cultural genes. Thirdly, the formation and evolution process of optical Valley entrepreneurial ecosystem has its inherent regularity, which is of great significance to the research on the development of innovation and entrepreneurship.

4 Theoretical Framework Construction

MARKS puts forward the "input-process-output" IPO model[13], which emphasizes the cyclical characteristics of dynamic evolution. This study analyzes the formation and evolution of Wuhan East Lake High-tech Zone by using the evolutionary path of "element composition -- evolutionary growth -- value creation", focusing on the input of cultural gene.

4.1 Construction of cultural gene map

Genetic DNA is the genetic code of an organism, which can reproduce from generation to generation by base pairing. Similarly, cultural genes are the genetic code of the human cultural system. Under the action of internal and external factors, a region-specific arrangement method is formed, and the

transmission and inheritance of cultural genes is completed through exchange, recombination or even mutation, thus forming regional cultures. In Isenberg's six-field model, the entrepreneurial ecosystem includes six elements: accessible market, policies and regulations, financial capital, infrastructure, entrepreneurial culture and labor market. Policy assistance and capital supplement provide basic conditions for the establishment of Wuhan Donghu New Technology Zone, and play a promoting role. However, the fundamental reason for entrepreneurs to gather here is not external conditions such as policies, capital and facilities, but internal conditions such as entrepreneurial culture and human capital. The Culture of Chu Shang is directly reflected in the characteristics of entrepreneurs and cultural inheritance, and the cultural gene map is established from these two dimensions, as shown in Figure 3.

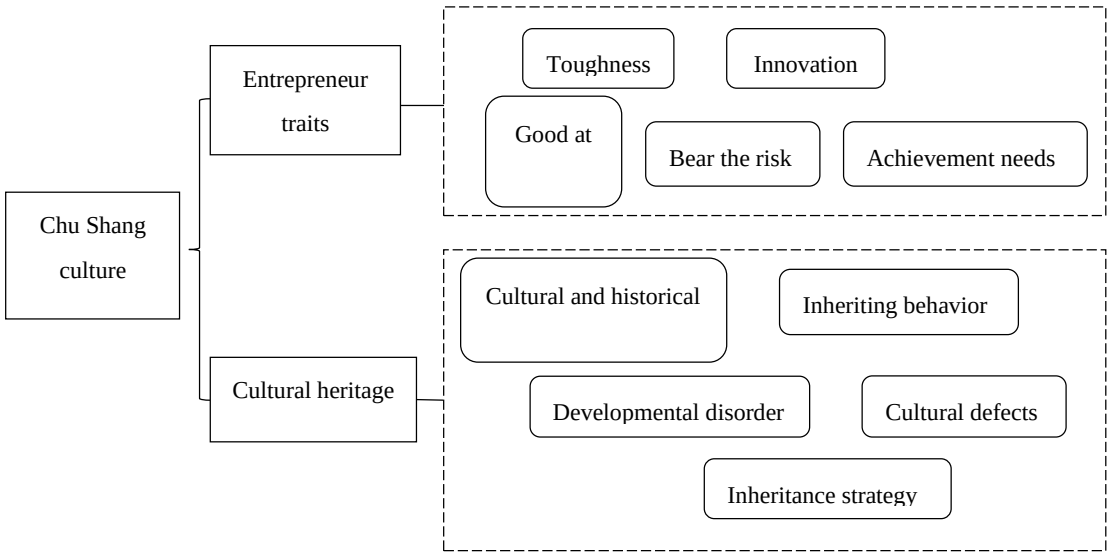

Figure 3 Chu Quotient Cultural Gene Map

4.2 The evolution mechanism and main body relationship analysis of Optical Valley entrepreneurial ecosystem

In recent decades, chu and Shang culture has gone through genetic transformation and reorganization in the process of inheritance, which is more suitable for the development of The Times. Chu and Shang are concentrated in the wave of innovation and entrepreneurship, and play a facilitating role in the formation of entrepreneurial ecosystem. The inheritance of Chu Merchant culture attracted a large number of Chu merchants to return to start business. The aggregation of these entrepreneurs made full use of external resources and promoted the initial formation of optical Valley entrepreneurial ecosystem. This study adopts the questionnaire method to explore the influence mechanism of chu Shang cultural inheritance on chu Shang's return to entrepreneurship. Through analysis, it is concluded that the cultural inheritance of Chu Shang has a positive impact on chu Shang's return to entrepreneurship, and its internal relationship is shown in Figure 4.

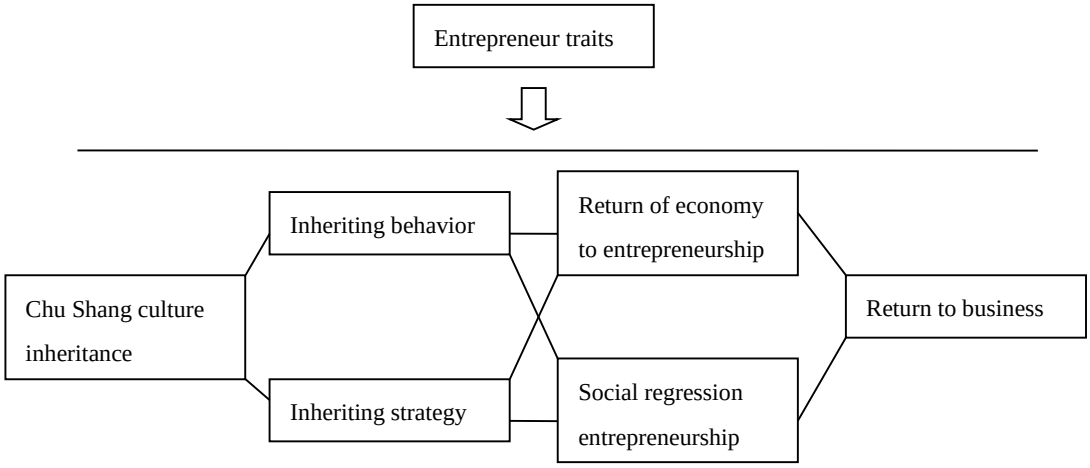

Figure 4 Influence Mechanism of Chu Shang Cultural Inheritance on Chu Shang's Return to Entrepreneurship

Chu Shang's return to entrepreneurship only makes the optical Valley entrepreneurial ecosystem take shape, and chu Shang's leading role is the key to the development and improvement of the optical Valley entrepreneurial ecosystem. The return of Chu Merchants attracts more diversified entrepreneurs to enter the Optical Valley. Chu Merchants' culture is no longer exclusive to chu merchants, but under the influence of foreign entrepreneurs, chu Merchants' cultural genes are further reorganized and changed, and their intrinsic values are diffused to form a more inclusive "Optical Valley culture". Therefore, regional cultural genes promote the evolution of entrepreneurial ecosystem in the cycle of inheritance, transformation, recombination and remodeling. The evolutionary relationship is shown in Figure 5.

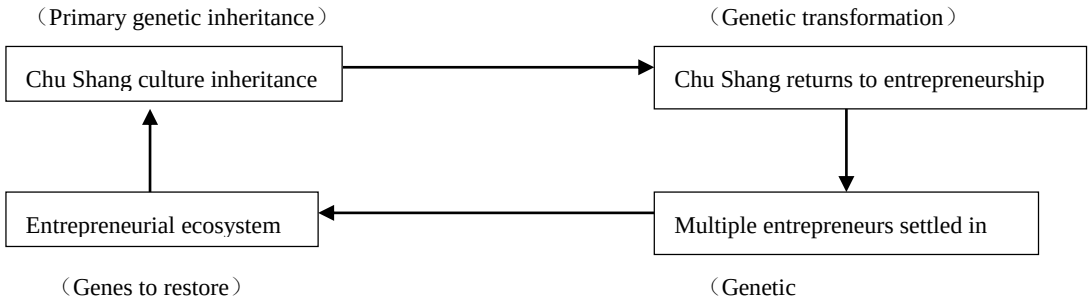

Figure 5 Relationship Between Regional Cultural Gene Arrangement and the Evolution of Entrepreneurial Ecosystem

The subjects of optical Valley entrepreneurial system show obvious agglomeration effect and symbiotic relationship. On the one hand, since the beginning of the 21st century, the wave of optical Valley entrepreneurship has hit, PPTV, Xiaomi and other Internet companies have settled in optical Valley. With Guan shan Avenue as the central axis and Min zu Avenue and Guang gu Avenue as the extension, a "Chuan" shaped innovation and entrepreneurship belt has gradually taken shape, with the agglomeration effect growing increasingly prominent. On the other hand, the multi-agent symbiosis effect has become

more and more obvious in the evolution process. At present, the East Lake High-tech Zone has established a mechanism of market status, technological advantage and mutual assistance of resources, and the interaction among enterprises has been enhanced. The main driving force is regional cultural identity and external platform conditions, such as Optical Valley Entrepreneurship coffee and mass innovation service platform, which play a key radiating role and shorten the relationship between entrepreneurial subjects. The multi-agent aggregation and symbiotic relationship of optical Valley entrepreneurial system are shown in Figure 6.

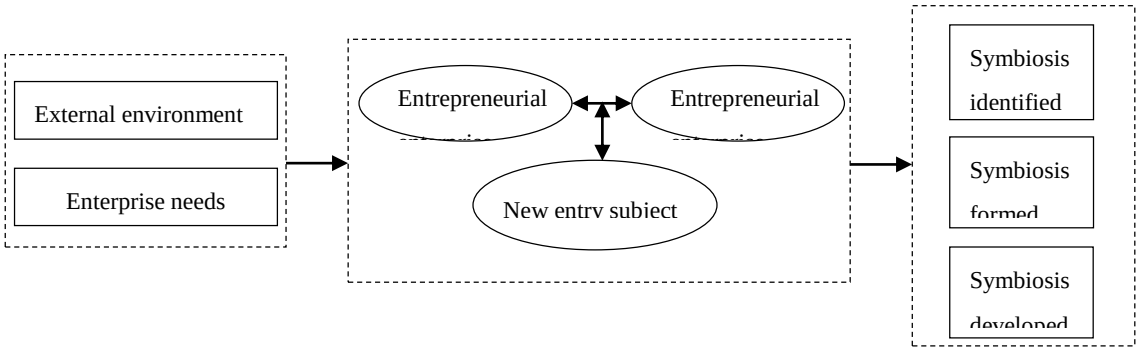

Figure 6 Aggregation and Symbiosis of Entrepreneurial Ecosystem

4.3 Value evaluation

According to the progressive evaluation framework of entrepreneurial ecosystem value, the value of East Lake High-tech Zone is evaluated according to the idea of "determinants -- direct effects -- social effects". The broad market space, the injection of financial capital, the aggregation of human resources and preferential policies determine that Optical Valley has a strong ability to create value. The direct economic effect is more obvious. The number of enterprises settled in Optical Valley has been increasing in a straight line. According to the data, 98 new enterprises have been added every working day, and the total number of enterprises will reach 150,000 by 2021. In addition, the formation of optical Valley entrepreneurial ecosystem provides a broad space for chu Shang to return to entrepreneurship, and further promotes the inheritance of Chu Shang culture and chu Shang's return to entrepreneurship. Optical Valley has an increasingly strong driving force for the employment of college students. Wuhan's "One million College Students Studying in Wuhan Entrepreneurship and Employment Project" has provided certain policy support, and more and more graduates choose optical Valley. It has obvious social effect.

5 Conclusion

The success of Optical Valley has certain enlightenment significance for the evolution and development of entrepreneurial ecosystem. First of all, in addition to policy support and necessary human resources, the formation of an entrepreneurial ecosystem, the identification of regional culture is an important guarantee to maintain the vitality of the entrepreneurial ecosystem. Secondly, in the evolution of entrepreneurial ecosystem, multi-agent aggregation and symbiotic effect will promote value creation. In addition, the ability to create value is a direct criterion for evaluating the entrepreneurial ecosystem, providing a platform for entrepreneurship and attracting more entrepreneurial subjects to join, thus forming a virtuous circle.

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A WoO Decision-making Model of Start-ups Exploration Opportunity Innovation based on Knowledge Capital

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Abstract: Under the public entrepreneurship innovation, exploration opportunity innovation becomes a sharp weapon for start-ups to challenge incumbent enterprises. However, start-ups face the resource constraints, path lock-in and its negative effects in the process. The A-U model and resource bricolage is used to analyze the window of opportunity (WoO) of exploration opportunity innovation, and reveal that chaotic status is the best WoO. Then, the first-mover advantages theory is used to explore the positive effect of knowledge capital on exploration opportunity innovation, and build a WoO decision-making model of start-ups exploration opportunity innovation.

Keywords: Start-ups; Exploration opportunity innovatio; Window of opportunity(WoO); Decision-making model; Knowledge capital

1 Introduction

Under the public entrepreneurship innovation, a large number of start-ups have sprung up and become engines of economic growth, innovation and wealth creation in China. As start-ups, the proportion of opportunity entrepreneurship is significantly higher than that of survival entrepreneurship, of which the proportion is as high as 70.75% in 2019. It is thus clear that the key to success of start-ups is the exploitation and exploration of opportunities.

The opportunities are innovative, and start-ups face the choice of exploitation and exploration in the process of identifying new opportunities, so the notion of balance between exploitation opportunity innovation and exploration opportunity innovation has emerged (Xing et al., 2019). The exploitation opportunity innovation focuses on continuous, incremental improvements, which leads start-ups to lose their internal reform motivation (Du and Wang, 2018), while the exploration opportunity innovation is the test, development and creation of new opportunities for start-ups, and more focused on radical technology breakthrough (Wu et al., 2019), subversive market innovation (Xu et al., 2020). Compared with the path lock-in of exploitation opportunity innovation and its negative effects, exploration opportunity innovation is conducive to identifying new development opportunities for entrepreneurs and helping start-ups win the late-development advantages (Limaj and Bernroider, 2019). Meanwhile, although the former helps to alleviate the short-term survival and competition pressure of entrepreneurs, start-ups can only obtain Schumpeter rent through the latter (Brown et al., 2019). Moreover, start-ups have a weak internal base (Andersson and Xiao, 2014) and are less likely to achieve economies of scale than incumbents (Knoben and Bakker, 2019). For this behavior activity, the existing literature emphasizes the importance of exploration opportunity innovation for start-ups, but there is a lack of attention to the window of opportunity (WoO) (Zhang and Yu, 2019). Furthermore, start-ups face the challenge of identifying the opportunities, exploring new opportunities to adapt to market dynamic changes, but also integrating resources at hand to achieve sustainable development. To overcome these challenges, the A-U model and resource bricolage (Yu, 2017) is used to explore the WoO of exploration opportunity innovation. In particular, a WoO decision-making model composed of knowledge capital is built.

The rest of the study is structured as follows. Two dilemmas in the current situation of exploration opportunity innovation are revealed in Section 2. The WoO of exploration opportunity innovation and the factors of knowledge capital are analyzed, and then a WoO decision-making model is built in Section 3. Finally, the conclusions are drawn in Section 4.

2 The Situation of Start-ups Exploration Opportunity Innovation

2.1 The dilemma of resource constraints

The resource shaping of start-ups is not an overnight process. Compared with incumbent enterprises, start-ups often have a new weakness (Peng et al., 2017), that is, natural resource disadvantage, weak resource development capacity, inadequate management experience, Lack of organizational legitimacy, including information resources, government relations, network effects, and so on, which limit

opportunity innovation. Due to the limited resources of start-ups, any external impact may exhaust resources and lead to failure, including product development or commercialization delay, wrong judgment of the founding team, etc.

Therefore, it is particularly necessary to study how start-ups conduct opportunity innovation based on the existing resources, gather the late-development advantages, implement the opportunity entrepreneurship, and then catch-up and even surpass incumbent enterprises.

2.2 The dilemma of path lock-in

The path locking faced by start-ups is mainly passive locking and self-locking and active locking in the process of development and growth. Due to the high transfer cost between technologies, irreversible investment, economies of scale and other factors, in the process of start-ups opportunity innovation within different industries, there is a path dependence on the old technology paradigm and market track until it is locked. At present, the path lock-in of start-ups is mainly passive lock-in, while they are faced with self lock-in and active lock-in in the process of development and growth.

For path lock-in, there are two kinds of negative effects: technology paradigm lock-in and market track lock-in. In addition, technology has a lifecycle, and the locked technology will inevitably enter the recession period, meanwhile there will be alternative new technology in the market, which will inevitably lead to a new round of technology competition. However, due to the sluggish response to the external market, start-ups will be in a passive position in the new round of competition, thus a vicious circle of innovation trap and success trap will take shape, and then hindering the start-ups development. In a word, the path lock-in and its negative effects in the process of opportunity innovation slow down the pace of catch-up and surpassing of start-ups in China.

3 The WoO Decision-making Model of Exploration Opportunity Innovation

3.1 Basic framework

Compared with the incumbent enterprises, start-ups are less constrained by past experience, practices and existing industry-leading thinking. While, they have more keen insight into the industry development trend and are good at developing new technology or upgrading technology. To find a way out of the dilemma of resource constraints and path lock-in, the WoO decision-making basic framework of start-ups exploration opportunity innovation based on knowledge capital is proposed, as shown in Figure 1.

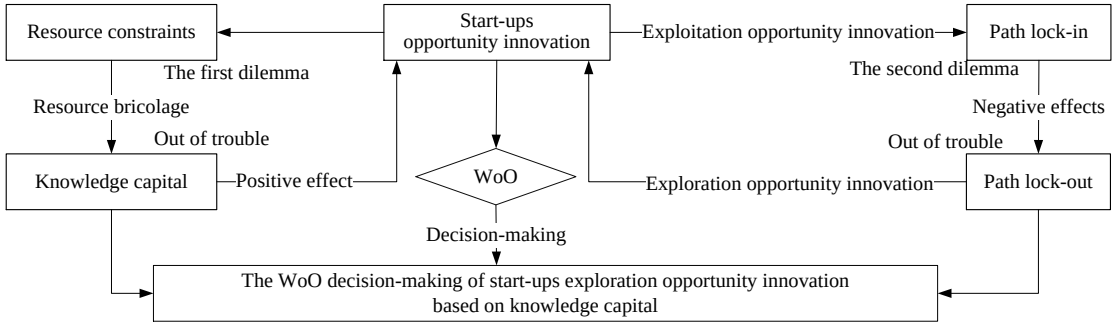

Figure 1 The Basic Framework of WoO Decision-making

Resource bricolage theory provides a new way for start-ups to get rid of resource constraints and carry out opportunity innovation, that is, to maximize the development and entrepreneurship opportunities by integrating internal resources and using the relation network to obtain external resources, so as to create value for enterprises. By integrating internal resources (human resources, technology, etc.) and external resources (external relationship construction, enterprise cooperation, government support, etc.), start-ups gather knowledge capital, optimize the allocation of knowledge capital, and effectively play a positive role in promoting the exploration opportunity innovation.

Besides, due to the dilemma of the path lock-in and its negative effect of exploitation opportunity innovation, the start-ups need to adopt the exploration opportunity innovation to realize the path lock-out. However, the lock-out process is discontinuous and highly uncertain, which is not achieved overnight. Therefore, the start-ups need to choose the WoO, confirm the opportunity, and then grasp the perfect time.

3.2 The WoO of start-ups exploration opportunity innovation

The technology state evolution, including technology path, technology evolution stage, characters of technology innovation, and product features is induced based on A-U model and technology lifecycle theory. Among them, the first curve represents the existing lock-in technology, and the other one is the new technology, and the technology state in closed interval $[t_0,t_1]$ is the same as in closed interval $[t_2,t_3]$, so only the closed interval $[t_1,t_4]$ is analyzed, as shown in Figure 2.

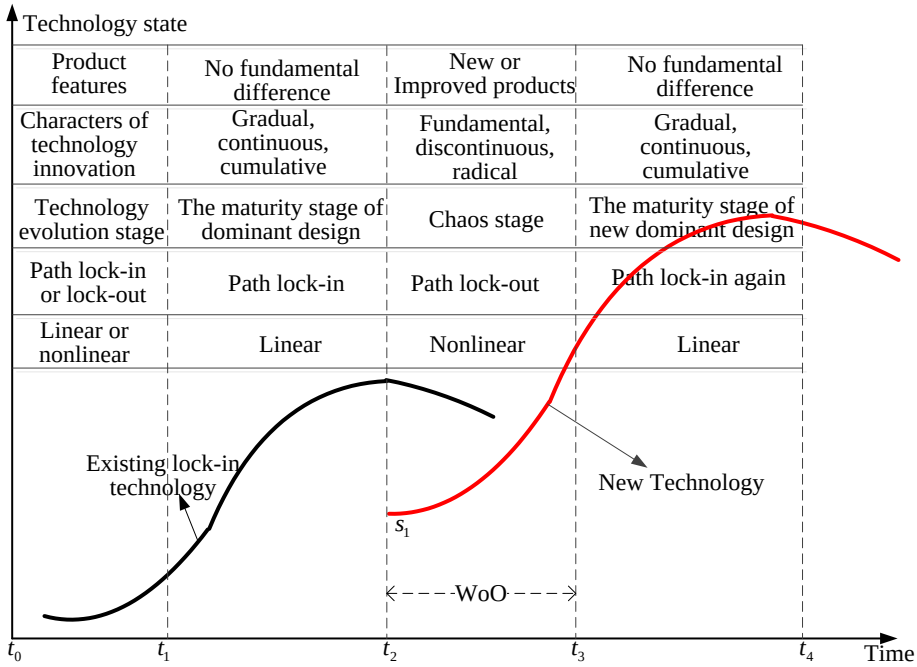

Figure 2 The General Process of Technology State Evolution

In the linear stage () of the technology evolution lifecycle, the market has the dominant design or technology standards of the incumbent enterprises, while the start-ups are in the path lock-in, mainly in the linear path, in the mature technology stage, and in the state of gradual, continuous, and cumulative innovation. Meanwhile, compared with the existing products in the market, they have no fundamental difference.

At point (t_2,s_1), there are great potential breakthrough innovation technologies in the market, including the exploration opportu$[t_1,t_2)\cup(t_3,t_4]$nity innovation of start-ups. Therefore, there are two or more technologies in the market (to comparative analysis, only two technologies are discussed), namely, the existing lock-in technology and the new technology in the non-linear stage ($[t_2,t_3]$), defined as the chaos stage.

In the chaos stage, the non-order is continuously strengthened, and the technology system is relatively chaotic. The existing lock-in technology is gradually entering the late stage of maturity. The product performance of gradual innovation based on the existing lock-in technology will not be greatly improved, and it cannot meet the needs of potential consumers or the emerging needs of market consumers. However, according to the general law of technology evolution and the WoO theory, the chaos stage contains more opportunities and is closer to the new technology paradigm stage.

Therefore, in the chaos stage, the WoO of exploration opportunity innovation for start-ups opens, which is the best time to lock-out technology to enter the market. When the WoO is opened, start-ups need to confirm the opportunity and make the following decisions: do we carry out the opportunity innovation? Do we carry out exploration opportunity innovation or exploitation opportunity innovation?

3.3 The WoO decision-making based on knowledge capital

Compared with the incumbent enterprises with lock-in technology, the start-ups, as the latecomers, have the first-mover advantages of knowledge capital in exploration opportunity innovation and adopting new technology, as shown in Figure 3.

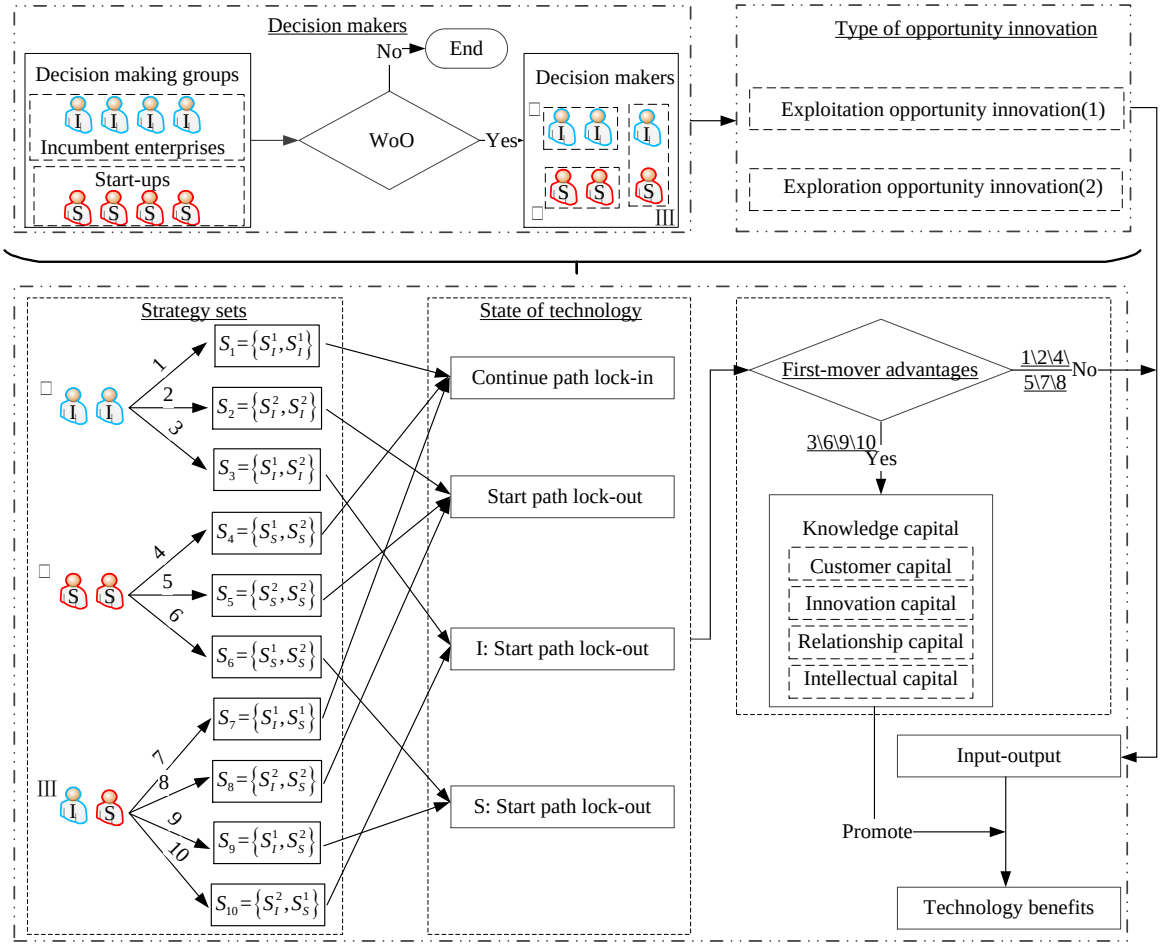

Figure 3 The First-mover Advantages of Knowledge Capital in Exploration Opportunity Innovation

When the WoO opens, incumbent enterprises and start-ups in the market are faced with the choice of whether to continue to lock-in or lock-out. The decision-making groups include incumbent enterprises and start-ups, start-ups and start-ups, incumbent enterprises and incumbent enterprises.

Compared with the sunk cost and investment irreversibility of the path lock-in, the exploration opportunity innovation of the start-ups has more first-mover advantages. It has advantages in resources, market and other aspects, more reflected in the factors of knowledge capital. The performance of lock-out technology products is much better than lock-in, even new products. In this way, it can stimulate the emerging or potential demand of consumers, improve the utility of consumers, even be accepted, and have the advantage of customer capital. The start-ups that take the lead in exploring opportunity innovation can also gain or establish brand and reputation first, which is conducive to the possession of industry-leading core technology, the formation of patents, the holding of more intellectual property rights, and even the establishment of industry standards, etc., belonging to the category of innovation capital. Start-ups are more likely to obtain the support of the government, scientific research institutions, etc., and use the existing technological achievements, which belongs to the category of relationship capital. Start-ups that take the lead in adopting lock-out technology have the advantage of a large number of high-tech professionals, which is the category of intellectual capital.

4 Conclusion

In the face of resource constraints and path lock-in, there is a high degree of uncertainty and discontinuity in the exploration opportunity innovation of start-ups, so it is particularly important to grasp the opportunities and integrate resources. To overcome these challenges, the WoO of exploration opportunity innovation in the chaotic stage was clarified, the advantages of customer capital, innovation capital, intellectual capital, etc., which are the first to carry out exploration opportunity innovation was summed up, and then the WoO decision-making model was built.

The innovation of this study is that the WoO decision-making model of start-ups exploration innovation based on knowledge was proposed. It provides a new perspective for the research and practice of start-ups opportunity innovation. Despite the new findings, constraints related to the knowledge capital advantages.

Start-ups choose to make use of the exploitation opportunity innovation, or exploration opportunity innovation. On the surface, it is the choice of innovation type. In essence, it is the prediction of the economic benefits of technology bearing products. Obviously, the advantage of knowledge capital is not sufficient. On the surface, it is the choice of innovation type, and in essence, it is the prediction of the economic benefits of technology bearing products. Obviously, the knowledge capital advantages are not sufficient.

In the future research, based on the WoO decision-making model, the game model and payoff function including economic benefits of technology and knowledge capital advantages will be built, and the decision-making visual simulation will be carried out.

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Relationship between Technological Capability and Firm Performance: The Moderating Role of Employee Diversity

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Abstract: Being the strategic resources, the strength of technological capability and the employee diversity play an important role in driving the firms' development. This paper built a theoretical model to explore the effect of technological capability on firm performance, and analyze the moderating role of employee diversity. Based on the data of 264 listed manufacturing firms, this paper constructs a multiple regression model and tested the hypothesis. The empirical results show that technological capability positively affects firm performance, and both occupational background diversity and educational level diversity negatively moderates the relationship between technological capability and firm performance. According to the research results, this paper puts forward corresponding suggestions to improve the firm performance.

Keywords: Technological capability; Firm performance; Employee diversity; R&D investment

1 Introduction

The level of manufacturing reflects the productivity level of a country, is an important factor that distinguishes developing and developed countries, and occupies an important share in the national economy. Manufacturing is a key component of the modern economy and is more important than its contribution to GDP shows. How to promote the development of firms has become a hot topic for scholars. For manufacturing firms, the level of technological capabilities is an important factor affecting their development （Yu,2020）. Technological capability is the technological advantage of a firm to obtain competitive advantage and a strategic resource to distinguish a firm from other firms (Wu,2019). Technological capabilities can improve the productivity of firms, increase their efficiency, and speed up the development of new products. Employees are undoubtedly an important driving force for the development of the company. Employees of the company will present the phenomenon of employee diversity due to age, gender, education, professional background and other reasons, which will affect the development of the company. For example, some studies have shown that the age diversity of employees has a positive effect on organizational performance (Li,2020). There are many factors that affect the development of manufacturing firms. Technological capability is one of its important factors, and employee diversity is another important factor that affects the development of firms. It is necessary to study how to give full play to the advantages of technical ability and employee diversity in manufacturing firms to improve the performance of firms.

To sum up, this paper will take listed manufacturing companies as the research object, take employee diversity as the moderating variable, and study the influence of firm technical ability on firm performance, so as to provide some suggestions for manufacturing firms to improve technical ability and optimize employee diversity.

2 Theory and Hypotheses

With the intensification of market competition, technological capabilities are more and more valued by firms, which is the basis for firms to maintain long-term competitive advantages (Yan,2017). The essence of technical capability is knowledge. The stronger the technical capability, the more the firm's knowledge stock and the stronger the ability to manage knowledge. Therefore, the stronger the ability to integrate external environment resources, the stronger the core competitiveness of firms.

2.1 Technological Capability and Firm Performance

The key factor for firms to improve profitability is their ability to use technical knowledge resources (Arballo,2019). As the most important asset of a firm, technology can enhance the profitability and promote the development of the firm. The technical capability does not directly affect the firm performance, but indirectly affects the firm performance in the process of product update and equipment improvement. Technological capabilities promote firms to carry out innovation activities, and they can produce products that meet market demands at a faster speed, so that firms have a larger market share. From the perspective of innovation, technological capabilities can promote the innovation activities of firms to improve their profitability and performance.

Paulo (2018) research results show that companies with strong technical capabilities are more able to discover potential demand in the market, develop new products or services early, expand emerging markets and improve corporate performance. Wang (2016) research results show that technological capabilities help companies seize innovation opportunities and achieve good performance, and technological capabilities have a positive and important impact on corporate performance. In summary, the following hypotheses are proposed in this study:

H1: The technological capability of a firm positively affects its performance.

2.2 The moderating role of employee diversity

It is different to understand the influence of employee diversity on firm performance from different theoretical perspectives. Similarity-attraction theory and socialization theory suggest that employee diversity negatively affects corporate performance. In the environment of employee diversity, individuals differ due to gender, age, education, professional background, values and other factors, so it is difficult for them to form a unified view on problems and influence the decision-making of the organization. Due to the differences in some attributes of employees, it is easy to lead to poor communication, conflict and other problems, which will negatively affect the firm performance.

In the information decision perspective, employee diversity has an positive impact on performance. The theory holds that in the context of employee diversity, diversified employees will have more external social connections and more knowledge and information resources, which will bring a wealth of perspectives and views. It will help solve various organizational problems. These different perspectives are conducive to companies' innovation activities and improve their performance.

Diversity of employee education will bring diversification of information and help improve business performance. Employees with low work performance can master various work skills by exchanging diversified information, which is conducive to the improvement of personal work performance. Diversity facilitates discussions and exchanges information between each other and helps employees learn new things. The diversity of employees' educational level is conducive to the improvement of firm performance. Therefore, this study puts forward a hypothesis:

H2: The diversity of employees' educational level positively moderates the relationship between technological capabilities and firm performance.

Employees with different professional backgrounds will bring different knowledge and experience. When organizations encounter complex and changing problems, these information resources can bring different perspectives and solutions. It also helps the organization's innovation activities and improve firm performance. For example, in a marketing team, the diversity of employees' professional backgrounds will bring different professional experience and information. The marketing team needs to face people from different industries in the process of work. The information brought by the diversity of occupational backgrounds can help solve various problems. The team can use these knowledge and information to generate marketing ideas and improve the team's performance. Some scholars believe that diversity will lead to poor information communication, which will lead to negative effects. Therefore, this study puts forward a hypothesis:

H3: The occupational background diversity of employees positively moderates the relationship between technological capability and firm performance.

3 Methods

3.1 Date collection

The research object of this article is manufacturing companies. The sample data comes from the 2017 annual report of Juchao.com. The companies with poor operating conditions and those without R&D investment projects in the annual report were excluded, and 264 sample companies that met the requirements were selected and data were analyzed.

3.2 Variables and measures

Dependent variable. According to the literature review, it is found that scholars have many indicators to evaluate corporate performance. There are three commonly used: economic value-added EVA, Tobin Q, and business performance. These indicators have their own advantages and disadvantages. The advantages of accounting indicators to measure corporate performance are true and accurate, and easy to obtain. The accounting statements of listed manufacturing companies can only be released after strict review, which ensures the authenticity of the data and can accurately reflect the company's operating performance. Therefore, this paper has adopted the company's net profit (NP) as a measure of firm performance after screening, which can objectively represent firm performance (Wu,2019).

Independent variable. Assessing the level of a firm's technological capabilities is a tedious process that is affected by many factors such as the market environment and internal resources. R & D investment refers to the investment made by companies in patent research and product improvement activities. The technology investment of a firm affects its performance through invention patents and the promotion of the realization of new products or services. These investments include the company's R & D investment and the costs required to integrate and utilize resources. This article chooses to represent the technological capabilities of firms by their R & D investment(RD) (Taewon Kang,2017).

Moderating variables. Diversity of employee education and occupational background diversity of employee. There are multiple measures of employee diversity. There are several methods for measuring diversity in the existing literature (Liang, 2008). As shown in Table 1.

Table 1 Measures of Diversity

Method name	Calculation formula	Measurable scenarios	Analysis level	Representative author
Entropy index	$D = -\sum_{i=1}^{n} P_i(\ln P_i)$	Categorical variables such as gender, ethnic background, etc.;	group	Jehn (2004)
D Score	$D = \sqrt{1 - P_i}$	Suitable for measuring demographic variables	individual	Tsui (1992)
Herfindahl index	$H = 1 - \sum_{i=1}^{n} P_i^2$	Suitable for measuring categorical variables such as age, gender, etc.	group	Joshua (2005)
Coefficient of variation	$CV = S/M * 100\%$	Age, gender, race, education, etc.	group	Moynihan (2001)

The diversity of employees studied in this article is considered from the two dimensions of occupational background diversity(CAR) and education level diversity(EDU). Occupational background is divided into five categories: production staff, sales staff, technical staff, financial staff, and administrative staff. Educational level is divided into three categories: technical secondary school and below, bachelor, master and above. Because the research object is company employees, the degree of diversity should be measured from a group perspective. Borrowing from previous literature studies, using the Entropy index to measure diversity.

Control variables. Considering the impact of technological capabilities on firm performance will be affected by the size and age of the firm, this study uses firm size(SIZE) and firm age(AGE) as control variables. In order to reduce the adverse impact of abnormal data, this article uses the logarithm of total assets of manufacturing companies at the end of 2017 to measure the size of the company.

3.3 Mathematical model

According to the research hypothesis and the definition of research variables, the following model is constructed in this paper:

Model 1 is used to test the influence of control variables on enterprise performance, so as to verify the relationship between firm size, firm age and firm performance.

$$NP=\gamma_0+\gamma_1 SIZE+\gamma_2 AGE+ \varepsilon \quad (1)$$

Model 2 introduces independent variable technical capability on the basis of Model 1, so as to verify the impact of technical capability on firm performance.

$$NP=\gamma_0+\gamma_1 SIZE+\gamma_2 AGE+\gamma_3 RD+ \varepsilon \quad (2)$$

In this paper, the interaction term between employee diversity and technical capability is introduced into the model, so as to study the regulating effect of employee diversity on the relationship between technical capability and firm performance. The model is as follows:

$$NP=\gamma_0+\gamma_1 SIZE+\gamma_2 AGE+\gamma_3 RD+\gamma_4 CAR+\gamma_5 RD \times CAR +\varepsilon \text{ (Model 3)}$$

$$NP=\gamma_0+\gamma_1 SIZE+\gamma_2 AGE+\gamma_3 RD+\gamma_4 EDU+\gamma_5 RD \times EDU +\varepsilon \text{ (Model 4)}$$

4 Empirical Result

This paper analyzes the correlation between the sample data of 264 manufacturing listed companies, as shown in Table 2. It has been seen from the table that the more companies invest in R & D, the more

net profits the company has. Correlation analysis preliminarily tests the relationship between corporate technological capabilities, employee diversity and firm performance.

Table 2 Correlation analysis of variables

Variables	RD	NP	CAR	EDU	SIZE	AGE
RD	1					
NP	0.544**	1				
CAR	-0.104	-0.089	1			
EDU	0.204**	0.010	0.477**	1		
SIZE	0.674**	0.567**	-0.158**	0.104	1	
AGE	0.175**	0.132*	-0.017	-0.018	0.224**	1

Note：N=264，** p <0.01,** p <0.05*

Table 3 shows the results of the regression analysis based on examination of the hypotheses. Model 1 tested the effects of the control variables (Firm age, Firm size) on firm performance. Model 2 is a multiple regression model with independent variables based on model 1. Model 1 (F=61.794, P<0.01) has better explanatory power, and there is no co-linearity among variables. Model 2(F=50.730, P<0.01) has better explanatory power, and there is no co-linearity among variables. The coefficient of independent variable in Model 2 is 0.296 and passed the 1% significance level test, so the company's R & D investment has a significant positive effect on firm performance. The firm increases the research and development investment, the firm performance net profit will also increase. Firms investing in research and development of production line equipment processes can save costs and increase productivity, bringing more economic benefits to firms. From a long-term perspective, companies conducting research and development activities may find potential demand, open up new consumer markets and enjoy market dominance and most market share. Therefore, the company's technological capabilities are positively affecting its performance. Hypothesis 1 passes the test.

Model 3 is a multiple regression model constructed by adding the diversity of employees' education levels based on Model 2. Model 3 (F=33.818, P<0.01) has better explanatory power, and there is no co-linearity among variables. The coefficient of the interaction term is-0.184. It has passed the significance level test of 1%. It can be seen that the diversity of employees' educational level plays a negative role in regulating the impact of technical capabilities on firm performance. Hypothesis 2 fails the test.

Table 3 Multiple regression model

Variables	Model 1	Model 2	Model 3	Model 4
SIZE	0.566**	0.368**	0.405**	0.323**
AGE	0.005	-0.003	0.006	0.000
RD		0.296**	0.180*	0.468**
EDU			-0.127	
EDU*RD			-0.184**	
CAR				-0.001*
CAR*RD				-0.224**
R^2	0.321	0.369	0.396	0.410
Adjusted R^2	0.316	0.362	0.384	0.399
Hierarchical F	61.794**	50.730**	33.818**	35.908**
VIF	1.053	1.872	3.102	2.164

Note：N=264，** p <0.01,** p <0.05*

Model 4 is a multiple regression model constructed by adding the diversity of employees' professional backgrounds on Model 2. Model 4 (F=35.908, P<0.01) has better explanatory power, and there is no co-linearity among variables. The coefficient of the interaction term is -0.224.It has passed

the significance level test of 1%. It can be seen that the diversity of employees' professional backgrounds plays a negative role in regulating the impact of technical capabilities on firm performance. Hypothesis 3 fails the test.

5 Conclusions

The empirical results show that: (1) The technological capability of a firm positively affects its performance;(2) Both occupational background diversity and educational level diversity negatively regulate the relationship between technological capability and firm performance. Employees have different cognitive abilities and professional skills due to different vocational backgrounds and education levels. The higher the degree of diversity, the greater the difference in employees' perceptions. The possibility of increased friction among corporate employees can easily lead to conflict. It will affect the management ability of the firm, reduce the overall integration and operation efficiency. It is difficult to resolve contradictions and thus affect the overall decision-making and implementation of the company. It will affect the specific direction of the company's R & D investment and the strength of implementing R & D strategies, and then lead to a decline in corporate performance. Therefore, the diversity of employees' career background and education diversity negatively regulate the relationship between technological capability and firm performance.

The conclusion of this study can provide some guidance for firms. Continuous technological product innovation is an important reason for manufacturing firms to maintain their leading competitiveness. Therefore, manufacturing firms should pay attention to their R & D investment and investment in technical personnel when making decisions. Higher employee diversity leads to team conflict. Therefore, firms should cultivate a good corporate culture and enhance their sense of belonging and responsibility. It can consolidate the centripetal force of employees and form a good working atmosphere.

In view of the shortcomings of this research, this article believes that future research can be explored from the following perspectives: First, we can expand the research sample size. This will strengthen the scientific nature of the research conclusions and expand the practical significance of the conclusions. Second, we can expand the number of moderating variables and control variables. There are only two moderating variables and control variables in this article. For example, expanding age diversity and gender diversity of employees as moderator variables and asset-liability ratio as control variables. Third, we can improve the indicator system. According to the characteristics of manufacturing firms, we can establish a comprehensive evaluation system of technological capabilities and comprehensively measure the technological capabilities of firms to make the research conclusions more scientific.

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Combined Innovation Model of Sci-tech Financial Instruments

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Abstract: As an innovation activity, sci-tech finance is the process to improve the organic composition of financial capital by the homogenization of financial capital through the heterogeneity of sci-tech configuration. The innovation of financial instruments is the main carrier and effective way to realize the innovation of sci-tech finance. Starting from the evolution logic of sci-tech financial combined innovation instruments, this paper analyzed the driving factor of the instruments deeply, and on the basis of the analysis of the combination model of the innovation of sci-tech financial instruments, put forward with the path selections and implementations of sci-tech financial instruments combined innovation.

Keywords: Sci-tech finance; Instruments innovation; Combined model; Investment and loan linkage

1 Introduction

Accelerating the industrialization of high-tech is an important part of the implementation of innovation-driven development strategy in the 13th Five-Year Plan, and the core of high-tech industries is the combination of technology and finance(Cui Li, Shen Shan, Yang Kairui, 2020). Science and technology enterprises are the main body of technological innovation, and the key of high-tech enterprise' survival and development is the insurance of the supply of funds(Zhang Ling, Guo Yingyuan, Zhang Shen, Pan Yingwen,2019). Sci-tech finance, which is regarded as a series of financial instruments, financial systems, financial policies, systematic and innovative arrangement of financial services of the promotion of the development of science and technology, the transformation of achievements and the development of high and new technology industries, is a system which provides science and technology innovation activities with financial resources from government, enterprise, market, social intermediary institutions and other main subject, together with the behavioral activities in the process of technological innovation financing, and it's also an important part of the national science and technology innovation system and the financial system(Yu Yongda, Lu Wenxiang, 2017). Due to the problems of the narrowness of financial channels, the lack of mortgage assets, the poor service of financial institutions and the lack of financial instruments innovation, it has become a realistic and urgent task to find how to guide financial institutions to promote the sci-tech financial service system continuously and correctly(Chao Wenfang, 2018), and through innovative technology and service model of sci-tech financial instruments, together with improving the service environment of sci-tech financial, tries to promote the science and technology enterprises to accomplish the goal of high-tech industrialization rapidly(Li Ximei, Zou Ke, 2018).

2 Analysis

According to the current situation of the shortage of financial tools and service innovation of science and technology, we must establish and perfect the financial service system to meet the needs of the development of science and technology enterprises, and broaden the channels and selections of financing of the technology industrialization and solve the financing problems of technology-based enterprise

innovation development through the conscious technology innovation and practices of financial tools(Ewa Karwowski, Engelbert Stockhammer, 2017). Therefore, we should further integrate the resources and the strength of the relevant subjects of sci-tech financial, and give full play to the advantages and characteristics of the government, financial institutions, high-tech enterprises, R&D institutions, intermediaries and so on. We should establish and improve the related mechanism, risk sharing mechanism and coordination mechanism, set up business operation platform together; and explore the promotion and combined innovation towards financial of venture capital, bank loans, credit guarantees, scientific and technological risks and other financial products actively(Ana Simpson, Ane Tamayo, 2020). As a special participant in the financial system of science and technology, the government is the guide and regulator of the financial market. We can make a further use of sci-tech financial innovation tools and means, and integrated the limited credit resources of science and technology enterprises into financial products. With the platform of science and technology supported by the government policy, to disperse and control the financial risk of science and technology, and help technology companies to exchange all kinds of financial products from the suppliers. Due to the differences of financial instruments between repayment, liquidity, risk and profitability, thus can meet the different financial needs of market participants. With the combined innovation of technology financial instruments and the enhancement the types of financial products in technology financial market, the subject of the market will have more choices, thus to form their own portfolio, greatly enhance their ability of avoid risks, resist risks and improve investment income. By expanding the scale of the financial market of science and technology continuously, to realize the maintain value and added value of the financial assets of science and technology, then further promote the sound development of the financial market of science and technology. This is also the internal needs of the construction of financial instruments(Pham, 2019).

In addition, the innovation of sci-tech financial instruments is usually affected and droved by the supply and demand factors of the financial market, and the changes of these factors are the external cause of the innovation of it. From the perspective of financial instruments innovation process, the innovation of financial instruments in western countries has been developed rapidly since the 60s of last century, and its motives are mainly from supply and demand of the financial markets(Xing Yan, Ge Zhangzhi, Song Wei, 2016). On the one hand, due to the narrow investment channels, the small quantity and wide area, the science and technology enterprises present diversified and personalized features during the financing needs in different life cycle, which requires scientific financial instruments should be more diverse, flexible, applicable and efficient, and the combined innovation of sci-tech financial instruments has become the realistic choice(As shown in the table 1); On the other hand, with the increasing competition of science and technology in financial markets, financial institutions can not obtain huge profits from the traditional business, only through the innovation of financial instruments of science and technology, especially the combined innovation to develop new markets and look for new customers, can they meet the diversified financial needs of customers at utmost, thus to expand the living space, to get more revenue, to enhance their core competitiveness(Li Shangzhen, 2015). At the same time, new technologies, especially the advances in computer and communication technology greatly reduces the cost of a financial transaction technology, and build up the material platform and technical basis of integrating the scientific and technological financial resources and realizing the innovation of the combination of science and technology financial instruments.

Table 1 Sci-tech Financial Instruments in Life Cycle of Small and Mid-sized Technological Enterprise

Enterprise Life Cycle Sci-tech Financial Instruments	Seed period	Start-up period	Growing period	Maturity period
Government R & D investment	√	√		
Venture Capital Fund	√	√		
Incubator	√	√		
Angel investment or private lending	√	√		
Venture Capital (VC)		√	√	
Private equity (PE)			√	√
Initial public offering (IPO)			√	√
Secured financing	√	√	√	
IPR pledge	√	√	√	√
SME collective bonds			√	√
Policy loans with commercial banks			√	√
Hi-Tech Property Market		√	√	√
Growth enterprise market (GEM)			√	√
Technology Insurance			√	√

3 Model

Financial innovation refers to the new combination of various financial elements in the financial field. The means of financial instruments innovation of scientific and technological are mainly depended on the introduction of new technology and financial instruments products, the improvement of the business increment and the innovation of the existing tool product portfolio, and revitalize the stock assets of the financial market. Due to the restrictions of technology and finance market conditions, the government regulations and the level of technology, the introduction of new products technology and financial tools are always faced with problems of a long development cycle, the high transaction costs and high operation risk. However, the characteristics of convenient, flexibility and effectiveness of combined innovation of science and technology financial instruments had just adjusted to the real requirements in the market. Here we will introduce several typical innovation models of financial instruments.

3.1 Investment linkage model

It is a loan model which based on the interaction between bank and VC or PE, make a comprehensive use of guarantee and credit financial instrument. Technology bank provides loans to the enterprise of science and technology, VC or PE provides a guarantee, and the loan enterprises can obtain financing without selling equity rights and the management of enterprise. VC or PE improves the enterprise's equity rate of return, and at the same time, it also reduces the threat of dilution of equity; Technology bank can greatly reduce the risk of bank lending, which is favorable to develop the growth of customers, and the real realization of science and technology enterprises, technology banking and equity investment institutions this three win-win situation can be realized. Through the business linkage between commercial banks of science and Technology and equity investment institutions, the model realize the ahead of the period of credit funds, thus to effectively support the industrialization of scientific and technological achievements.

3.2 Finance collection model

This is the convergence of group composition of forces of small and medium enterprises which launched a collection of direct financing instruments portfolio. Pooled for direct financing is a business of

strong innovativeness, which is a collection of corporate bond debt, and its essence is a trust loans, but it fixes with many financial products design elements such as income products, securitization, industry funds, trust products, bank financing, venture capital and so on; The essence of the trust is also a trust loan, through the corporation between government, banks, venture capital, social capital, capital management companies, trust companies and Guarantee Corporation to issue trust products, and put the risk-sharing into effect; collection; As an innovation of direct debt financing instrument, the collection of bills reduce the cost of financing, build a bridge with the capital and money market exchange for small and medium enterprises, help them to successfully enter the direct financing market and further expand the financing channels and space through each debt collection issue, the main issue and moderate scale, the innovation of flexible issuance period and the introduction of credit enhancement mechanism.

3.3 Unified loan and return model

While exploring the combination of government and market promotion of SME financing, the Chengdu Hi-tech Development Zone, gradually formed a system by the system also lending model, help with major banks to develop SME credit characteristics of the Chengdu Hi-tech Zone. The model gives a combination of government and the market portfolio to promote SME financing models, through the quartet cooperation of venture capital (corporate financing platform), government, banks and guarantees, by the use of information advantage and organization advantage of the small and medium sized enterprises of science and technology in the park, and through venture capital, security and bank three party review mechanism and multi regulatory mechanisms to control the risk of loans, it reduces the cost of corporate loans and loan threshold, at the time of facilitating the financing of technology-based SMEs, it also promote the development of venture capital, bank profitability and the fulfillment of government functions.

3.4 Consortium forming model

This is a typical pattern option loan, which is mainly through the establishment of a consortium with the investment banking institutions, to provide borrowers with debt, equity, including the combination of investment and financing services. General Mode option loans is determined by the borrower or its affiliates in addition to credit, the additional rights conferred designated investment bank, to find a suitable equity stake in the borrower who line the right bank during the period; Such as listed companies, which means sell shares by equity investors to gain benefits and banks and equity investors share out the bourns. In terms of the specific rights arrangement of the Consortium mode, the investment banks still hold and exercise the borrower's equity. The difference between this model and the general model is mainly in the form, some companies are more willing to accept the consortium form psychologically.

3.5 Creative power model

This is provided for the small and medium-sized enterprises who have equity financing demands of projects docking and jointed stock and debt with financial services. Creative power is a technology platform to solve the difficulty of SME financing in Chengdu high and new technology industrial development zone, which the operation of venture capital is the main part, the physical platform is the basis, and the database is the core. By providing database information, venture investment to the mechanism, realize the service of bank and enterprise docking. Provide the enterprise with financing guarantee consultant, unified loan and return consultant restructuring and listing consultant, equity financing consultant and other services; Provide financial institutions, small and medium sized enterprises and scientific and technological enterprises with comprehensive, timely and efficient services, the model enhance the vitality of innovation and promote the development of high-tech zones by leaps and bounds.

3.6 Silicon valley bank model

The core of Silicon Valley Bank is the deep integration between business organizations and VC. At the time that Silicon Valley Bank services for innovation company which supported by VC, it also services for VC institutions and has closely cooperation with it; conduct operations through VC option arrangement, change the risk-benefit structure, the focus is to get loans to customers stock call options; integrated financial services chain, to set up VC sector, improve risk control capabilities through the cooperation within the commercial banking sector and the VC sector; regard enterprise life cycle and growth as an important criterion to classify the management of loan customers. Silicon Valley Bank provides the nation's more than 50% VC-backed companies, Silicon Valley more than 70% VC-backed companies, about 600 VC, PE institutions worldwide with services. Among the U.S. technology and bio-sciences IPO companies, 1/3 have received Silicon Valley banking services.

4 Results

According to the running mechanism of science and technology and the different roles in the allocation of science and technology, technology and finance combines in different models. Under different models, technology and financial tools innovation should follow the optimal route selection and the implementation of plans under the focus of safety, effectiveness, and the implementation of the program, the realization of profit and the foresight of positioning, in order to maximize portfolio innovation and efficiency of scientific allocation of financial instruments, optimizing the financing structure of SME, and realize the best combination of science and technology with financial innovation.

4.1 The safety path

The main purpose of the initial motivation innovation configuration technology and financial instruments is to prevent financial asset management risk. In the research and development of science and technology, the transformation of scientific and technological achievements, and the industrialization of high and new technology, there are not only the technical risks brought by the high exploration and the management risk brought by the high knowledge intensity, but also with all kings of external environment risk which brought by the short life cycle of the market. In order to enhance the capacity of financial risks and improve the safety of financial assets, the risks should be shared, transferred and controlled in the optimum process of the industrialization of scientific and technological achievements in science and technology through a combination of configuration technology innovation of financial instruments.

4.2 The effective path

The combinatorial innovation configuration of technology financial instruments should be for the purpose of the actual needs of the financial subject and technology enterprises and own the maneuverability and practicability in the scientific financial practice. The characteristics of diversification and differentiation of technology and financial market demand the matched science and technology financial tools and service, adhere to the path of “government support, market oriented”, to mobilize the enthusiasm of all parties, pay attention to actual effect, give full play to the role of scientific and technological financial assets, improve the efficiency of the innovation of financial instruments.

4.3 The profit path

The combination of financial instruments innovation in science and technology is to revitalize the technology of financial market stock assets and meet the urgent financing needs of science and technology enterprises at utmost, promote the development of science and technology achievements and

industrialization of high-tech industry, improve the technology of financial supply chain partners profitability, thus to achieve the win-win situation. In order to achieve the maximization goal of the profit, the optimal allocation of financial resources of science and technology should be made, and the combination of financial instruments innovation in science and technology is an important way to achieve.

4.4 The prospective path

Some innovative financial instruments in the world are the products of the developed market economy. Therefore, learning needs certain conditions. At the same time of combination of financial instruments innovation configuration, special attention should be paid to the technology of financial instruments of environmental conditions, by using the conditions and environment for creating and improving the technology of financial instruments, to gradually enrich a great variety of science and technology for financial products, and expand the scale of the financial markets, improve the scientific and technological type technology of financial market science and technology, so as to promote the internationalization of financial market.

5 Conclusion

Sci-tech financial tools configuration is not arbitrary, whose purpose lies in application. According to the different roles in the operation mechanism of science and technology and the financial technology and financial tools in the configuration, technology and finance are combined in different mode, mainly to carry out the technology innovation of financial instruments of government policy oriented mode which government plays a dominant role in, the technology innovation of financial tools which social mechanism or folk organization groups play a major role in and folk organization leading mode; technology innovation of financial tools in the capital market oriented mode which securities market (bond market and the stock market) and venture capital market based financial market plays a leading role in and the major financial institutions financing object technology enterprise oriented model with banks and other financial institutions as. In different modes, technology and financial tools innovation should follow and focus on safety, effectiveness, and the implementation of the program and select the optimal path forward to achieve profitability and positioning, to maximize the role of Innovation Portfolio Allocation and efficiency of science and technology of financial instruments, financial structure optimization technology based small and medium enterprises, the best combination of sci-tech financial innovation.

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Optimal Differentiation and Maximum Profit in Hotelling's Duopoly

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Abstract: Differentiated competition is an important strategy for maximizing firm's profit today. On the one hand, Hotelling proposed the principle of "minimum differentiation" by assuming the linear transport cost function. On the other hand, D'aspremont et al. proposed the principle of "maximum differentiation" via the assumption of quadratic transport cost function. However, the transport cost in real world is very complicated, so the combination of linear transport and quadratic transport cost may be more accurate. Herein we assume a mixed function, which combines linear and quadratic transport cost. It is found that, when no anyone part of mixed transport cost is dominant, there exists an internal equilibrium, which means the principle of "optimal differentiation".
Keywords: Optimal differentiation; Maximum profit; Hotelling model; Differentiated competition; Internal equilibrium

1 Introduction

Early economic theories ignored the spatial characteristics of the market and abstracted the market into a "point", where firms produce homogeneous products and competed in price. In the "point" market, the one, who set a lower price, will obtain the entire market, so eventually reach a stable equilibrium where the price is equal to the marginal cost (Bertrand, 1883). However, any real economic activities must in space. It is duly assume the market as a "line segments" with fixed length, and the transportation cost is a linear function of distance (i.e., $f(d) = md$, $f(\cdot)$ is the transportation cost function, m (>0) is the unit transportation cost, d is the distance of transportation). The linear city model shows that when the positions of the two firms are fixed, the differentiation of products (location difference) determines the equilibrium price of the products. When location competition is possible, the two firms will minimize the product difference in order to maximize profit (close to each other). Finally, they would like to be at the same point for homogeneous competition (Hotelling, 1929). If replaced the linear transportation cost function with a quadratic form (that is, $f(d) = nd^2$, n (>0) is the transportation cost acceleration), then found that two firms would like to expand product differences as far as possible (away from each other) for maximize profit. Finally, they could achieve a monopoly profit by the production on the two terminals, so pure price equilibrium exists (D'aspremont et al.,1979).

The real market normally has both of competition and monopoly. The theory of monopoly competition, believed that the market in reality is neither perfect competition nor pure monopoly, but is somewhere in between "monopoly" and "competition" (Morrison & Chamberlin, 1933). Monopoly and competition, these two forces should be coexisted because of the differences of products which cannot be replaced completely (Etro, 2019). With the progress of society and economy, many industries gradually enters the mature stage, the development of monopoly competition market has become an irresistible trend (Sun Ming, 2020). In the "point" market, monopoly competition firms usually have two competitive strategies, quantity competition and price competition. For maximizing profit, firms will choose quantity competition, but pricing competition can maximize social benefits (Gao Qing & Shi Mengyu, 2019). In the "line" market, monopoly competition firms also have two competitive strategies, location competition and price competition. The two firms, first determine the location difference, and then determine the price of product (Mao Zhanyu et al., 2020). The Hotelling's "minimum differentiation" represents a special case of perfect competition market, and D'aspremont's "maximum differentiation" represents a special case of pure monopoly market, these cases are too idealized.

However, the principle of "optimal differentiation" may be more common in the real world. If assumed that the transportation cost is the α-th power of distance (i.e., $f(d) = d^{\alpha}$, and $2 \geq \alpha \geq 1$), then can finds that the level of "optimal differentiation" is existed when $\alpha \in [5/3, 1.26]$ (Economides, 1986). Two professors once combined linear transportation costs and quadratic transportation costs (i.e. $f(d) = md + nd^2$), but they only discussed the non-price equilibrium under the situation of small and symmetrical difference, without "optimal differentiation" issue (Gabszewicz & Thisse, 1986). One Chinese professor used weighted linear and quadratic transportation cost function forms (i.e. $f(d) = \theta md + (1-\theta)nd^2$, and

$0 \leq \theta \leq 1$), he show that exist a "optimal differentiation" when the weight is belongs to some range (Ruan Min, 2009). Economides' α-th power transportation cost function revealed that the function is a linear transportation when $\alpha=1$ and a quadratic transportation function when $\alpha=2$. However, the economic significance is difficult to be explained when α takes other values. It is notable that the weighted transportation cost function proposed by Ruan Min has an intelligible economic meaning, but without loss of generality, which should be combine weights and coefficients. Herein, we discuss the topic of "optimal differentiation" and its economic significance within mixed transportation cost function from Gabszewicz & Thisse. In the next, we will firstly review the Hotelling model, and then solve the internal equilibrium and the level of "optimal differentiation", finally given the conclusion.

2 The Hotelling Model

2.1 Minimum differentiation

In Hotelling's linear city model, the market is assumed to be a "line segment" of length L. Consumers are uniformly distributed on the line with completely inelastic demand. Each consumer purchases one unit good, so the length L represents the total market size. For the generality and convenience of next derivation, the length L can be normalized as 1, indicating that the total market size is 1. Firm A chooses the location at the distance (set as "a") from the left end of the line segment and set factory price is p_1. At the same time, firm B chooses the location at the distance (set as "b") from the right end of the line segment and the factory price is p_2. In the original Hotelling model, transport cost is a linear function of distance, that is, $f(d) = md$, and m (>0) is the unit transportation cost. In order to maximize profits, firm A and firm B would like to move closer to the middle and be away from the endpoints. Without the assumption of symmetrical selection on locations, firm A and firm B will finally gather at a same location, which may not be the 1/2 position of the line segment exactly. The economic significance is that, firm A and firm B prefer to reduce the product differentiation as much as possible in order to maximize their profits, which is so called the principle of "minimum differentiation".

Figure 1 Hotelling Model with Linear Transport Cost

2.2 Maximum differentiation

At present, the research of Hotelling models not yet formed a complete system (Xu Hui et al., 2019). Hotelling model is an important model to solve the problem of location, which is established from different spatial positions of firms. D'aspremont et al. modified the transportation cost to a quadratic function form without any changes on other assumptions, that is $f(d) = nd^2$. In their model, firm A and firm B would like to move away from the initial position to the two end points in order to maximize profits. In the end, firm A is located at position 0, and firm B is located at position 1. The economic significance is that firm A and firm B would like to increase their product differentiation as much as possible for maximizing their profits, which is so called the principle of "maximum differentiation". In other words, firm A and firm B could improve their monopoly power and obtain monopoly profits, which greater than zero, based on the principle of "maximum differentiation".

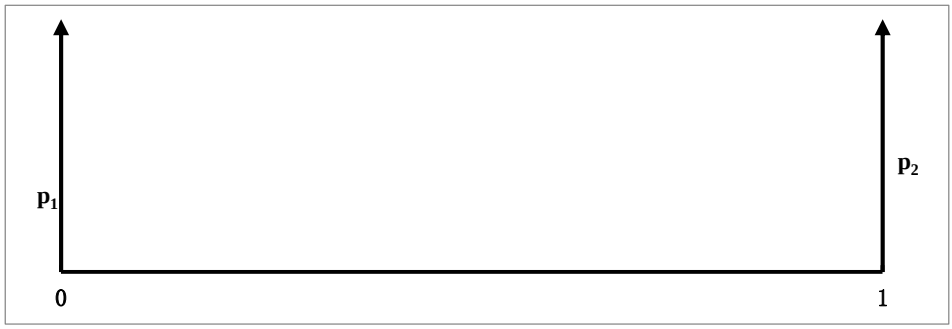

Figure 2 Hotelling Model with Quadratic Transport Cost

3 Optimal Differentiation

3.1 Mixed transport cost

The difference between linear and quadratic transport cost function has an important influence on the equilibrium. The former leads to homogeneous competition but the latter leads to monopoly (Fleckinger & Lafay, 2010). However, the transport cost in real world is very complicated. Neither linear nor quadratic transport cost can achieve an accurate result due to the oversimplification. The combination of linear and quadratic transport cost may be close to the real world. For example, the transport cost includes oil consumption which is close to linear function and human cost which is close to quadratic function because the accumulation of driver fatigue and so on. So the mixed transport cost promoted by Gabszewicz & Thisse can be used. It is supposed that the real transport cost can be written as:

$$f(d) = m * d + n * d^2 \tag{1}$$

In this equation, d (>0) is transport distance, m (≥0) and n (≥0) are structure parameters, which determine the transport cost structure. When $m \to 0$ and $n > \epsilon$, the transport cost function is close to quadratic form. When $n \to 0$ and $m > \epsilon$, the transport cost function is close to linear form. Therefore, this function has more universality. Fig.3 shows the curve of the mixed transport cost function with an acuminate bottom. Obviously the internal equilibrium solution can be obtained when m and n satisfy some relations.

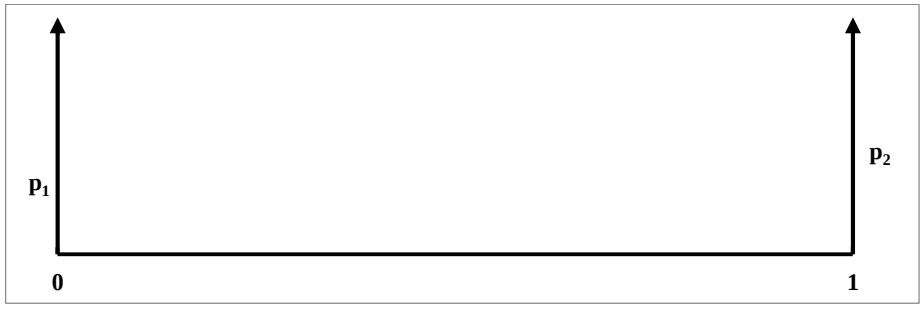

Figure 3 Hotelling Model with Mixed Transport Cost

3.2 The internal equilibrium Solution

In the mixed transport cost function, consumer is indifferent at point x, can be calculated as:

$$p_1 + m(x-a) + n(x-a)^2 = p_2 + m(1-b-x) + n(1-b-x)^2 \tag{2}$$

The point x, where consumer is indifferent, can be written as:

$$x = \frac{p_2 - p_1}{2(m+n-na-nb)} + \frac{1+(a-b)}{2} \tag{3}$$

To simplify the next derivation, we assume that $\alpha = a - b, \beta = m + n - na - nb$. So the position x can be written as:

$$x = \frac{p_2 - p_1}{2\beta} + \frac{1+\alpha}{2} \tag{4}$$

The consumers on the left of x buy goods from firm A, so the market share of A is x. The consumers on the right of x buy goods from firm B, so the market share of B is 1- x. Without loss of any generality, assume the marginal cost is zero. The profit functions of the firms A and B are as follows:

$$\pi_1 \quad = p_1 * x \tag{5}$$
$$\pi_2 = p_2 * (1 - x) \tag{6}$$

In the second stage, the firms would like to maximize the profit through the price competition. If exist internal equilibrium price, then the first-order necessary conditions[3] should be satisfied as below:

$$\frac{d\pi_1}{dp_1} = x + p_1 \frac{\partial x}{\partial p_1} = \frac{p_2 - 2p_1}{2\beta} + \frac{1+\alpha}{2} = 0 \tag{7}$$
$$\frac{d\pi_2}{dp_2} = (1-x) - p_2 \frac{\partial x}{\partial p_2} = 1 + \frac{p_1 - 2p_2}{2\beta} - \frac{1+\alpha}{2} = 0 \tag{8}$$

Based on the first-order conditions, the internal equilibrium price and market shares can be solved:

$$p_1^* = \frac{(3+\alpha)\beta}{3} \tag{9}$$
$$p_2^* = \frac{(3-\alpha)\beta}{3} \tag{10}$$
$$x^* = \frac{3+\alpha}{6} \tag{11}$$

In the first stage, the firms perform differentiated competition to maximize their profit. p_1^*, p_2^*, and x^* are functions of α and β, at the same time, α and β are the functions of the positions a and b. Substituting them to the profit function, obtains that π_1 and π_2 are also the functions of positions a and b. If exist internal equilibrium price, then the following first-order necessary conditions[4] can be satisfied as below:

$$\frac{d\pi_1}{da} = \frac{\partial p_1}{\partial a} x + p_1 \frac{\partial x}{\partial a} = \frac{3+\alpha}{6}\left(\frac{2\beta - n\alpha - 3n}{3}\right) = 0 \tag{12}$$
$$\frac{d\pi_2}{db} = \frac{\partial p_2}{\partial b}(1-x) - p_2 \frac{\partial x}{\partial b} = \frac{3-\alpha}{6}\left(\frac{2\beta + n\alpha - 3n}{3}\right) = 0 \tag{13}$$

Summing and subtracting the above two equations, get:

$$\alpha(\beta - 3n) = 0 \tag{14}$$
$$6\beta - 9n - n\alpha^2 = 0 \tag{15}$$

The binary quadratic equation has two solutions:
One solution is $\alpha = 0, \beta = \frac{3n}{2}$, as well as $a = b = \frac{2m-n}{4n}$. If $0 \le a + b \le 1$ is satisfied, so $\frac{1}{2} \le \frac{m}{n} \le \frac{3}{2}$ can be obtained.
Another solution is $\beta = 3n$, $\alpha^2 = 9$, so $(a-b)^2 = 9$, further $a - b = \pm 3$. This solution has conflict with assumed condition where $0 \le a \le 1$ and $0 \le b \le 1$.
Finally the internal equilibrium positions are as below:

[3] $\frac{d^2\pi_1}{dp_1^2} = \frac{d^2\pi_2}{dp_2^2} = -\frac{1}{\beta} < 0$, so the second-order sufficient conditions is hold.
[4] $\frac{d^2\pi_1}{da^2} = \frac{d^2\pi_2}{db^2} = -\frac{n}{2} < 0$, so the second-order sufficient conditions is hold.

$$a^* = b^* = \frac{2m - n}{4n}, \quad \frac{m}{n} \in [\frac{1}{2}, \frac{3}{2}] \tag{16}$$

The internal equilibrium positions can be substituted into the internal equilibrium price equation and the profit expression in the second stage:

$$p_1^* = p_2^* = \frac{3n}{2} \tag{17}$$

$$x^* = \frac{1}{2} \tag{18}$$

$$\pi_1^* = \pi_2^* = \frac{3n}{4} \tag{19}$$

Therefore, based on the mixed transport cost function $f(d) = md + nd^2$, when $\frac{m}{n} \in [\frac{1}{2}, \frac{3}{2}]$, the position of internal equilibrium can be obtained in the Hotelling model. Firm A and firm B should adopt the principle of "optimal differentiation". If $\frac{m}{n} = 1$, $a^* = b^* = \frac{1}{4}$, which means the positions $\frac{1}{4}$ and $\frac{3}{4}$ of the line segment are the internal equilibrium respectively. That is so called "the position of optimal differentiation".

4 Conclusion

The linear city model has received extensive attention since its introduction. However, assuming different transport cost function, we may get completely opposite conclusions, which show that the form of transport cost function has an important impact on the equilibrium. Based on the assumption of linear transport cost function "f(d) = md", Hotelling obtained the principle of "minimum differentiation", which represents a special case of perfect competition market. Based on the assumption of quadratic transportation cost function "$f(d)=nd^2$", D'aspremont et al. obtained the principle of "maximum differentiation", which represents a special case of pure monopoly market. We propose the principle of "optimal differentiation" based on the mixed transport cost function "$f(d) = md + nd^2$", which represents a more general monopolistic competition market.

In the mixed transport cost function, the linear part represents the force for competition and the quadratic part represents the force for monopoly. When $\frac{m}{n} \in [0, \frac{1}{2}]$, the force for competition is enough lager than monopoly, so the competition is dominant in maximizing profit. For enforcing competition, firms need "minimum differentiation" strategy. When $\frac{m}{n} \in [\frac{3}{2}, +\infty)$, the force for monopoly is enough lager than competition, so the monopoly is dominant in maximizing profit. For enforcing monopoly, firms need "maximum differentiation" strategy. On the basis of those facts, we draw a conclusion that: when $\frac{m}{n} \in (\frac{1}{2}, \frac{3}{2})$, no one of these two opposite forces is enough lager than the other one, so the differentiation cannot be too large or too small, in order to maximize the profit, the "optimal differentiation" competitive strategy should be adopted.

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Relationship between Firm's Social Capital and Innovation Performance: A Meta-analysis

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Abstract: Despite a surge of studies examining the impact of firm's social capital on the innovation performance, empirical research shows controversial results. To resolve this problem, this paper conducted a meta-analysis to restudy the relationship between firm's social capital and innovation performance based on the empirical research results of 63 independent samples. This paper also identified some moderators affecting this relationship. The results indicated that the firm's social capital-innovation performance link was positive and significant (r=0.363), and the age of the firm and the cultural context affected the impact of social capital on innovation performance to a large extent. Based on these findings, this paper developed recommendations for future research.

Keywords: Firm's social capital; Innovation performance; Meta-analysis; Moderating factors

1 Introduction

Since the concept of social capital was firstly proposed, more and more sociologists, political scientists, economists, and management scientists have begun to explore the answers to the problems of their fields from the perspective of social capital. In recent years, the concept of social networks and social capital has gradually entered the field of innovation research, and a large number of studies have been done in order to explore the relationship between social capital and innovation (Yeşil, 2019).

Previous theoretical studies have clarified that social capital can play a positive role. The contribution of social capital to corporate innovation was that social capital could help reduce transaction costs, search and information costs, negotiated decision costs, and strategy development and implementation costs (Giuseppe, 2020). Social capital could not only increase the degree of participation in innovation, but also could promote radical innovation (Zhao, 2016). Social capital was the foundation of innovation, mainly because innovation is gradually considered to be the result of the interaction and exchange of knowledge from actors in different organizations (Chen, 2018). Therefore, innovation requires the accumulation of diverse knowledge from different types of actors. Obviously, social capital can achieve it. However, empirical research shows some results that are different from the theoretical analysis.

Some scholars' researches show that there is a positive and significant relationship between the two variables. Social capital has a positive and significant effect on the effectiveness of new product innovation (Presutti, 2020). Social capital has a positive and significant impact on the performance of technological innovation and service innovation (Sulistyo, 2016; Ozkan, 2017).

Furthermore, some researches have shown that there is no significant relationship between the two variables. The structural and relational dimensions of vertical and horizontal social capital incubating enterprises have no direct impact on technological innovation performance (Delgado, 2016). The impact of social capital on innovation is not significant when hen human capital interacts (Dost,2019).

In addition, some researches have shown that there is a negative relationship between the two variables. The cooperative network structure hole has a negative impact on innovation (Srivastava, 2017). High social capital did not give rise to high levels of innovation (Safran, 2020), and network connections have a negative impact on the number of new products or services (Eiteneyerh, 2019). In addition, some scholars believe that there is a curvilinear relationship between the two variables. The effect is more significant when engaged in exploratory innovation tasks, and it will be difficult to play its role under innovative tasks (Duodu, 2019).

In sum, although the importance of firm's social capital in the innovation process has been generally recognized, no consensus has been reached on whether social capital can improve innovation performance. Therefore, the author uses the meta-analysis method to quantitatively evaluate the existing empirical research, and to obtain a more general conclusion by correcting the sample and measurement

errors. It is expected that it will be helpful to the corporate practice. This article will focus on two issues: (1) Can firm's social capital improve innovation performance? (2) What factors affect the relationship between firm's social capital and innovation performance?

2 Research Design

2.1 Data collection and encoding

The following criteria for sample selections are used in this paper: (1) The research must be empirical; (2) The outcome variables in research must be relevant variables reflecting innovation performance, and predictive variables must include social capital; (3) The research must provide the correlation coefficient r between social capital and innovation performance or other statistical values that can be converted into r by calculation; (4) The research must be at the enterprise level, not at the individual, teaming or regional level; (5) The research sample must be independent samples. If there are multiple studies using the same sample, only one of them will be selected. If two samples are used for one study, the two independent studies are considered.

The database includes John Wiley, Elsevier Science, Emerald, EBSCO, SAGE Premier, cnki.net. Search in titles with terms such as “social capital”, “innovation performance”. The literature includes not only journal articles, but also conference papers, dissertations and working papers. A total of 63 articles were selected, including 21 dissertations, 39 journal articles and 3 conference papers, 38 English documents and 25 Chinese documents.

The 63 articles collected were coded, and the first author of each study, the number of samples, the year of publication, the type of literature (thesis D, journal article J, and conference paper P) and correlation coefficients were extracted. When extracting correlation coefficients or other statistics, some studies may not report the overall relationship between the two, but only the relationship between the dimensions. Therefore, the overall value is obtained by averaging the results of each relational dimension at the time of processing the data.

2.2 Encoding and defining variables

Moreover, the author defined the corresponding contextual factors and variable measures. Scenario moderators include cultural background, industry characteristics, and firm age: (1) According to cultural background, it can be divided into individualism (L) and collectivism (C). The former is mostly presented in western countries, and the latter is mostly presented in eastern countries.(2) Industry characteristics include high technology (H), low technology (L) and mixed technology (M) while high technology includes biotechnology, internet, software, electronic communications, etc., low technology includes food, agriculture, manufacturing, construction, etc.; (3) According to the age of the firm, it can be divided into new enterprise (N) and old enterprise (O), which are regarded as new enterprises for those whose average age is less than eight years, and vice versa.

In addition, the influence of variable measurement is also considered in this paper: social capital metrics is divided into multi-dimensional (M) and single-dimensional (S), and social capital evaluation is divided into subjective criteria (S) and objective criteria (O) .Innovation performance dimension is divided into technical categories (technical innovation T and product innovation P) and non-technical categories (service innovation S, management innovation M, and comprehensive innovation G).Innovation performance evaluation is divided into subjective criteria (S) and objective criteria (O), and the evaluation sources are divided into single source (S) and multiple sources (M).

3 Results

3.1 Main effects and homogeneity analysis

Table 1 shows the results of the meta-analysis of the relationship between social capital and innovation performance. It can be seen from Q=464.010 that each effect value is heterogeneous and it needs to be analyzed by random effect model. I2 (I-squared) = 86.6%, indicating that only 13.4% of it is caused by random errors. And Tau2=0.031, which indicating that 3.1% inter-study variation can be used as the weight calculation. From the results of the stochastic model in Table 1, it can be seen that the effect size between social capital and innovation performance is 0.380. After Fisher transformation, the correlation coefficient is 0.363, indicating that the intensity is moderate, and 95% confidence interval does not include 0, indicating that the relationship is significant in general.

Table 1 Meta-analysis Overall Effect and Homogeneity Test

K/N	Method	ES	95% CI	Z	Q	I^2	Tau^2
63/13619	Fixed	0.374	[0.357, 0.391]	43.301***	464.010***	86.6%	0.031
	Random	0.380	[0.333, 0.428]	15.611***			

Note: K and N represent the literature and sample size of the study, respectively , ** p <0.05,*** p <0.001

3.2 Analysis of moderating effects

In order to test the moderating effect between social capital and innovation performance, the author uses subgroup and regression analysis to analyze cultural background, industry characteristics, firm age, and variable measurement factors. The subgroup is divided according to the variable category, and the regression is divided according to the 0-1 variable (where collectivism, high technology, new enterprises, multi-dimensional social capital, subjective, technological innovation performance, and multi-party evaluation sources are set to 1) .The final results are shown in Table 2 and 3.

Table 2 Subgroup Analysis Results

Moderators	K	N	ES	95% CI	Q	I^2	Tau^2	Z
Total	63	13619	0.380	[0.333, 0.428]	464.01***	86.6%	0.031	15.61***
Cultural Background								
C	54	11057	0.400	[0.346, 0.455]	425.41***	87.5%	0.035	14.36***
L	9	2562	0.270	[0.207, 0.332]	16.57*	51.7%	0.004	8.44***
Industry Characteristics								
H	24	4596	0.408	[0.313, 0.502]	231.86***	90.1%	0.049	8.47***
M	13	3920	0.387	[0.336, 0.439]	28.19***	57.4%	0.005	14.72***
L	26	5103	0.350	[0.270, 0.431]	192.84***	87.0%	0.036	8.58***
Firm age								
N	13	2655	0.517	[0.401, 0.633]	100.55***	88.1%	0.039	8.73***
O	50	10964	0.344	[0.297, 0.392]	290.97***	83.2%	0.023	14.17***
Social capital dimension								
M	31	5949	0.372	[0.291, 0.453]	286.97***	89.5%	0.046	9.03***
S	32	7670	0.385	[0.329, 0.440]	168.83***	81.6%	0.019	13.60***
Social capital evaluation								
S	59	12528	0.381	[0.334, 0.428]	390.21***	85.1%	0.028	15.80***
O	4	1091	0.383	[0.113, 0.654]	39.80***	92.5%	0.069	2.78**
Innovation performance dimension								
TP	50	10921	0.359	[0.306, 0.413]	367.27***	86.7%	0.031	13.11***
SMG	13	2698	0.459	[0.357, 0.561]	82.91***	85.5%	0.030	8.82***
Innovation performance evaluation								
S	55	11944	0.386	[0.337, 0.436]	384.45***	86.0%	0.029	15.28***
O	8	1675	0.335	[0.180, 0.491]	55.35***	87.4%	0.040	4.22***
Evaluation source								
M	47	9611	0.377	[0.324, 0.431]	304.62***	84.9%	0.028	13.85***
S	16	4008	0.390	[0.284, 0.496]	156.35***	90.4%	0.041	7.20***

3.3 Cultural background

The study divided the cultural background into collectivism background and individualism background. From Table 2, we can see that there is significant heterogeneity within the group (QC=425.41, QL=16.57), and the two variables have a stronger positive relationship under collectivism (ESC=0.4, ESL=0.27).According to the results of regression analysis Model 1, the cultural background regression coefficient is positive and significant (B=0.159, p=0.023), which is consistent with the subgrouping results. Therefore, the cultural background has a positive regulating effect on the relationship between social capital and innovation performance, and in the context of collectivist culture, the relationship between firm's social capital and innovation performance is more significant.

3.4 Industry characteristics

In Table 2, there is significant heterogeneity within the industry characterization cluster (QH=231.86, QM=28.19, QL=192.84) and a stronger positive relationship between the two variables in high technology industries (ESH=0.408, ESM=0.387, ESL=0.350), According to the results of regression analysis Model 1, the regression coefficient of industry characteristics is positive but not significant (B=0.011, p=0.665), which is consistent with the subgroup results. Therefore, it is impossible to explain the impact of industry characteristics on innovation performance.

3.5 Firm age

It can be seen from Table 2 that the results within the two groups of new and old enterprises have significant heterogeneity (QN=100.55, QO=290.97). There is stronger positive relationship in the new firm (ESN=0.517, ESO=0.344). According to the results of regression analysis Model 1, the age regression coefficient of the company is negative and significant (B=-0.169, p=0.008), which is consistent with the subgroup results. Therefore, the research results show that company age has a negative moderating effect on the relationship between social capital and innovation performance, and the moderating effect is more significant in new enterprises.

Table 3 Regression Analysis Result

Variables	Model 1	Model 2	Model 3
	B（t）	B(t)	B(t)
Constant	0.359*** (3.93)	0.546*** (3.68)	0.501*** (2.83)
Cultural Background	0.159** (2.34)		0.188** (2.43)
Industry Characteristics	0.011 (0.44)		0.003 (0.10)
Firm age	-0.169*** (-2.75)		-0.169** (-2.57)
Social capital dimension		-0.016 (-0.30)	-0.017 (-0.34)
Social capital evaluation		-0.113 (-0.72)	-0.128 (-0.84)
Innovation performance dimension		-0.115 (-1.70)	-0.054 (-0.82)
Innovation performance evaluation		0.091 (0.78)	0.109 (0.98)
Evaluation source		-0.056 (-0.87)	-0.101 (-1.53)
Tau^2	0.027	0.034	0.029
I^2	84.68%	86.29%	83.64%
Adjust R^2	16.32%	-4.17%	12.38%
F	4.10	0.77	1.93

p	0.010	0.575	0.07

Note: ** p < 0.05, *** p <0.001

3.6 Variable measurement

From Table 2 and Table 3, the influence of variable measurement factors on the relationship between firm's social capital and innovation performance can also be obtained.

For social capital, the value of the relationship between the two when using multiple dimensions is smaller than the value when using a single dimension (ESM=0.372, ESS=0.385). Regression analysis Model 2 supported the conclusion but showed no significant difference (B=-0.016, p=0.769). The relational value of subjective evaluation is slightly smaller than that of objective evaluation (ESS=0.381, ESO=0.383). Although regression model 2 supports this conclusion, it shows that the difference is not significant (B=-0.113, p=0.477).

For innovation performance, the relationship value of technological innovation is smaller than that of non-technical innovation (ESTP=0.359, ESSMG=0.459). Regression analysis Model 2 supported the conclusion but showed no significant difference (B=-0.115, p=0.094). The value of the relationship between the two when using subjective evaluation is greater than the value when objectively evaluating (ESS=0.386, ESO=0.335). Although regression model 2 supports this conclusion, it shows that the difference is not significant. (B=0.091, p=0.438).

For the evaluation source, the value of the relationship between the two sources when using multiple sources is smaller than that when using single sources (ESS=0.377, ESM=0.390). Although regression model 2 supports this conclusion, it shows that the difference is not significant (B=-0.056, p=0.390).

In addition, in Model 3, when the situational variables and measuring variables are included simultaneously, the results of the sub-group analysis and regression analysis are the same.

4 Conclusion

We use meta-analysis to analyze 63 literature, and the results show that the relationship between firm's social capital and innovation performance is positive and significant. Therefore, investing in the construction of social capital can help companies improve their innovation performance and achieve long-term development.

The analysis of the moderating effects of situational factors shows that cultural background and the age of the firm have an important impact on the relationship between firm's social capital and innovation performance, the effects of collectivism and new enterprises are more significant, and positive impact of the relationship between industry characteristics and firm's social capital and innovation performance is not significant. Therefore, for enterprises, the impact of different cultural backgrounds on corporate attitudes and behavior patterns is profound and significant, and it should be used to coordinate the development of corporate innovation activities; Although new enterprises have their own unfavorable conditions, they are better at using relationship networks to exert their value. Although the industry has different technological content and different resource elements required for innovative activities, enterprises can use their own advantages to achieve innovations that meet their conditions.

This paper also has some important practical implications. The meta-analysis in this paper has certain limitations that need to be improved in the future. Firstly, the literature collection only focuses on the research that directly addresses social capital and innovation performance, and ignores similar

descriptions such as network structure. At the same time, no unpublished papers have been collected. In the future, it may join to enhance universality. Secondly, when selecting situational factors, due to the lack of literature data itself, the author does not analyze other variables that may have an impact on the relationship between social capital and innovation performance, such as the size of the enterprise, which can be analyzed in the future.

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The Impact of Intellectual Property Protection on Enterprise Innovation: A Threshold Model Based on Regional Heterogeneity

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Abstract: Combined with the background of economic globalization, this paper analyzes the impact of intellectual property protection on enterprise innovation. This paper uses the method of non-linear panel threshold model analysis to describe the synergistic effect of intellectual property protection and other related factors by establishing the interaction between the intensity of intellectual property protection and per capita GDP. This paper holds that there is a threshold effect between intellectual property protection and enterprise innovation. When the threshold is exceeded, the protection of intellectual property is not conducive to enterprise innovation. Moreover, according to the change of per capita GDP, it shows obvious regional heterogeneity.

Keywords: Intellectual property protection; Enterprise innovation; Threshold model; Regional heterogeneity

1 Introduction

Since the 21st century, the process of economic globalization has been accelerating, and international competition has become increasingly fierce. Many enterprises are facing the situation of accelerating transformation and upgrading and adapting to the new international situation. Innovation and technology have become the core economic capital, especially to improve the level of national (or regional) innovation has become an effective way to achieve sustainable economic development. At the same time, as the core competitiveness of enterprises, intellectual property plays a key role in influencing enterprise innovation. Countries around the world pay more attention to and protect intellectual property rights, which has become an important force to promote the innovation and development of enterprises. However, with the in-depth research of enterprises, governments and academia, it is found that the over protection mechanism of traditional intellectual property rights, to some extent, hinders the flow of innovation elements, reduces the efficiency of innovation, and is not conducive to enterprise innovation.

There is significant regional heterogeneity in the impact of intellectual property protection on innovation. Li Jingjing and Zhuang Ziyin research showed that the impact of patent protection on innovation and development in various regions of China is different, that is, patent protection can promote economic development and regional innovation ability in developed regions of China, while in underdeveloped and moderately developed regions, technological innovation ability will be restrained (Li Jingjing, Zhuang Ziyin, 2017); Chen Heng and Hou Jian research found that the influence of Regional R & D investment and FDI inflow on innovation ability has complex nonlinear significant characteristics with the threshold effect of intellectual property protection intensity (Chen Heng, Hou Jian, 2017); Ramzi & Salah studied the drivers of innovation capacity in different countries and found that most of the assumptions about innovation in the context of developed or emerging countries are not applicable to countries with weak innovation capacity. All in all, there is significant regional heterogeneity in the

impact of intellectual property protection on innovation, and this regional heterogeneity is closely related to the level of regional economy. However, the division of economic level in the existing research is too general to reflect the impact of changes in economic level and different levels of intellectual property protection on innovation (Ramzi & Salah,2015).

In the past literature, when studying the impact of intellectual property protection on technological innovation, the non-linear panel threshold regression model based on Hansen was generally adopted, with intellectual property protection as the threshold variable. Intellectual property protection affects innovation by acting on other innovation elements (such as foreign direct investment, R & D investment, etc.). However, from the perspective of macro-economy, intellectual property as an environmental variable should be linked with economic level.

Environmental variables also play a role in innovation. Because the impact of intellectual property protection on regional innovation has significant regional heterogeneity, that is, the impact of intellectual property protection on technological innovation depends on the level of regional economy, the level of regional economic development can be considered as a threshold variable to investigate the impact of intellectual property protection on technological innovation at different levels of economic development.

2 Current Situation Analysis and Problem Proposal

The intellectual property development research center of the State Intellectual Property Office of the people's Republic of China issued the 2018 evaluation report on the development of China's intellectual property in 2019. The report shows that the comprehensive development level of China's intellectual property has been improved in an all-round way, the protection level has achieved remarkable results, and the protection index has been improved steadily.

According to the analysis of 2018 evaluation report on China's intellectual property development released on the China Economic Net, "innovation score" of China's economic development has been continuously improved from 2010 to 2018. In 2010, the number of invention patents authorized per ten million yuan of R&D funds in China was only 1.27, reaching 1.9 in 2018. This data represents the relationship between R&D investment and technological innovation output, reflecting the significant improvement of innovation efficiency in China. In 2017, China's contribution to innovation in the world increased significantly, ranking third, and ranking fourth in terms of international influence.

Through the research and analysis of the survey data, we can draw the conclusion that the increase of the protection of intellectual property is beneficial to the innovation of enterprises to a certain extent. We believe that in a single closed economic condition, the government adopts the protection mechanism of relevant laws to protect the inventor's work achievements, make the inventor profit from his invention, and stimulate enterprise innovation.

However, with the development of global economic integration, innovation competition among countries is becoming increasingly fierce. In the open innovation economy environment, the exclusivity and exclusiveness of traditional intellectual property protection hinder the flow of innovation elements, weaken the exchange and interaction of innovation thinking, and will bring negative impact on enterprise innovation.

3 Empirical Research

According to Selma Ezzeddine and Hammami(2018), Han Xuefei and Zhao Liming(2018), intellectual property protection may have a non-linear relationship with technological innovation, and it has regional heterogeneity. Therefore, the intensity of intellectual property protection can be used as a threshold variable, and the interaction between intellectual property protection and regional economic development level can be introduced for threshold regression. Taking a single threshold model as an example, its basic form is as follows: $Y_{jt} = \eta_0 + \eta_1 X_{jt} I(q_{jt} \le \tau) + \eta_2 I(q_{jt} \ge \tau) + \eta_3 CX_{jt} + \varepsilon_{jt}$ Y_{jt}, X_{jt} and CX_{jt} are explained variables, explanatory variable and control variables respectively, q_{jt} is threshold variable, τ is threshold values and I(.) is index functions. At time of $q_{jt} \le \tau$, the index function is 1, otherwise 0, ε_{jt} is a random interference term.

This paper uses emerging countries for analysis, including Argentina, Brazil, China, India, Indonesia, South Korea, Mexico, Russia, South Africa, Turkey, Saudi Arabia, etc., and uses 2009-2018 data to build a balanced panel. “inno” as the explained variable, “ipri” as the core explanatory variable. The variables in this paper are as follows:

Table 1 Variable Description

Variable name	Variable description	data sources
inno	Technological Innovation	Measured by the global innovation index released by WIPO
ipri	Intellectual Property Protection Index	Adopt the GP index of the World Property Organization
free	Index of Economic freedom	Adopt the world economic freedom index released by the Heritage Foundation
lnpgdp	Natural value of GDP per capita	From the world bank database, in order to eliminate the influence of heteroscedasticity, natural logarithm is adopted
open	Openness	In terms of dependence on foreign trade, import, export and GDP data are from the world bank database
iprilnpgdp	Interaction item	The interaction between intellectual property protection index and per capita GDP

Descriptive statistics of the above variables are as follows:

Table 2 Descriptive Statistics of Variables

Variable	Obs	Mean	Std.Dev.	Min	Max
inno	110	37.302	7.127	27.8	57.7
ipri	110	5.517	0.766	4.043	7.891
free	110	58.967	6.848	43.8	74.3
lnpgdp	110	3.936	.338	3.042	4.497
iprilnpgdp	110	21.762	3.905	15.095	31.979
open	110	0.456	0.178	0.172	0.898

3.1 Correlation coefficient and variance inflation factor of each variable

Through the correlation coefficient test of each variable (see table 3), it can be found that the correlation coefficient of each variable is below 0.6. After examining the variance inflation factors, it is found that the variance inflation factors are all less than 4, and the mean value is 2.35, less than 2.5. It can be considered that there is no serious multicollinearity problem in the model.

Table 3 Correlation Coefficient of Each Variable

Variable	inno	ipri	free	lngdp	iprilngdp	open
inno	1.0000					
ipri	0.4691	1.0000				
free	0.1616	0.0461	1.0000			
lnpgdp	0.1541	0.2003	0.0122	1.0000		
iprilnpgdp	0.2895	0.0800	0.0743	0.0939	1.0000	
open	0.3526	0.0658	0.2597	0.0296	0.0939	1.0000

3.2 Threshold existence test

To analyze the panel threshold model, the existence of threshold variables should be tested first. With “inno” as the explained variable, “ipri” as the threshold variable to be verified, the trimming ratio is set to 0.15, and 5000 operations are performed based on bootstrap method. The test results are as follows: the estimated threshold value is 5.9050, the LM value is 69.0476085, and the bootstrap p value is 0.000, which indicates that the original hypothesis is rejected at the 5% significance level, indicating that “ipri” is the threshold variable affecting innovation.

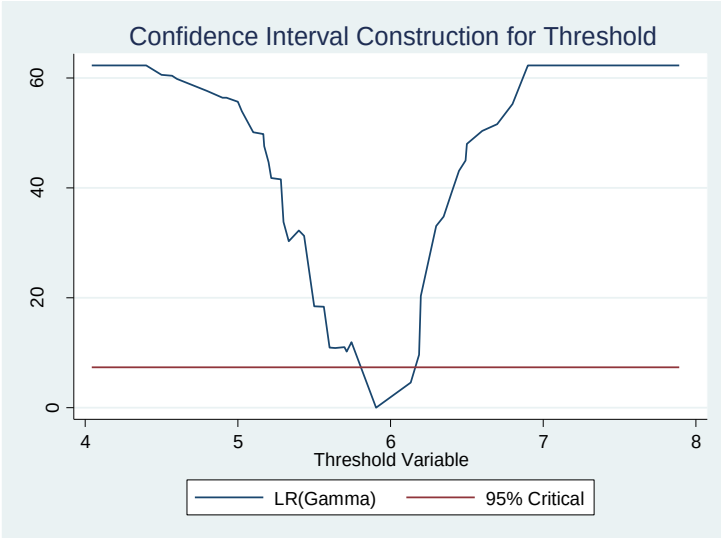

Figure 1 Threshold Likelihood Ratio Sequence

Figure 1 shows the trend chart of likelihood ratio sequence statistics as the threshold function with "ipri" as threshold variable when the explained variable is “inno”. The estimated threshold value is 5.9050, which is at the lowest point in the graph. At this time, the likelihood ratio sequence statistic is 0, lower than the 95% confidence level, indicating that the threshold exists significantly.

3.3 Threshold regression results

Using stata14.0 as the analysis tool and using the “thresholdreg” command to estimate, the results are as follows:

Table 4 Threshold Regression Results

	q<=5.9050	q<=5.9050	no threshold
ipri	4.0454***（2.2776）	-1.8784***(0.0123)	2.7742***(0.9418)
lnpgdp	0.0237***（0.0719）	0.0425****(0.00197)	0.0347***(0.0127)
free	0.0142***（0.0018）	0.0290*(0.0287)	0.02214***(0.0021)
open	0.0016***（0.0129）	0.0274**(0.0078)	0.0178***(0.0029)
iprilnpgdp	0.0121***（0.0037）	0.0219***(0.0083)	0.0201***(0.0109)
Intercept	0.0177***(0.0051)	-2.707***(0.8126)	-1.7714*(1.1441)
Sum of Squared Errors	0.2234	1.9887	2.1145
R-squared	0.4405	0.4029	0.3904
obs	110	110	110

Note: * * * P < 0.01, * * P < 0.05, * P < 0.1, standard error in brackets.

According to the sum of squares of residuals on both sides of the threshold, the existence of double threshold and triple threshold is verified.The results are as follows: the bootstrap P values of double threshold and triple threshold are 0.3924 and 0.4728 respectively, which are greater than 0.05, so there is only a single threshold.

This paper uses the methods of substitution variable (replacing per capita GDP with per capita GNP) and changing research objects (excluding the data of South Korea) to test the robustness, and finds that the results are relatively stable. Due to the length of the paper, it will not be explained.

4 Conclusions

Through the threshold regression model, we can find that: (1) there is an obvious mechanism transformation in the impact of intellectual property protection on technological innovation. When the intensity index of intellectual property protection is less than 5.9, intellectual property protection has a positive impact on technological innovation; when the intensity index of intellectual property protection is greater than 5.9, intellectual property protection has a negative impact on technological innovation; (2) through the interaction of intellectual property protection and regional economic development level, it can be found that there is obvious regional heterogeneity of intellectual property protection on technological innovation, that is, regional economic development level has a positive role in the process of intellectual property protection affecting technological innovation; (3) a country's economic freedom and economic openness have a positive impact on a country's technological innovation. As for the negative effect of intellectual property on technological innovation after passing the threshold, we analyze the possible reasons: (1) excessive intellectual property protection may lead to the increase of exclusiveness and exclusivity, and weaken the flow of innovation elements among enterprises; (2) excessive intellectual property protection is easy to cause technological monopoly, which will have a negative impact on market development, and then affect enterprise innovation; (3) under the condition of foreign investment, the transition of intellectual property protection is easy to hinder the inflow of foreign advanced technology, which makes the domestic innovation process relatively slow.

Based on the above research findings, we believe that we should constantly improve the intellectual property protection mechanism and should not blindly pursue excessive intellectual property protection. In particular, in the context of global economic integration, the introduction of foreign advanced

technologies should not be restricted, nor should domestic innovation ideas be excessively retained. Appropriately promoting the flow of international innovation elements is conducive to innovation development.

In this regard, the author thinks that the government and enterprises can take the following countermeasures: (1) improve government subsidies and related preferential policies, correct the externality of scientific research activities, and encourage enterprises to innovate independently. We should not only implement the protection of intellectual property rights in place, but also take a number of measures to support enterprise innovation, so as to continuously increase the vitality of enterprise innovation; (2) appropriately introduce foreign advanced technology, enhance the openness of regional economy, promote the flow of innovation elements, and weaken the exclusiveness of excessive property rights protection to a certain extent; (3) actively participate in global economic governance to maintain self-reliance At the same time of protecting domestic intellectual property rights, we should have more voice on the world stage and gain more innovation experience.

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The Influence of Regional Culture on Entrepreneurial Performance: A Meta-analysis-based Study

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Abstract: The influence of culture on economy has been widely recognized. After narrowing down the scope of research topics, it can be found that regional culture also has an important influence on entrepreneurial performance. Based on the theory of cultural genes and entrepreneurial orientation, entrepreneurial performance as the research object, the regional culture is divided into multiple dimensions, using meta-analysis, the main conclusion is: the important influence factors of entrepreneurial performance, entrepreneurial culture, education, environment, science and technology culture, imitative learning between enterprises, between enterprises competition atmosphere of cooperation. In addition, mutual trust between enterprises also has a certain impact on entrepreneurial performance, while government training support has a small impact on entrepreneurial performance.
Keywords: Regional culture; Entrepreneurial performance; Influencing factors; Meta-analysis

1 Introduction

1.1Culture and economy

At present, the view that "economy determines culture and culture reacts on economy" has been widely accepted, and there are endless studies on culture and economy. A direct search of "Culture and economy" on CNKI yielded 36,782 documents. Therefore, the relationship between culture and economy is inseparable, and the influence of culture on economy and the mutual development and com mon development of culture and economy are very common. However, among the above 30,000 literatures, the research topics are mostly macro aspects such as "economic system", "market economy" and "cultural industry", while there are only 451 literatures related to regional economy, and most of them are researches on a specific industry.

Based on the comprehensive influence of regional culture on economy, it can be found that its research direction can be summarized as the influence of regional culture on economic development and the utilization of regional cultural characteristics, and the development of cultural industries that integrate culture and economy. Among them, the influence of regional culture on economic development is mainly carried out in the aspects of ideology, code of conduct, educational environment, science and technology and cultural level.

1.2 Regional culture and entrepreneurial performance

By using the literature statistics method, the "regional culture" was searched in CNKI, and a total of 8183 literatures were retrieved, among which 133 were on the theme of enterprise management. However, among the 133 literatures, most of them mainly discussed the cultural industry, and only one literature related to the influence of regional culture on entrepreneurial performance, but did not directly talk about entrepreneurial performance and did not involve quantitative analysis.

Although hundreds of literatures were obtained during literature retrieval in the database, there were few literatures that were relatively relevant to this study. The literatures that were relevant to this study

were only conducted by taking cultural factors as one of the many influencing factors in the whole study. In the above search literature, if the correlation is low, it can be found that in terms of social concept, the young and middle-aged population in the east of China accounts for a large proportion and has a strong sense of mercantilist, which makes the spread of entrepreneurship easier and forms an entrepreneurial atmosphere. In the eastern region, the Engel coefficient is relatively low and more attention is paid to spiritual consumption, which promotes the generation of entrepreneurial motivation (Wang Yinhao, 2014). In terms of education, basic education and vocational education can provide corresponding human resources for entrepreneurial enterprises (Li Daliang, 2007). In some areas, especially in religion more complex region, religious belief will affect entrepreneurship: caused by religious beliefs and values, habits, such as differences, which will cause certain exchanges and communication between different religious believers difficult or even conflict, inhibition of entrepreneurship in this area; But on the other hand, by religious sermon specification may also be in a certain extent, promote entrepreneurship ability, such as islamic commercial culture of "fair trade, against speculative" make their followers in the process of entrepreneurial management pay more attention to their own reputation, enhance its ability to resist risk (Luo Lan, 2016), and improve the business performance.

1.3 Research content

Although there are many existing studies on the "influence of regional culture on economy", regional culture is divided into multiple dimensions, and only a small number of literatures have been conducted on the topic of "influence on economy". Narrowing it down to regional culture has even less impact on entrepreneurial performance. Most of the literatures related to "factors affecting entrepreneurial performance" mainly studied culture or regional culture as one of the influencing factors, but did not divide regional culture into multiple dimensions.

Therefore, this study will be devoted to exploring the influence of regional culture on entrepreneurial performance, and divide regional culture into multiple dimensions to present a literature exploring the influence of various factors at the regional cultural level on entrepreneurial performance.

2 Theoretical framework

2.1 Meme theory

"Memes are things that are similar to the role of genes in biological evolution in the transmission of language, ideas, beliefs, and behaviors." Unlike biological genes, memes also have acquired pathways. Three characteristics of cultural genes, heredity, variability and selectivity, can be obtained by analogy with biological genetic genes. Heritability, that is, cultural transmission is like the process of genetic inheritance; Variability means that in the process of cultural transmission, the contents transmitted will be reduced or increased to a certain extent, just like genetic variation in biology. Selectivity means that content with strong communication ability will be more easily transmitted, while content with weak communication ability will be more difficult to be transmitted. Unlike biological genes, memes also have acquired pathways.

Different regions have different geographical environment and historical background, and their inherited cultural genes are also different, thus forming different cultural genes among different regions. Economic activities, as one of human behaviors, are subtly influenced by certain concepts and qualities (Zeng Lingtai, Lu Mingchun, 2006). Specifically, culture has an impact on entrepreneurship in terms of trust, norms of conduct, systems, traditional customs and ideas.

2.2 Entrepreneurship orientation

Entrepreneurial orientation refers to the innovation, risk bearing and pioneering spirit and behavioral tendency of enterprises in the process of growth and development when facing new entry problems or strategic decisions (Gu Hong, 2011).

Innovation refers to the organization's tendency to commit itself to the development of new products or technologies and other innovations. Risk taking is the behavioral tendency of an organization to take risks in pursuit of opportunities and benefits. Forerunner, that is, the organization mainly through the prediction of external competition and market environment, taking into account the internal environment, the future development of decision-making has a forward-looking behavior tendency.

Entrepreneurial orientation has an impact on the overall strategy, competitive strategy, r&d strategy and other aspects of organizational operation, thus further affecting performance.

3 Research design

3.1 Research methods

In this study, meta-analysis is used to conduct a statistical analysis of a large number of obtained research results on the basis of integrating existing research conclusions, which makes up for the shortcomings of single research (Wang Pei, Feng Lijuan, 2005) and makes the research results more reliable. Compared with traditional literature reviews, meta-analysis is more rigorous in literature selection and can better avoid personal subjective influence (Wang Jianya, Niu Xiaorong, Wan Li, 2020). Moreover, meta-analysis is a quantitative analysis method, which is more accurate and reliable than qualitative analysis.

3.2 Research steps

Firstly, literature retrieval is conducted according to the research content, and the retrieval results are screened to determine the literature scope of data sources. Secondly, the literature is coded, including data extraction and single effect size determination. Thirdly, conduct heterogeneity test. Finally, the results of the meta-analysis are discussed.

3.3 Literature selection

3.3.1 Retrieval scheme

In this study, literature retrieval was carried out in CnKI, Weipu journal and Wanfang data. However, it was found after preliminary retrieval that although the retrieval results of each database were different, the required literature duplication was higher after the literature was screened. Therefore, this study takes CnKI as the main literature source.

Firstly, a search was conducted on "The influence of Regional culture on entrepreneurial performance", but there was no literature with high relevance to this study. Secondly, advanced retrieval was used to retrieve the literature with the theme of "regional culture" and containing "entrepreneurial performance". Search the literature containing "regional culture" and "entrepreneurial performance" within the full text scope; The literature with the theme of "factors influencing Entrepreneurial Performance" and including "empirical research" was searched.

3.3.2 Search results

Directly searched "the influence of Regional culture on entrepreneurial performance", no relevant literature was searched in CnKI and Weipu journals, and 56 literatures were searched in Wanfang data, but there was no literature with high relevance to this study.

Using advanced retrieval, the literature with the theme of "regional culture" and including "entrepreneurial performance" was retrieved, and 4 literatures were retrieved from CnKI. In Viper journals, no search results are available; Among the wanfang data, a total of 74 Chinese literatures were retrieved, and there were no foreign literatures. Among them, 3 literatures were related to this study to some extent. Then, the literature containing "regional culture" and "entrepreneurial performance" were searched within the scope of the full text. On CnKI, a total of 327 Chinese literatures and 2 foreign literatures were retrieved. Among them, there are 17 literatures focusing on entrepreneurial performance. There are 12 literatures on influencing factors. There is little correlation between the two foreign literatures and the content of this study. In Viper journals, no search results are available.

The literature with the theme of "factors influencing Entrepreneurial Performance" and containing "empirical research" was searched. In CnKI, there were 24 Chinese literatures and no foreign literatures. In the weipu journal, 82 articles in total; Among the wanfang data, there are 919 Chinese literatures, 3 foreign literatures and 22 literatures related to regional culture.

3.4 Data extraction

Among the retrieved literatures, literatures that conducted empirical research on the relationship between regional culture and entrepreneurial performance were selected as data sources. Since there are few literatures that directly discuss the influence of a certain region's culture on entrepreneurial performance, many literatures that take a certain region as the object of study are included in the data source range in literature selection. Because the research taking a certain region as the object of study, the results will have the regional color of the object of study and conform to the category of regional culture.

Within the scope of the obtained literature, repeated publications of the same research project were excluded, especially those with different titles but the same content. Then, the literature with incomplete data was eliminated again, and the influencing factors in the literature and their correlation coefficients with entrepreneurial performance were extracted. In the coding process, different authors give the same concept and express different concepts uniformly in different literatures.

It can be seen from the above that "culture is all the spiritual activities and products of human beings relative to politics and economy". Therefore, this study classifies the "trust", "imitation and learning", and "competition and cooperation" among enterprises in Wuhan Optical Valley into the relationship atmosphere among enterprises, thus taking it as an influential factor at the regional cultural level. "Getting government training support" is the training given by the government to entrepreneurs, and the training behavior belongs to education, so it belongs to the cultural category.

Table 1 Data Extraction and Literature Coding Results

The Serial Number	Author (Year)	Statistical Magnitude	Influence Factor
1	Bao Jiaojiao, 2018	coefficient of association	Entrepreneurial Culture (0.457)
2	Liu Qingzhong, 2007	coefficient of association	Educational Environment (0.431), Cultural Environment (-0.065)
3	Xu Wenfei, 2019	coefficient of association	Science and Technology Culture (0.723)
4	Huang Sheng, 2010	coefficient of association	Access to Government Training Support (0.191)
5	Wang Duyou, Tong Chaojuan, 2018	coefficient of association	Access to Government Training Support (0.191)

6	Shuang Huajun, Hu Bei, 2011	coefficient of association	Inter-firm trust (0.393), Imitation Learning (0.560), Competition and Cooperation (0.577), Entrepreneurial Culture (0.697), Educational Environment (0.664)

Note: Cultural environment refers to all cultural factors except educational environment

The average correlation coefficient of the influencing factors in multiple studies was taken. The average correlation coefficient of entrepreneurial culture, educational environment and government-supported training was 0.577, 0.5475 and 0.191.

A correlation coefficient between 0. 00 and 0. 09 indicates basically no correlation, a weak correlation between 0. 10 and 0. 29, a moderate correlation between 0. 30 and 0. 49, and a strong correlation between 0. 5 and 1.0 (Cohen J. , 1988). Therefore, entrepreneurial culture, education, environment, science and technology culture, imitative learning between enterprises, between enterprises competition atmosphere of cooperation and business performance with strong positive correlation between trust between enterprises and business performance has a moderate positive correlation between, get government support and entrepreneurship training is a weak correlation between performance, basic no relationship between cultural environment and entrepreneurial performance.

4 Heterogeneity Test

Heterogeneity test was conducted on the influencing factors of multiple studies by using the quantitative methods of Q test, I test and H test.

When Q<0.05, significant differences can be considered between the data. However, Q test is sensitive to the number of studies, and its results are easily affected by the number of studies. In this study, the number of effect quantities is relatively small, so I test and H test are again used for verification to perform DOF correction.

Table 2 Heterogeneity Test

Influence Factor	Q	I^2	H
Entrepreneurial Culture	0.0144	-68.44……	0.12
Educational Environment	0.01357225	-72.679751	0.1165
Access to Government Training Support	0	-	0

In this study, I is negative, and I can be set to 0, indicating no heterogeneity. When H<1.2, studies can be considered homogeneous.

5 Conclusions

Above all, on the basis of previous literature retrieval, draw the conclusion: entrepreneurial culture, education, environment, science and technology culture, imitation learning, competition between enterprises, enterprise cooperation atmosphere is one of the important factors affect business performance, mutual trust between enterprises effects on business performance levels as the medium, to receive

government training support less impact on the business performance. Thus, to improve entrepreneurial performance.

5.1 Suggestions for improving entrepreneurial performance

5.1.1 Choose cities with high concentration of universities, ensure the educational environment and scientific and cultural level

High-quality education environment plays a certain role in improving the level of science and technology and culture. Meanwhile, the improvement of science and technology and culture level can also lay a foundation for creating a high-quality education environment. There is a certain complementary relationship between the two. High quality education environment not only represents a high level of science and technology and culture as a support for entrepreneurship, but also represents a relatively rich human resources. Therefore, choosing cities with concentrated universities can not only meet the needs of improving entrepreneurial performance in terms of education, but also meet their needs in terms of science, technology and culture.

5.1.2 Give full play to the advantages of enterprise agglomeration and create good inter-enterprise relations and entrepreneurial culture

It can be seen from the above that entrepreneurial culture, mutual imitation, learning, competition and cooperation among enterprises have a strong impact on entrepreneurial performance, and mutual trust among enterprises also has a certain impact on entrepreneurial performance. On the one hand, the agglomeration of space contributes to the spread of entrepreneurial culture. On the other hand, in order to strengthen the cooperation and mutual learning among enterprises, build good cooperation or competition relations among enterprises, and achieve mutual benefit and win-win results, the spatial agglomeration effect can be fully utilized to break the spatial barriers of enterprise communication and exchange. Small space distance is conducive to mutual understanding between enterprises, forming a relationship of mutual trust, laying a foundation for further cooperation. A benign atmosphere of competition and cooperation should be formed among enterprises in the same industry with competitive relations to promote their product development and marketing strategy improvement. A stable cooperative relationship is formed between upstream and downstream enterprises to reduce conversion costs and stabilize supply and sales.

5.1.3 The Government shall provide appropriate training support

The first two Suggestions are mainly for entrepreneurs or start-ups, while this one is mainly aimed at the government. Meanwhile, entrepreneurs and start-ups should also make active and reasonable use of government support. Government training support has little influence on entrepreneurial performance, but its influence still exists. Therefore, the government can be based on the actual business performance, in view of the business performance is low or thought very confused in the specific people to guide targeted, avoid training content because of entrepreneurs with a common, directional guidance, and neglect of the low level of education, lack of entrepreneurship and enterprise management knowledge of targeted, specific training.

5.2 Research Prospect

At present, there are a wide range of studies on regional culture or entrepreneurial performance and its influencing factors, but there are few direct studies on the influence of regional culture on entrepreneurial performance, and the number of empirical studies is even less. Therefore, other research methods can be further used to study the influence of multiple dimensions within the scope of regional

culture on entrepreneurial performance, such as religious belief and consumption structure, so as to provide more data for meta-analysis.

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Industry Difference and Management Innovation of Manufacturing Cost Stickiness

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Abstract: Listed companies in China's manufacturing industry have large investment scale, long industrial value chain and great difficulty in cost management. It is of great significance to study whether there is cost stickiness in various manufacturing industries to maintain the cost advantage of Chinese manufacturing. By analyzing the financial data of 1045 listed companies in manufacturing industry, this paper finds that the listed companies in 9 sub-industries all have the cost stickiness. Among them, the cost stickiness of textile apparel, food beverage, paper printing is relatively serious, while the cost stickiness of medicine biology, petroleum chemical and electronics is relatively insignificant.
Keywords: Cost stickiness; Cost behavior; Manufacturing industry; Empirical

1 Introduction

According to the traditional cost theory, cost is divided into fixed cost and variable cost, the model is $y=a+bx$, where a is regarded as fixed cost and bx is regarded as variable cost. If you take the derivative of x with respect to both sides of this equation, you will get $dy/dx=b$ (b is a constant). This is to say, the marginal change of cost has nothing to do with the direction of sale change. As long as the increase and decrease of sale are equal, the increase and decrease of corresponding cost are also equal.

However, modern research has found that the cost and the sale is not a linear relationship. Anderson (2003) first proposed the concept of cost stickiness, which put forward the cost increase caused by the increase of sale is greater than the cost decrease caused by the decrease of sale. That is to say, the scope of cost reduction is smaller than the scope of cost increase when the amount of sale changes by the same amount. For example, when the volume of sale increases by 1%, its cost increases by 9%; when the volume of sale decreases by 1%, its cost decreases by 5%. Chinese scholars Sun Zheng and Liu Hao (2004) proved for the first time that listed companies in China do have stickiness in expenses.

Decisions based on the traditional cost theory tend to overestimate or underestimate the relationship between cost and sale, so the analysis and study of cost stickiness can better understand the cost behavior and help to reduce the cost of enterprises. Cost stickiness can realize the effective use and reasonable allocation of resources, and help enterprise managers to make more accurate cost decisions and cost management. Therefore, the study of cost stickiness has important practical significance.

2 Literature Review

Foreign scholars first discovered and studied cost stickiness. Banker (Banker ,1993) was the first scholar who found the cost stickiness. In his analysis of U.S. airline industry data from 1981 to 1985, he found that the rate of change in costs varied as cost drivers increased and decreased. Later, Noreen (Noreen ,1994) verified this conclusion, he studied more than 100 hospital samples, proved that the management cost does not change with the same volume of sale, supporting Banker's conclusion. The word “stickiness” was first mentioned in the article by Anderson (Anderson,2003). After investigating

the sales expenses, general expenses and management expenses of 7,629 companies in 20 years, he found that when sales increased by 1%, expenses increased by 0.55% on average, while when sales decreased by 1%, expenses only decreased by 0.35%. There was an asymmetry in the change of expenses, which he called “expenses stickiness”. Banker and Chen (Banker and Chen,2006) formally adopted the concept of "stickiness" and extended the stickiness to the total cost. Through the investigation and research on the sample data from 1998 to 2002, it is confirmed that the decrease of cost when sales decrease is less than the increase of cost when sales increase, and enterprises do have “cost stickiness”.

Domestic scholars who study cost stickiness are later than foreign scholars. Sun Zheng and Liu Hao (2004) analyzed the data of 292 companies listed before December 31, 1995 from 1994 to 2001, and found that when the sales revenue increased by 1%, the expenses increased by 0.5597%, while when the sales revenue decreased by 1%, the expenses only decreased by 0.0578%, which for the first time proved that the listed companies in our country exists expenses stickiness. Liu Wu (2006) studied cost stickiness in different industries on this basis, and confirmed that there were industry differences in the cost stickiness behavior in the five selected industries, among which the manufacturing industry had the most significant cost stickiness behavior. Cao Xiaoxue (2009) studied the sample data of enterprises from 2001 to 2006 and found that there was no industry difference in the stickiness of expenses among the listed companies of central enterprises. Kong Yusheng (2007) found that construction industry, manufacturing industry, real estate industry, extractive industry and information technology showed the characteristics of cost stickiness, while other industries showed weak cost stickiness or no cost stickiness behavior.Yang Chunli (2015) empirically tested the existence of cost stickiness in high-tech enterprises. Luo Hong (2015) empirically tested the different degree of cost stickiness of enterprises with different property rights. Lv Sha (2016) found that management compensation incentive is negatively correlated with cost stickiness, indicating that management self-interested behavior is one of the main causes of cost stickiness. Yang Jingjing (2017) found that the higher the ownership concentration, the lower the cost stickiness, which can suppress the degree of cost stickiness. Shao Wenwu (2019) found that compared with small and medium-sized enterprises, large-scale enterprises have higher stickiness in cost.

3 Research Hypotheses and Test Models

3.1 Research hypotheses

Since the reform and opening-up, the rise of China's manufacturing industry is the root cause of China's rapid economic development. As listed manufacturing companies in China have large investment scale、long industrial value chain、difficult cost management. At present, China's internal governance problems are serious, leading to enterprise cost control is not strict, cost adjustment is not timely, and this may be cost stickiness. China's manufacturing industry is divided into 9 sub-industries. The study on whether the listed companies in each sub-industry have cost stickiness is significant for keeping the rapid development of the whole manufacturing industry. Therefore, hypothesis 1 is proposed

H1：The cost stickiness exists in each sub-industries of China's manufacturing listed industry

3.2 Test models

This paper uses the method of Anderson (2003) for reference to test the cost stickiness of China's manufacturing listed industry in each sub-industry through model 1. Model 1 is shown as follows:

$$\ln(\frac{Exp_{i,t}}{Exp_{i,t-1}}) = \beta_0 + \beta_1 \times \ln(\frac{\mathrm{Re}\,v_{i,t}}{\mathrm{Re}\,v_{i,t-1}}) + d_{i,t} \times \beta_2 \times \ln(\frac{\mathrm{Re}\,v_{i,t}}{\mathrm{Re}\,v_{i,t-1}}) + \varepsilon_{i,t}$$

Among them: $Exp_{i,t}$ represents the sum of the operating cost, management cost and sales cost of the ith listed company in the period t; $Exp_{i,t-1}$ represents the sum of the operating cost, management cost and sales cost of the ith listed company in the period t-1; $\mathrm{Re}\,v_{i,t}$ represents the operating income of the ith listed company in period t; $\mathrm{Re}\,v_{i,t-1}$ represents the operating income of the ith listed company in period t-1; $d_{i,t}$ is a dummy variable, set 0 when the operating income in period t is greater than that in period t-1, and set 1 when the operating income in period t is less than that in period t-1; β_0、β_1、β_2 is the coefficient to be estimated; $\varepsilon_{i,t}$ is the random error term.

4 Samples and Data

4.1 Sample selection and data sources

Considering that China began to implement new accounting standards in 2007, this paper selects the annual financial data of listed companies in various sub-industries of manufacturing industry in Shanghai and Shenzhen from 2012 to 2019 for research. The data came from the CSMAR financial database of Guotai'an, and the samples were screened as follows: 1. a total of 1045 manufacturing enterprises listed before December 31, 2006 were selected as the original samples. 2. The observations of ST and PT from 2012 to 2019, major mergers and acquisitions, changes in main businesses, and missing data of operating income, operating cost, management expense and sales expense were excluded.

Through the above steps, a total of 1,045 sample enterprises were obtained. Issued by the China securities regulatory commission “industry classification guidance of listed companies” put out by manufacturing enterprises classified subsectors, divided into mechanical equipment, petroleum chemical, textile apparel, electronics, metal and nonmetal, wood furniture, paper printing, food beverage, Medicine biology, such as 9 niche business. Among them, there are few effective samples in the sub-industries of wood furniture. Considering that the inspection structure may be affected by specific values, this sub-industry is excluded. Among the reserved sub-industries, the proportion of mechanical equipment is the largest, which is 40.11%. The industry with the smallest proportion is electronics, with 1.69%.

Table 1 Sub-industry Distribution of the 2012-2019 Sample

Sub-industry	Number of listed companies	Number of observations	The sample proportion	The cumulative percentage
Mechanical Equipment	424	3392	40.11%	40.11%
Petroleum Chemical	181	1448	17.23%	57.34%
Textile Apparel	47	376	4.61%	61.95%
Electronics	15	120	1.69%	63.64%

Metal and Nonmetal	149	1192	14.31%	77.95%
Paper Printing	32	256	3.01%	80.96%
Food Beverage	76	608	7.34%	88.30%
Medicine Biology	121	968	11.70%	100%

4.2 Descriptive statistics

The descriptive statistics of the selected sample companies in this paper are shown in table 2

Table 2 Descriptive Statistics of Sample Companies

		Mean	Median	Standard Deviation	Minimum	Maximum
Mechanical Equipment	Exp Rate	1.198	1.119	0.578	0.241	15.161
	Rev Rate	1.218	1.118	1.230	0.082	59.487
Petroleum Chemical	Exp Rate	1.217	1.103	0.929	0.166	18.187
	Rev Rate	1.252	1.104	1.342	0.175	28.425
Textile Apparel	Exp Rate	1.145	1.042	0.669	0.076	7.806
	Rev Rate	1.207	1.046	1.632	0.058	28.914
Electronics	Exp Rate	1.364	1.237	0.668	0.691	6.361
	Rev Rate	1.353	1.220	0.565	0.646	4.273
Metal and Nonmetal	Exp Rate	1.162	1.083	0.944	0.282	29.476
	Rev Rate	1.185	1.093	1.100	0.380	34.370
Paper Printing	Exp Rate	1.179	1.085	0.828	0.292	12.872
	Rev Rate	1.261	1.080	2.122	0.215	32.502
Food Beverage	Exp Rate	1.181	1.067	0.977	0.140	15.777
	Rev Rate	1.265	1.066	2.140	0.009	46.875
Medicine Biology	Exp Rate	1.285	1.137	1.685	0.094	46.692
	Rev Rate	1.364	1.145	3.714	0.086	108.066

According to descriptive statistics, except for the electronics industry with the smallest proportion, in other manufacturing sub-industries, the standard deviation of the growth rate of total cost (the sum of operating cost, management cost and sales cost) is less than the standard deviation of the growth rate of operating revenue, which indicates that the difference of the growth rate of revenue is greater than the difference of the growth rate of total cost；The machinery equipment industry, which accounts for the largest proportion of the manufacturing industry, has a median growth rate of total cost greater than the median growth rate of operating income, which may be an intuitive reflection of the existence of cost stickiness in the machinery equipment industry.

5 Regression Results

This paper uses the model to conduct an empirical test on the existence of cost stickiness of China's manufacturing listed industry in various sub-industries. The results are shown in table 3:

Table 3 Test the Existence of Cost Stickiness of Listed Companies in Various Sub-industries of Manufacturing Industry

	β_0	β_1	β_2	Adj R^2	F	N
Mechanical Equipment	0.009***	0.916***	-0.162***	0.933	20832.02	2982
Petroleum Chemical	0.004***	0.920***	-0.060**	0.934	9025.66	1281

Textile Apparel	-0.009**	1.016***	-0.304***	0.949	3157.97	343
Electronics	0.007***	0.975***	-0.072*	0.916	668.76	126
Metal and Nonmetal	0.001***	0.884***	-0.111***	0.892	4389.36	1064
Paper Printing	0.002***	0.998***	-0.234***	0.914	1180.19	224
Food Beverage	0.002***	0.790***	-0.265***	0.856	1614.00	546
Medicine Biology	0.013***	0.902***	-0.035*	0.839	2267.05	868

Due to the production and operation of the manufacturing industry requires the input of machinery, equipment, plant land, capital personnel, and the cost of the sink, so that the cost of adjustment is very limited. China's manufacturing industry involves many aspects of production, and the characteristics of all aspects of production are very different, each of the sub-industries is not the same way of cost management. It can be seen from table 3 that in the test results of the existence of cost stickiness, all the 8 sub-industries selected have cost stickiness. Among them, the cost stickiness of textile apparel, food beverage, paper printing is relatively serious. The coststickiness of mechanical equipment, metal and nonmetal is general. The cost stickiness of medicine biology, petroleum Chemical and electronics is not obvious. Specifically, when the operating income increases by 1%, the total cost of mechanical equipment increases by 0.916%, petroleum chemical increases by 0.920%, Textile apparel increases by 1.016%, electronics increases by 0.975%, metal and nonmetal increases by 0.884%, paper printing increases by 0.998%, food beverage increases by 0.790%, and Medicine biology increases by 0.902%. When the operating income decreases by 1%, the total cost of mechanical equipment decreases by 0.754%, petroleum chemical decreases by 0.860%, Textile apparel decreases by 0.712%, electronics decreases by 0.903%, metal and nonmetal decreases by 0.773%, paper printing decreases by 0.764%, food beverage decreases by 0.525%, and Medicine biology decreases by 0.867%. In addition, the test results are statistically significant, which fully proves the existence of cost stickiness of listed companies in various sub-industries of China's manufacturing industry. Therefore, H1 is verified.

6 Conclusions

The cost stickiness behavior contradicts the traditional cost behavior theory. This paper conducts an empirical study on the financial data of 1,045 listed manufacturing companies in China before December 31, 2006, so as to investigate the cost stickiness behavior of various manufacturing sub-industries. The research conclusions are as follows:

Firstly, different from the traditional theory of cost state, it is innovatively found that the listed companies in various sub-industries of China's manufacturing industry have cost stickiness. Among them, the cost stickiness of textile apparel, food beverage, paper printing is relatively serious. With the rapid development of online e-commerce, textile apparel, food beverage and other industries have developed rapidly in recent years, and their relatively high cost stickiness exposes that the industry does not pay attention to cost control and has a poor level of cost management. The cost stickiness of medicine biology, petroleum Chemical and electronics is not obvious. This indicates that the development of these industries has declined in recent years and the cost control is relatively strict, so the change of cost and business volume changes in the opposite direction of cost stickiness

Secondly, there is innovation in the theory of management thought, which enables managers to understand the stickiness of industry cost and reduce the errors in making cost decisions based on the

traditional cost state theory. Compared with other industries, China's manufacturing industry due to the high ratio of fixed assets and inventories, cost control management activities are particularly important. Managers fully understand the cost stickiness of their industries, which can help enterprises make timely and accurate judgments on the changes of market sales volume, so as to improve the asymmetric changes of cost and sales volume and keep the stickiness coefficient within a reasonable range. To be specific, firstly, managers should strengthen the external supervision of listed companies, so that managers can make more reasonable and accurate cost management decisions on the basis of information symmetry, and reduce the cost stickiness of enterprises. Secondly, shareholders of listed companies should pay attention to the improvement of managers' quality, establish and improve the incentive and restraint mechanism of managers, so that managers have the talents needed for enterprise management. In this way, in the face of the constantly changing environment, managers can take the initiative and make correct decisions. Specifically, shareholders' shareholding ratio and compensation incentive mechanism can prevent managers' self-interested behaviors and reduce the cost stickiness of enterprises.

Finally, managers can effectively use the stickiness of cost to complete the allocation of economic resources and realize the innovation of management decision. Since the existence of cost stickiness is inevitable, it can only be reduced as much as possible. It is impossible for an enterprise to complete all the work, so it must divide and cooperate to produce the products needed by each other. The effective use of cost stickiness can realize the allocation of economic resources. The existence of cost stickiness is related to the operating efficiency, internal management and cost decision-making of enterprises. Enterprises should pay enough attention to the rule of curve change of cost when allocating economic resources, so as to avoid the misdirection brought by traditional state of nature theory. To be specific, firstly, reasonable selection and management of supplier portfolio, establishment of supply chain alliance, and reduction of supply chain and product cost. Cost related to supplier relationship occupies an important position in enterprise cost structure. Mature supplier relationship is conducive to information sharing and risk sharing among enterprises, thus reducing cost stickiness. Secondly, establishing stable communication mechanism and flexible contract mechanism. Contracts can be made to enable managers to take into account the cost of default and abandon cost-adjustment strategies in the face of minor economic fluctuations. Managers predict that economic fluctuations are temporary, and standardized contracts can help companies quickly resume production after economic stability and ensure business efficiency. Accurately grasping the market trend, accurately analyzing the future of products, comprehensively understanding the information of competitors, and correctly evaluating the stickiness of costs can better realize the allocation of economic resources and save social costs.

The existence of cost stickiness is related to the operating efficiency, internal governance and cost decision-making of enterprises. A correct understanding of cost stickiness can help managers to reduce the error in making cost decisions according to the traditional cost state theory, so as to better realize the allocation of economic resources and save social costs. In addition, it should be noted that cost is affected by multiple factors. This paper only reveals a part of the phenomenon, and the more specific and deeper phenomena and reasons need to be further studied.

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The Impacts of Timber Export on Economic Growth in Sierra Leone

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Abstract: Sierra Leone is one of the natural resource-based economies in Africa that relies on its natural resource exports for growth. This study examines the impact of timber export on economic growth in Sierra Leone between 1990 and 2018 using time series data from the Statistic Sierra Leone and World Development Indicators. The analysis uses cointegration and error, correction models. The findings from the result showed that timber export has an insignificant effect on the economic growth of Sierra Leone in both the short and long run. The findings recommend, among other things, that policies aimed at increasing the productivity and quality of timber be implemented. Furthermore, the additional value needs to be added to the timber before exporting. Correspondingly, the professional knowledge and expertise needed to transform the harvested timber to final products made available by training local technicians in the timber processing value chain.

Keywords: Timber; Export; Economic growth; Co-integration; Error correction; Sierra Leone.

1 Introduction

The relationship between exports and economic growth is a relevant field of study in recent years, specifically for developing countries like Sierra Leone. Exports influence economic growth by giving the go-ahead to give preferential treatment to the exploitation of economies of scale and encourage the spread of technical knowledge. In the particular case of the policy of trade openness, the literature indicates the existence of a possible causality between exports and economic growth.

Furthermore, many empirical studies have examined the relationship between exports and economic growth not, resolved the causality between these two variables, especially for timber export. Among the studies shown, an expansion of exports has a significant positive impact on the economic growth are Titus Isaiah Zayone et al., (2020), Kalaitzi & Cleeve, (2018), Sunde, T (2017), Karamelikli, Akalin & Arslan (2017), Shafiullah, Selvanathan & Naranpanawa,(2017). However, the study by Faridi (2012) contradicts the export-led growth strategy. It indicates that scientific studies on primary exports and growth have concentrated on coffee, cocoa, rubber or piassava, and other exports like oil and iron ore, with the neglect of timber exports. Studies concentrating on the link between timber exports and economic growth have less literature, probably because timber considered a natural resource than an agricultural commodity.

The exportation of timber has contributed to the growth of most economies across the globe. In France for instance, round wood exports contributed on average about $252 million to the country's yearly total export revenue between 1970 and 2012. Similarly, in Japan and United Kingdom, average annual contributions of total round wood to export revenue were approximately $4.5 million and $252 million respectively (FAO, 2014). The contribution of timber to the economic growth of Malaysia has been significant. In 2010, it contributed 3.7 of the GDP and 3.2% of the country's total merchandize

exports. Timber contributed an estimated $7.4 billion to Malaysia's total export and between 1% and 2% to GDP in 2011 (Harun, 2012). In Gabon and Democratic Republic of Congo, round wood contributed an annual average of about $193 million and $27 million to total export revenue and consequently GDP between 1970 and 2012 respectively (FAO, 2014). Gabon's forestry sector contributed 0.3% in GDP in 2011 (African Economic Outlook, 2012). Timber production makes up approximately 6% of Ghana's GDP. It provides around 12% of foreign exchange between 1990 and 2000 (Lebedys, 2004).

Sierra Leone has a foreign market for timber in Asia, particularly China and other parts of Africa. China remains Sierra Leone's single largest trading partner, receiving around $169M of goods exports in 2018. Sierra Leone remains reliant on exports of raw materials with a few agricultural commodities and titanium ore dominating the export basket followed by rough wood. The most recent exports are led by Titanium Ore ($145M), Rough Wood ($106M), Diamonds ($88.4M), Aluminium Ore ($79.8M), and Non-fillet Frozen Fish ($32.6M). The most common destination for the exports of Sierra Leone are China ($169M), Belgium-Luxembourg ($146M), Romania ($74.2M), United States ($49.3M), and Germany ($29.5M).

However, irrespective of the huge export of rough wood from Sierra Leone, it has not contributed significantly to GDP growth. The main problem that has led to the insignificant contribution of timber exports to Sierra Leone's GDP is largely attributed to that of unprocessed log exports. Unprocessed and semi-processed logs are relatively cheap because value added to them is small. Export of unprocessed logs only makes the balance of payments situation of the country worst-off. The Sierra Leone government has rather taken few measures to resolve this problem. Most government measures are only out to ensure that all the wood harvested and exported should be from a legal origin, ignoring what the activity should add to the GDP. The only main measure which government took to add value to the timber exports of Sierra Leone is the implementation of the log export ban. This was meant to encourage local wood processing activities and to protect the local wood processing industries from foreign competition.

There have been two timber export bans in the recent history of Sierra Leone. The first was enacted in August 2007 and was in response to the incursion of (largely) Chinese timber merchants into northern Sierra Leone (from Guinea) to clandestinely harvest valuable timber species for export. The ban was lifted in 2008, with the announcement of new regulations creating dramatically heavier fees for logging operations and related equipment. As mentioned above, this policy was essentially about "cleaning up" the timber harvesting market, forcing smaller companies who could not afford the fees out of business, subsequently creating a market for a lesser number of larger companies who would in theory be easier to regulate. The Forestry Division then, unexpectedly, instigated a second export ban in January 2010 although there was a three month suspension of this ban in mid-2011 to allow export of previously harvested timber and consequently the process continued to date. Since the uplift of the ban, there has been no proof of exports of processed wood products. The export of raw logs has, however persisted, implying that the revenue and share of timber exports to the GDP of the country will continue falling. It is within this backdrop that this study is designed.

Several pieces of literature provided evidence for the export-led growth hypothesis, though a few find inconclusive evidence. The literature is dominated by studies that focus on the effects of total exports on economic growth, with just a few on manufactured and agricultural exports. Though primary commodities make up a more significant share of exports in Sierra Leone, yet still, it is not given the pace it deserves in the export-led growth literature. Furthermore, the literature on commodity-specific studies

in this country has lots of policy implications relating to product promotion is limited. One of the reasons why the current study focuses on timber exports, it is the most traded primary commodities in the country. Also, timber has longer-term implications on growth compared to the other primary products, which either are exhaustible or have relatively short rotation periods. The use of correlation technique and causality tests criticized because they fail to show which one variable causes the other.

Instead of the above, this study will, therefore, bridge an essential gap in the empirical literature. In terms of the analytical methods, the study adopts the Solow Growth model. It uses the cointegration and error correction modeling approach, not just for the sake of estimating the long and short-run situations. Because the timber resource is renewable, and it would be essential to consider its long-run implications on economic growth.

2 Methodology

2.1 Empirical Model Specification

Various economic growth theories are being suggested. These theories, among others, include Classical growth theory, Endogenous growth theory. For this study, we traced the Endogenous growth theory with the function Y=AK; where Y is output, A is technological progress, and K is capital and assumes a non-diminishing return to capital, which criticized by different Authors. This study used the Solow-Swan production function, an economic model of long-run economic growth set within the framework of neoclassical economics as a base to develop the economic growth model for this study. This model attempts to explain long-run economic growth by looking at capital accumulation, labor, and technological progress, and due to its particularly attractive mathematical characteristics, Solow-Swan shows to be a convenient starting point for various extensions. Therefore, since the economy of Sierra Leone is labor-intensive, and the study did not focus on the non-economic variables of the classical growth theory, the following neoclassical production function will be used:

$$Y=f(L, K) \quad (1)$$

This production function is expanded by adding timber exports and other export commodities as follows:

$$Y_t= f(L_t, K_t, \text{Timber}X_t, \text{Cocoa}X_t, \text{Iron Ore}X_t) \quad (2)$$

Where Y_t is the annual real gross domestic product, L_t is the total labor force K_t is the gross domestic fixed capital formation, TimberX_t is timber export which is a proxy of forest rent as timber contribute a greater percentage to the forest in Sierra Leone, CocoaX_t is coca export, and Iron OreX_t is iron ore export. Finally, from equations one and two, equation three is derived by taking a natural logarithm on both sides of equation 2 in order to discard the differences in the units of measurements for the variables and to minimize the gap between independent variables and dependent variables. It is then used to analyze the impact of timber exports on economic growth in Sierra Leone from 1990 to 2018.

$$\ln Y_t= \alpha_0 + \beta_1 \ln L_t + \beta_2 \ln K_t + \beta_3 \ln \text{Timber}X_t + \beta_4 \ln \text{Cocoa}X_t + \beta_5 \ln \text{Iron Ore}X_t + \varepsilon_t \quad (3)$$

Where; $\ln Y_t$ is a natural logarithm of real gross domestic product, $\ln L_t$, is the natural logarithm of the labor force, $\ln K_t$ is the natural logarithm of gross domestic fixed capital formation, $\ln \text{Timber}X_t$ is the natural logarithm of timber export, $\ln \text{Cocoa}X_t$ is the natural logarithm of cocoa export, $\ln \text{IronOre}X_t$ is the natural logarithm of iron ore export, and εt is error term α_0 is the constant term and β_1, β_2, β_3, β_4 and β_5 are the parameters of independent variables to be estimated.

2.2 Data Source

This pursuit bestows six variables: (i) GDP (constant US$), (ii) exports of timber which is a proxy of forest rent in the percentage of GDP, (iii) Fixed Formation Capital (constant US$), (iv) labor force participation rate (v) Cocoa export (constant US$) and (vi) iron ore export (constant US$) to explore the short-run and long-run impacts of timber exports on economic growth. The secondary data for the period 1990-2018 were collected from WDI (2020) and the Statistics Sierra Leone and converted into logarithm denoted by "ln" in each variable, making the model linear to avoid heteroskedasticity problem (Shawa and Shen, 2013).

2.3 Estimation Procedure

We employed an econometric technique where the time-series properties of the variables were first examined. Since the study requires the use of cointegration and error correction models, a few words regarding these are in order. It is standard practice for every useful research that requires the use of an econometric technique to underscore the importance of investigating the data generating process underlying the variables before estimating the parameters and carrying out various hypothesis testing. This procedure tries to avoid the problem of spurious regression results. First, the unit root testing was done to determine the orders of integration for each variable under consideration, i.e., differencing each series successively until stationary is achieved. Second, we conducted the cointegration test following the Johansen method. Third, we estimated regressions with the Ordinary Least Squares (OLS) method using variables with the same order of integration. Fourth, we estimated the error-correction model, and finally, the stability of the estimated model examined using the methodology of Cumulative Sum (CUSUM) and the Cumulative Sum of Squares (CUSUMQ) test proposed by Brown et al. (1975). The condition is that if the plot of CUSUM and CUSUMQ keep on within a 5% significance level (depicted by two lines), then the coefficient estimates are said to be stable.

3 Empirical Analyses

3.1Test for unit roots

The unit root tests ought to be executed before pursuing the cointegration tests because the statistical inference from a time series is usually asserted on the surmise of stationarity. This study utilizes the Augmented Dickey-Fuller (ADF) test. The null hypothesis of a non-stationarity is tested against the alternative hypothesis of stationarity and investigated for all variables. Table 1 presents the Unit Root Tests using the ADF test.

Table 1 Unit Root Tests using the ADF test

	Level		
Variable	Specification through DSR procedure	ADF 5% Critical Value	ADF Stat
lnGDP	Trend and Constant	-3.580623	-2.607908
lnL	Trend and Constant	-3.587527	-3.478162
lnK	Trend and Constant	-3.595026	-3.340142
lnTimberX	Trend and Constant	-3.580623	-3.164114
lnCocoa	Trend and Constant	-3.580623	-3.555929
lnOre	Trend and Constant	-3.580623	-2.219785
	∆Level		
Variable	Specification through DSR procedure	ADF 5% Critical Value	ADF Stat

lnGDP	Trend and Constant	-3.587527	-4.963876
lnL	Trend and Constant	-3.229230	-4.339330
lnK	Trend and Constant	-3.612199	-9.938250
lnTimberX	Trend and Constant	-3.587527	-6.083944
lnCocoa	Trend and Constant	-3.587527	-7.603065
lnOre	Trend and Constant	-3.587527	-6.033603

Results from table 1 show that all variables were not stationary at level but became stationary after differencing them. Therefore, cointegration can be performed to investigate the long-run relationship between variables.

3.2 Cointegration Test Analysis

In order to establish a long-term relationship among variables, the Johansen cointegration approach was used. The order of integration, which inters the specified economic growth model, is already specified for each variable. All the integrated variables are of order one I (1). Next is to estimate the long-run relationship between economic growth and timber export in Sierra Leone using Johansson's maximum likelihood methods and the two steps Engel and Granger procedure.

Most of the time, the trace and maximum Eigenvalue statistics might give conflicting results. To deal with this problem, Johansen (1990) recommended basing on one of them to identify the number of cointegration vectors. However, this study used both the trace and maximum Eigenvalue, given that both of them are showing the same number of a cointegrating vector. Table 2 shows the cointegration test results for the economic growth model based on the above two statistics.

Table 2 Results of the Test of Cointegration

Null hypothesis H0	Alternative H1	Trace statistics	0.05% critical value	Max-Eigen statistics	0.05% critical values
R=0	R≤1	206.9734*	95.75366	87.88137*	40.07757
R≤1	R≤2	119.0921*	69.81889	55.23634*	33.87687
R≤2	R≤3	63.85572*	47.85613	35.27519*	27.58434
R≤3	R≤4	28.58053	29.79707	16.66984	21.13162
R≤4	R≤5	11.91069	15.49471	10.55469	14.26460
R≤5	R≤6	1.356001	3.841466	1.356001	3.841466

From Table 2, both the trace and Max-Eigen statistics indicated three cointegrating vectors (equation) at the 5% significance levels. Therefore, null hypothesis of no cointegration is excluded. We would, therefore, estimate the Error Correction Model (ECM). Intuitively, the cointegration test result showed the existence of long-run relationships among GDP and the explanatory variables-labor, capital, timber export, cocoa export, and iron ore export. The result of the long-run GDP growth function is presented in table 3 below.

3.3 Results of Long run relationship

In this sub-section presented the long-run results via cointegration analysis, we first present the results in table 3 and, thereafter, elaborate on the findings by comparing and contrasting it from the previous findings by other scholars in the literature.

Table 3 Long-run Relationship between Timber Export and Economic Growth

Variables	Coefficient	Std. Error	t-Statistic	Probability	VIF

Const.	-1.487842	2.351059	-0.632839	0.5334	…….
lnL	1.528512	0.171985	8.887495	0.0000***	3.294724
lnK	0.676243	0.196379	3.443561	0.0027***	2.631254
lnTimberX	0.082015	0.087129	0.941311	0.3568	1.558970
lnCocoa	-0.004460	0.019021	-0.234495	0.8168	2.201469
lnOre	0.040782	0.008385	4.863448	0.0001***	1.740926
R-squared	0.950360				
Adj. R-squared	0.939079				
F-statistic	84.23871				
Prob(F-stat)	0.000000				
D-W stat	1.861825				

Source: Author's calculations from E-views version 15.*** denotes significant at the 1% level

Results in table 3 show that the significant variables were labor force, capital and iron ore export at a 1% level of significance, and timber export and cocoa export are not significant. The value of the adjusted R^2 is 93.9 percent. This implies that about 93.9% of the changes in the set of independent variables have the potential to influence the growth rate of GDP.

The long-run result showed that the labor force *(lnL)*, The gross domestic fixed capital formation *(lnK)* proxy for capital, iron ore export (*lnIron Ore*) directly influence economic growth. The relationship is positive and highly statistically significant.

3.4 Impact of timber export (lnTE) on economic growth

The timber export (*lnTimberX*) has a positive sign and statistically insignificant in explaining economic growth in the long run. The positive sign indicates the direct relationship between timber export and economic growth by confirming the theory. The insignificance condition of the timber export is indicating a low level of investment in this sector. The core problem that has led to the insignificant contribution of timber exports to Sierra Leone's GDP is unprocessed of log-exports. Unprocessed and semi-processed logs are relatively inexpensive because the value-added to them is small. The export of unprocessed logs only makes the balance of payments situation of the country worst-off. However unlike timber export, Cocoa export has a negative sign and statistically insignificant in explaining economic growth in the long run.

3.5 Results of Short-run relationship

The Error Correction Model (ECM) has been used to determine the short-run dynamics. The existence of a long-run relationship among the variables leads to the estimation of the short-run dynamic model. The analysis of the short-run error correction model in table 4, the GDP in the lagged one year period has a positive and significant effect on economic growth in Sierra Leone for our study. Also, policy recommendations geared towards influencing economic growth in Sierra Leone in the short run must consider the lagged one-year period of GDP. A 1% increase in GDP in the lagged one year period will lead to a 0.32% increase in GDP in the short run within our period of study

Table 4 Short-run Relationship between Timber Export and Economic Growth

Variables	Coefficient	Std. Error	t-Statistic	Probability
C	-0.022523	0.020822	-1.081702	0.2945
D(lnGDP(-1))	0.325669	0.186961	1.741905	0.0996*
D(lnL(-1))	1.936654	0.845706	2.289985	0.0351**
D(lnK(-1))	-0.038959	0.017668	-2.205047	0.0415**

D(lnTE(-1))	-0.086864	0.061700	-1.407855	0.1772
D(lnCocoa(-1))	0.005350	0.012163	0.439872	0.6656
D(lnOre(-1))	-0.004513	0.010823	-0.416954	0.6819
ECM(-1)	-0.984238	0.225281	-4.368926	0.0004***
R-squared	0.663004			
Adj. R-squared	0.524241			
F-statistic	4.777965			
Prob(F-stat)	0.003980			
D-W stat	1.709259			

Source: Author's calculations from E-views version 15. ***, **,* denotes significant at the 1%, 5% and 10% levels

Results also reveal that gross capital formation, foreign earning from iron ore export, and foreign earnings from timber export in the lagged one-year period each have negative effects on the economic growth of Sierra Leone. However, only foreign earning on cocoa export and the total labor force is positive, with total labor force being significant. The negative effect of foreign earnings from timber to the economic growth of Sierra Leone suggests an ultimate decline in the use of timber resources over time. The most important thing in the short-run results is the speed of adjustment term. The coefficient error correction term has the expected negative sign and also significant. The speed of adjustment of the error term is -0.984. The scale of the coefficient implies that 98.4 percent of the disequilibrium in the preceding year's shock adjusts back to the long-run equilibrium in the current year.

3.6 Stability Test Result

The tests of CUSUM and CUSUMSQ are employed in this study. Figure 1 provides the graphs of CUSUM and CUSUMSQ tests. The results indicate that the plots are completely stable within 5% of critical bands, indicating the stability of parameters. The test results show that the Modulus of all roots are less than unity and lie within the unit circle. Accordingly, we can conclude that our estimated model is stable.

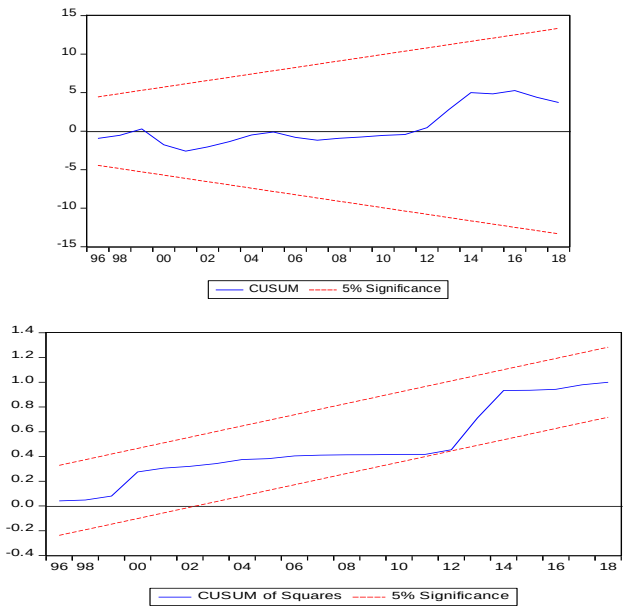

Figure 1 Plot of CUSUM and CUSUMQ

4 Conclusions

The main objective of this study was to empirically determine the contribution and impact of timber export on economic growth in Sierra Leone using annual data for the period 1990 to 2018. The study followed the Solow growth model framework and employed an econometric technique to verify the relationship in Sierra Leone. Series of tests were conducted to satisfy the underlying conditions that necessitate the use of the OLS technique for our empirical analysis. The main finding from the results is that in the short run, timber exports have a negative and insignificant effect on growth, whereas, in the long run, timber exports have a positive but insignificant effect on growth.

Given the findings from the empirical results, this study, therefore, recommends that timber exports should be limited. It means that most of the timber harvested should be processed locally such that only finished products from the timber are exported. Also, it is, first of all, suggested that industries should be established to transform the harvested timber to fully processed wood products to add value and attract higher prices in the world market. Furthermore, the expertise needed to transform harvested timber to final products should be made available by training local technicians in the timber processing value chain.

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Study on the Operating Mechanism of the Targeted Entrepreneurial Poverty Alleviation Model under the Constraints of Willingness, Resources and Capabilities

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Abstract: This articlestudies the different ways of thetargeted entrepreneurial poverty alleviation by analyzing the role of the core elements ofthe targetedentrepreneurial poverty alleviation model in poverty alleviation, and analyzes the operating mechanism of entrepreneurial willingness, resources and capabilities in the targetedentrepreneurial poverty alleviation modelon the basis ofempirical study onthe targetedentrepreneurial poverty alleviation in 6 impoverished counties in Hubei Province. The main conclusions of the studyare as follows: the targetedentrepreneurialpoverty alleviation model has a significantly positive impact on the effectiveness of the targetedpoverty alleviation for entrepreneurial poverty alleviation targets;breakingthe constraintsof willingness, resource and capabilityplays an intermediary role in the targetedentrepreneurial poverty alleviation; the self-help, the mutual-help and the others-help targeted entrepreneurial poverty alleviation mechanisms have an enhanced effect on the process that breaking the constraints of willingness, resources and capabilities positively affects the effectivenessof targeted poverty alleviationfor entrepreneurial poverty alleviation targets.

Keywords: Targeted entrepreneurial poverty alleviation; Entrepreneurial willingness; Entrepreneurial resources; Entrepreneurial capabilities

1 Introduction

It is a form of targeted poverty alleviation to encouragepoverty alleviation targets tocarry out entrepreneurial activities to get rid of poverty. It is also known as targeted entrepreneurial poverty alleviation, which is subject to the influence of the entrepreneurial willingness, resources and capabilities of the targets. However, due to their environment and limited access to education, the poverty alleviation targets have low entrepreneurial willingness,few entrepreneurial resources, and insufficient entrepreneurial capabilities, forming constraints on entrepreneurship (Peng Chunning, 2016). The collaborative education mechanism of colleges and universities is not perfect, the quality and level of innovation and entrepreneurship education need to be improved, and efforts in targeted poverty alleviation and targeted povertyelimination are not enough. Therefore, the targeted entrepreneurship poverty alleviation modeldemonstrates low resultsin practice andpoortargeted poverty alleviation effects (Kor et al., 2007). Entrepreneurial poverty alleviation modelis subject to multiple constraints, soit should be innovated and combined with other resources to play a more effective role. For example, by providing skills training for poverty alleviation targets and providing financial support at the same time, the entrepreneurial willingness and the entrepreneurial capabilities of the poverty alleviation targets can be enhanced toa certain extent, so as to break through the constraints of resources and capabilities (Grimm

and Paffhausen, 2015). With the help of the establishment of a sharing mechanism, the social network of poverty alleviation targets can bemore closely connected, which canpromote the expansion and extension of the poverty alleviation value chain and create more opportunities and resources for poverty alleviation targets (BalkemaandRomijn, 2015). In addition, the original rigid poverty alleviation mechanism does not thoroughly explore the role of self-help, mutual-help, and others-help poverty alleviation mechanisms, and has the following shortcomings: first, it has beengenerally recognized that the entrepreneurial poverty alleviation model must break the constraints of willingness, resources, and capabilities, but it fails to clarify the internal logic betweenthe targeted entrepreneurial poverty alleviation model and the constraints of willingness, resources, and capabilities, and it does not match the"targeted" which is emphasized in China's poverty alleviation mechanism. Second, it has been recognized that under different constraints of willingness, resources and capabilities, it is necessary to find an appropriatetargeted poverty alleviation model. Finally, although the existing studies havementioned that there is a connection between the breaking of the multiple constraints of the targeted poverty alleviation andrelevant policies, the specific logical relationship between the two needs to be further explored.

This articleexplores the targeted entrepreneurial poverty alleviation model which accords withthe situation of China by studying poverty alleviation and development theory and combining it withthe reality of China's targeted entrepreneurial poverty alleviation, and reveals the laws of breaking the constraints of willingness, resources, and capabilities through empirical analysis on the effectiveness of the targeted entrepreneurial poverty alleviation model and its operating mechanism on the targeted poverty alleviation for the entrepreneurial poverty alleviation target, in order to explore the internal mechanism of the targeted entrepreneurial poverty alleviation model to promote poverty alleviation targets to get rid of poverty. On this basis, the article proposes a policy optimization ideafor the operation of the targeted entrepreneurial poverty alleviation model under the constraints of willingness, resources, and capabilities, in the hope of improving the currenttargeted entrepreneurial poverty alleviation policies.

2 Analysis of the Targeted Entrepreneurial Poverty Alleviation Situation

In 2014, China carried out targeted poverty alleviation filing and registration, with the aim of finding the root causes of poverty in poor counties. At the 19th CPC national congress in 2017, targeted poverty alleviation was raised to a strategic level, and a comprehensive plan focusing on poverty alleviation in poverty-stricken areas was put forward. China has made agreat breakthrough in the practice of targeted poverty alleviation. By2020, we will lift all the people living in poverty out of poverty according to current standards, and achieve the goal of building a moderately prosperous society in all respects. On this basis, China will enter the first stage of its second centenary goal, which is to basically achieve socialist modernization by 2035. However, as of the end of 2018, there werestill more than 30 million people living in poverty in China. Poverty-strickenareas are constrained by many factors such as resource limits, weak infrastructures, low quality of labor force, and low level of social services, as well asthe low creativity of the poorand their low entrepreneurial willingness. As a result,it is difficult to give play to the "blood-making"function, andsolve the root causes of poverty. In addition, problems such as inaccurate targets forpoverty alleviation and insufficient efforts in industrial poverty alleviation also make it more difficult toget rid of poverty. Although the government has issued a number of policies to promote targeted poverty alleviation, such as expanding special discount loans for poverty alleviation and increasing nutrition packages for poor children, "blood transfusion" type poverty alleviation, such as

financial assistance and public welfare funding, cannot solve the root causes of poverty (Rametseand Shah, 2013; Obschonkaet al., 2010). From the perspective of poverty alleviation targets, we should improve the entrepreneurial willingness and entrepreneurial enthusiasm of the poverty alleviation targets and realize substantial poverty alleviation through voluntaryand independent entrepreneurial activities (Xu Yunsong, 2016; Najafizada and Cohen, 2017).

3 Analysis of Core Elements of the Targeted Entrepreneurial Poverty Alleviation Model

The targeted entrepreneurial poverty alleviation model creates value through opportunity identification and resource integration and utilization (Rametse and Shah, 2013), brings a new way of thinking to the development of poor areas. Under the targeted entrepreneurial poverty alleviation model, good social entrepreneurship atmosphere and entrepreneurship education caneffectively improve the openness, extroversion and purposiveness of the poverty alleviation targets (Obschonkaet al., 2010), so that they can more easily perceive entrepreneurial opportunities. On the one hand, the targeted entrepreneurial poverty alleviation model optimizeshard entrepreneurial conditions such as funds, technology and venues for the targeted entrepreneurial poverty alleviation targets (Xu Yunsong, 2016); and on the other hand, soft entrepreneurial environments such as government services and entrepreneurship guidance canalso be improved. From the perspective of targeted entrepreneurial poverty alleviation targets, the selectionof entrepreneurship projects is often based on the previousemployment experience of the poverty alleviation targets, and it is more convenient to obtain resources. Studies have shown that the targeted entrepreneurial poverty alleviation model can not only improve the economic situation of the poverty alleviation targets, but also enhance their own skills and enrich their spiritual connotation, thusenhancing their happiness (Peng Chunning, 2016; Kor et al., 2007). The core elements of the targeted entrepreneurial poverty alleviation model are divided into the element of entrepreneurial willingness, the element of entrepreneurial resources and the element of entrepreneurial capabilities.

3.1 Element of entrepreneurial willingness in the targeted entrepreneurial poverty alleviation model

The element of entrepreneurial willingness is the essential core elementin targeted entrepreneurial poverty alleviation. Whether the targeted entrepreneurial poverty alleviation target has the entrepreneurial willingness directly determines whether the entrepreneurial poverty alleviation work can be carried out, which is the prerequisite of the targeted entrepreneurial poverty alleviation. It is the primary task for poverty alleviation workers to try to stimulate the enthusiasm of poverty alleviation targets in poverty-stricken areas, guidethem to participate in entrepreneurial poverty alleviation, and enhancetheir entrepreneurial willingness through policy advocacy and educational practice. In colleges and universities, some breakthroughs have been made inmany aspects such ascultivating the consciousness of innovation and entrepreneurship of poor college students, constantly optimizing and improving the innovative and entrepreneurial education ideas for poor college students, and trainingthe poor college students to be self-reliant and work hard. Therefore, entrepreneurial willingness is the core element of poverty alleviation for poverty-stricken areas and the poor.

3.2 Element of entrepreneurial resources in the targeted entrepreneurial poverty alleviation model

When the poverty-stricken areas and the poor have the entrepreneurial willingness, the element of entrepreneurial resources is particularly important. How to integrate the element of entrepreneurial

resources to make thepoor areas and the poor gradually break through the traditional extensive farming economy and nomadic economy, shift to thesustainable development model, and improve the efficiency of resource utilization; how to make the poverty alleviation targets start to develop market-oriented economy activities in line with characteristics of local natural resources. Colleges and universities should give full play to the role of collaborative education, integrate social resources, strengthen school-enterprise cooperation andbuild practical platforms and business incubation bases for students. The government and public support organizations help integrate entrepreneurial resources, whichis an important mean for the targeted entrepreneurial poverty alleviation.

3.3 Element of entrepreneurial capabilities in the targeted entrepreneurial poverty alleviation model

In the targeted entrepreneurship poverty alleviation model, entrepreneurial capability is the key to solving the problem of long-term poverty alleviation. Targeted entrepreneurial poverty alleviation targets and their descendants can receive compulsory education; the anti-risk capabilities of the targeted entrepreneurial poverty alleviation targets can be improved to make response togeneral risks, such as sudden illnesses, market downturns, and business failures; poverty alleviation targets begin to try to provide commercial solutions for certain social problems; targeted entrepreneurial poverty alleviation targets take the initiative to carry out continuous learning to cultivate social skills and entrepreneurial skills. For poor college students who are constrained by family economic conditions, under the support of good entrepreneurial atmosphere and entrepreneurial conditions, entrepreneurial enthusiasm and success rate are positively correlated with their own professional knowledge reserve and application ability as well asthe innovation and entrepreneurship knowledge and skills learned. The improvement of entrepreneurial capabilitycanfundamentally solve the problem of poverty alleviation in poverty-stricken areas and the poor.

4 Analysis of the Targeted Entrepreneurial Poverty Alleviation Model

Targeted entrepreneurial poverty alleviation work is a solution that is carefully designed and arrangedin a long term based on careful individual analysis of poverty-stricken areas and the poor. According to the individual needs of the poverty-stricken areas and the poor, the targeted entrepreneurial poverty alleviation models are divided into self-help, mutual-help and others-helptargeted entrepreneurial poverty alleviation models.

4.1 Self-help targeted entrepreneurial poverty alleviation model

The self-help targeted entrepreneurial poverty alleviation isto attempt to provide commercial solutions forsome specificsocial problems after the poverty alleviation target has entrepreneurial willingness, resources, and capabilities. The self-help targeted entrepreneurial poverty alleviation mechanism has an enhanced effect on the process thatbreakingthe constraints of willingness, resources and capabilitiespositively affects the targeted poverty alleviation effectiveness for the entrepreneurial poverty alleviation target. After perceiving the entrepreneurial opportunity, the poverty alleviation targets will make a comprehensive assessment totheir development potential, andtake the initiative tocarry out continuous learning to developsocial skills and entrepreneurial skills.

4.2 Mutual-helptargeted entrepreneurial poverty alleviation model

Mutual-help targeted entrepreneurial poverty alleviation guides the sharing of resources and information among targeted entrepreneurial poverty alleviation targets through careful organization and

resource integration. Targeted entrepreneurial poverty alleviation targets will solve the problems of small and micro enterprises, such as project acquisition, capital shortage and enterprise operation by establishment of various mutual cooperatives. Targeted entrepreneurial poverty alleviation targets will gain greater power or influence byestablishing various community associations. Targeted entrepreneurial poverty alleviation targets will establish interest correlation mechanisms around local leading enterprises to form characteristic industrial clusters.

4.3 Others-help targeted entrepreneurial poverty alleviation model

Others-helptargeted entrepreneurial poverty alleviation provides low-cost or free entrepreneurial places for targeted entrepreneurial poverty alleviation targets. Provide low-cost or free continuous training for targeted entrepreneurial poverty alleviation targets, including basic and targeted training. The government will givepriority to relevant projects for targeted entrepreneurial poverty alleviation targets. Banks, funds and some social welfare organizations have provided great support for targeted entrepreneurial poverty alleviation targets. Universities and enterprises set upincubators for poor students. It's a way to help poverty-stricken areas and the poor to achieve poverty alleviation.

5 Empirical Study

In this study, a total of 6 poverty-stricken counties in Hubei Province were selected for empirical study. The selection basis is as follows: (i) obviousregional characteristics - the old revolutionary base areas and minority areas being two representative poverty-stricken areas,(ii) significanteffect of targetedentrepreneurial poverty alleviation,and (iii) strong entrepreneurial atmosphere.

Through the study of poverty alleviation in 6 poverty-strickencounties in Hubei Province, the analysis of the operating mechanism of the targeted entrepreneurial poverty alleviation model under the constraints of willingness, resources and capabilities as well as thepractical experience inself-help, mutual-help and others-helptargeted entrepreneurial poverty alleviation, the conclusions of the operating mechanism of the targeted entrepreneurial poverty alleviation model under the constraints of willingness, resources and capabilities are verified.

6 Conclusions

In summary, the targeted entrepreneurial poverty alleviation model has a significant positive impact on the effectiveness of targeted poverty alleviation for entrepreneurial poverty alleviation targets. Breakingthe constraints of willingness, resources and capabilities has a significant positive impact on the effectiveness of targeted poverty alleviation for entrepreneurial poverty alleviation targets. The self-help targeted entrepreneurial poverty alleviation mechanism has an enhanced effect on the process that breakingthe constraints of willingness, resources and capabilities positively affectsthe targeted poverty alleviation effectiveness for entrepreneurial poverty alleviation targets. The mutual-help targeted entrepreneurial poverty alleviation mechanism has an enhanced effect on the process that breakingthe constraints of willingness, resources and capabilities positively affect the targeted poverty alleviation effectiveness for entrepreneurial poverty alleviation targets. The others-help targeted entrepreneurial poverty alleviation mechanism has an enhanced effect on the process that breaking the constraints of willingness, resources and capabilities positively affect the targeted poverty alleviation effectivenessfor entrepreneurial poverty alleviation targets.

When targeted entrepreneurial poverty alleviation targets actively seek outside help, they should

actively identify entrepreneurial opportunities and entrepreneurial information and minimize deviations in entrepreneurial decision-making. The government should take into account each targeted entrepreneurial poverty alleviationtarget when making policies, appropriately slopes poverty alleviation resources and entrepreneurship resources toconcentrated poverty, contiguous poverty and key poverty-stricken areas;for decentralized targeted entrepreneurial poverty alleviation targets, the government should also pay attention to the acquisition of external entrepreneurial resources and the cultivation of entrepreneurial capabilities (Tang Yong et al., 2013), to prevent the phenomenon of "elite capture" in the top-down poverty alleviation work caused by the weakness of the poor group. With regard to the assistance provided by non-governmental organizations, the targeted entrepreneurialpoverty alleviation targets should maintain their dominant position while obtaining external resources to prevent their interests from being over-exploited by the outside world.

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Research on the Interaction between Manufacturing and Producer Services in Hubei Province of China

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Abstract: This article examines the interactive relationship between manufacturing and producer services in Hubei, using the input-output table of Hubei province. Two statistical measures known as the total consumption coefficient and the total distribution coefficient were calculated to measure the linkage effects between manufacturing and producer services. Empirical results seem to suggest that the interactive development between manufacturing and producer services in Hubei is still at a low level. The demand-driven role of manufacturing to producer services is insufficient. The traditional manufacturing sectors are still the pillar industry of Hubei's economic development and advanced manufacturing sectors have developed slowly and not produced a large driven effect. Modern producer services haven't significant driving effects on manufacturing. Finally, according to the empirical results, relevant suggestions are put forward.

Keywords: Producer service； Manufacturing; Linkage effects; Input-output analysis

1 Introduction

In recent years, much attention has been focused on the interactive development of manufacturing and producer service. It has been acknowledged that manufacturing and producer services have the relationship of interaction, interdependence, symbiotic development (Guerrieri & Meliciani, 2005; Kong & Xing, 2019; Di Berardino & Onesti, 2020).

The manufacturing provides demand for the productive service. The increasing technological, financial and management complexity of industrial production boost the development of producer services, external producer services have become prerequisite inputs for the competitiveness of the manufacturing sector (Cusumano, Kahl & Suarez, 2015; Zou, Shen & Chen, 2019). The producer services's expansion has deepened division of labor and increased productivity and efficiency through specialization. Specialized producer services are commonly believed to maximize economies of scope and specialization and deliver strategic benefits to manufacturers (Yin, 2015). By outsourcing noncritical service functions, manufacturers can focus on core activities with the best allocation of in-house resource (Yang, Yeh & Wang, 2018; Lanaspa, Sanz-Gracia & Vera-Cabello,2016). With the capacity to apply up-to-date knowledge and expertise, producer services are also crucial to the innovation performance of manufacturing users (Tang, Zhang & Li, 2018). Furthermore, the interaction between the producer services and manufacturing has a direct impact on the industrial upgrading and structural adjustment of all sectors of the national economy, which has become an important way for the economic development of a country in the future (Hemil & Vilko, 2015; Li, Wang & Han, 2018).

Hubei province is one of the most important manufacturing bases in China. To achieve high-quality progress, Hubei has stressed the importance of promoting the integration of advanced manufacturing and modern services. Therefore, this article explores the current interactive relationship between manufacturing and producer services in Hubei. The study will help to reveal the problems in the process

of industrialization in Hubei, provide an important theoretical basis for the industrial development and structural transformation of Hubei, and help local government to formulate specific policies to promote industrial development.

2 Methodology and data source

2.1 Methodology

In this study, to reveal the linkage effects between manufacturing and producer services in Hubei, the input-output analysis are employed. The total consumption coefficient and the total distribution coefficient were calculated to measure the relationship between manufacturing and producer services.

The total consumption coefficient (b_{ij}) represents the direct and indirect consumption of the sector *i*'s products by an output of sector *j*. The larger the total consumption coefficient b_{ij}, the greater the sector *i*'s products consumed by the sector *j*, and the more obvious the dependence or driven effect of the section *j* on the section *i*.

$$b_{ij} = a_{ij} + \sum_{k=1}^{n} b_{ik} \times a_{kj} \qquad (i, j = 1,2,\ldots,n) \tag{1}$$

where $a_{ij}=x_{ij}/X_j$, a_{ij} is the direct consumption coefficient, x_{ij} refers to the consumption of sector *i* by sector *j* in order to obtain an output of the current period and X_j indicates the total output of the sector *j*.

The total distribution coefficient (w_{ij}) refers to the proportion of sector *i*'s unit output directly and indirectly distributed to the sector *j*. The larger the total distribution coefficient w_{ij}, the greater the demand that sector *i* feel from the sector *j*, and the more obvious the sector *i*'s supply-driven power to the sector *j*.

$$w_{ij} = r_{ij} + \sum_{k=1}^{n} w_{kj} \times r_{ik} \qquad (i, j = 1,2,\ldots, n) \tag{2}$$

where $r_{ij}=x_{ij}/X_i$, r_{ij} is the direct distribution coefficient, x_{ij} refers to the product value provided by the sector *i* to the intermediate use of the sector *j*, X_i represents the total output of sector *i*.

2.2 Data source

In this study, the input-output table of Hubei in 2012 (the latest version) was used to calculate the total consumption coefficient and total distribution coefficient. The 2012 version of input-output sheet of Hubei lists the intersectoral relation of 42 sectors of Hubei, including 18 manufacturing sectors and 19 service sectors. For manufacturing industry, Hubei's input-output classification is directly used. Based on the reference to the National Economic Industry Classification (GB/T4754-2011) and the National Standard Producer Services Statistics Classification(2019), and combined with the statement of input-output classification in input-output table of Hubei, 7 sub-sectors of producer services were identified.

3 Linkage Effects between Manufacturing and Producer Services in Hubei

3.1 Linkage Effects of the five major industries in Hubei

For the research purpose, the input-output table of 42 sectors of Hubei was adjusted. The data were merged and the manufacturing and producer services were separated from the secondary industry and tertiary industry respectively to form a five-sector input-output table. On this basis, the total consumption coefficient and total distribution coefficient across the various industrial sectors are obtained.

Total consumption coefficients across industries shown in Table 1 indicate that inter-industry relationship between manufacturing and producer services shows asymmetrical dependence. The total

consumption coefficient of manufacturing industry to itself is 1.0618, which is almost five times that of manufacturing industry to producer services (0.2294). It reflects that manufacturing depends most heavily on its own output as inputs to its production; the inter-industry demand of manufacturing for produce services activities is insufficient. Namely, the driven effect of manufacturing on producer services is not obvious. Total consumption coefficient of producer service to manufacturing in Hubei is 0.4539, which is higher than that of the other four sectors, indicating that producer services activities tend to depend on the manufacturing sector as a source of inputs to a far greater extent and manufacturing plays a certain supporting role in the development of producer services.

Table 1 Total Consumption Coefficient(b_{ij}) and Total Distribution Coefficient(w_{ij}) of 5 Sectors

	The primary industry		Manufacturing		Other secondary industries		Producer services		Other service sectors	
	b_{ij}	w_{ij}	b_{ij}	w_{ij}	b_{ij}	w_{ij}	b_{ij}	w_{ij}	b_{ij}	w_{ij}
The primary industry	0.2134	0.2134	0.2003	1.2057	0.0978	0.1908	0.0524	0.0941	0.0612	0.0718
Manufacturing	0.5334	0.0886	1.0618	1.0618	0.8713	0.2824	0.4539	0.1352	0.4153	0.0810
Other secondary industries	0.0978	0.0501	0.3084	0.9514	0.4019	0.4019	0.1198	0.1101	0.1508	0.0907
Producer services	0.0839	0.0468	0.2294	0.7699	0.3930	0.4276	0.3300	0.3300	0.1308	0.0856
Other service sectors	0.0844	0.0719	0.0566	0.2900	0.0704	0.1170	0.1120	0.1710	0.1180	0.1180

According to the data of total distribution coefficient, the distribution coefficient of producer services to manufacturing industry is the largest relative to other industries, which indicates that the manufacturing plays the most important role in promoting producer services. It is also in line with the nature of producer services as intermediate input in manufacturing. But because of the low consumption of manufacturing industry to producer services in Hubei, the demand for producer services activities is still very limited by the influence of manufacturing and the interaction level between producer services and manufacturing is not high.

3.2 Linkage effects among sub-sectors of Manufacturing and Producer Services in Hubei

The total consumption coefficient shown in Table 2 represents the products and services which have been produced by 7 producer services sectors and consumed by 18 manufacturing sectors in Hubei province. From the results of the total consumption coefficient, the top 5 manufacturing sectors ranked by the total consumption coefficient are “leather, fur, feather, down and related products”, “non-metal Minerals”, “metal products”, “chemical industry”, “paper-making, printing and cultural, educational and sports goods industry”. It indicates that the traditional manufacturing sectors in Hubei are relatively highly dependent on producer services and have strong driven effects on it. But Technology-intensive manufacturing sectors including some Hubei’s superior industry (such as automobile, equipment manufacturing, optoelectronics and so on) has low correlation with producer services. The results presented in Table 2 also seem to suggest that three producer services branches, named “wholesale and retail trades”, “transport, storage, and postal services”, “Finance and insurance”, supplied the dominant share of producer service inputs to the manufacturing in Hubei. But the consumption of services provided by the three service sectors (“repair of metal products, machinery and equipment”, “Scientific research and polytechnic services; information transfer”, “computer services, and software”) is

Table 2 The Total Consumption Coefficient of Manufacturing Sectors to Producer Services Sectors

	Food & Tabacoo	Leather,fur,feather, down & related products	Textiles	Timber processing & Furniture	Paper-making, Printing & cultural,	Non-metal minerals	Processing of petroleum, coking, processing of nuclear fuel	Chemical industry	Smelting and pressing of metals metal products	General-purpose machinery	Special-purpose machinery	Transport equip.	Recycling & waste disposal	Electric equip. & machinery	Communication, computers & other	Instruments,meters and cultural & office machinery	Other manufacturing	Total
Wholesale& retail trades	0.03591	0.10037	0.05025	0.04958	0.06274	0.00401	0.03993	0.05652	0.03460	0.07654	0.05623	0.05593	0.04006	0.02675	0.05418	0.06771	0.06121	0.04851	0.97736
Transport,storage&postal	0.04144	0.06915	0.05215	0.04037	0.06935	0.06034	0.01707	0.06613	0.03747	0.05153	0.04810	0.05038	0.05240	0.07502	0.04437	0.02441	0.04327	0.06119	0.92806
Finance & insurance	0.03222	0.06537	0.04756	0.04276	0.05093	0.08426	0.03248	0.06504	0.05201	0.05414	0.05495	0.05037	0.04375	0.02886	0.04284	0.02682	0.03326	0.04973	0.85361
Leasing&commercial	0.02691	0.06190	0.02356	0.02250	0.03561	0.00986	0.03361	0.03693	0.01908	0.04873	0.02886	0.02421	0.03435	0.01507	0.02515	0.02334	0.03739	0.02752	0.56119
Information,computer, software	0.00495	0.01416	0.00660	0.00570	0.01013	0.08052	0.00443	0.00819	0.00608	0.01130	0.00759	0.00682	0.00583	0.00588	0.00652	0.00549	0.00820	0.00772	0.13545
Scientific research,polytechnic serv.	0.00427	0.00568	0.00429	0.00525	0.00292	0.03647	0.00172	0.00487	0.00223	0.00395	0.00371	0.00311	0.00474	0.00508	0.00449	0.00177	0.00810	0.00612	0.0775
Repair of metal products ,mach. & equip.	0.00117	0.00284	0.00231	0.00198	0.00183	0.00520	0.00777	0.00211	0.00287	0.00246	0.00160	0.00123	0.00142	0.00209	0.00154	0.00069	0.00101	0.00197	0.0409
Total	0.14687	0.31947	0.18672	0.16814	0.23351	0.28066	0.13701	0.23979	0.15434	0.24865	0.20104	0.19205	0.18255	0.15875	0.17909	0.15023	0.19244	0.20276	

Table 3 The Total Distribution Coefficient of Producer Services Sectors to Manufacturing Sectors

	Food & Tabacoo	Leather,fur,feather, down & related products	Textiles	Timber processing & F	Paper-making, Printing & cultural,	Non-metal minerals	Processing of petroleum, coking, processing of nuclear fuel	Chemical industry	Smelting and pressing of metals metal products	General-purpose	Special-purpose	Transport equip.	Recycling & waste disposal	Electric equip. & machinery	Communication, computers & other	Instruments,meters and cultural & office machinery	Other	Total
Wholesale& retail trades	0.09752	0.03441	0.03300	0.00727	0.01907	0.04638	0.01060	0.10281	0.04247	0.02835	0.02030	0.01604	0.07783	0.00090	0.02962	0.03527	0.00272	0.00315	0.60771
Transport,storage&postal	0.10117	0.02131	0.03079	0.00532	0.01895	0.05824	0.00407	0.10813	0.04134	0.01716	0.01561	0.01299	0.09153	0.00227	0.02181	0.01143	0.00173	0.00357	0.56742
Finance&insurance	0.15380	0.03940	0.05490	0.01103	0.02721	0.10881	0.01516	0.20794	0.11222	0.03525	0.03488	0.02540	0.14939	0.00171	0.04117	0.02455	0.00260	0.00568	1.0511
Leasing&commercial	0.15925	0.04625	0.03372	0.00719	0.02359	0.06110	0.01944	0.14638	0.05102	0.03934	0.02271	0.01513	0.14542	0.00111	0.02997	0.02650	0.00362	0.00389	0.83563
Information,computer, software	0.04338	0.01568	0.01401	0.00270	0.00994	0.02448	0.00380	0.04809	0.02409	0.01351	0.00885	0.00632	0.03660	0.00064	0.01152	0.00924	0.00118	0.00162	0.27565
Scientific research,polytechnic serv.	0.04949	0.00830	0.01202	0.00328	0.00379	0.01705	0.00195	0.03784	0.01171	0.00625	0.00572	0.00381	0.03930	0.00073	0.01047	0.00394	0.00153	0.00170	0.21888
Repair of metal products ,mach. & equip.	0.21227	0.06499	0.10098	0.01936	0.03707	0.20571	0.13761	0.25581	0.23468	0.06083	0.03852	0.02348	0.18397	0.00469	0.05631	0.02396	0.00300	0.00854	1.67178
Total	0.81688	0.23034	0.27942	0.05615	0.13962	0.52177	0.19263	0.90700	0.51753	0.20069	0.14659	0.10317	0.72404	0.01205	0.20087	0.13489	0.01638	0.02815	

significantly less. It shows that the manufacturing in Hubei still relies on the traditional business model and focuses on the production of physical products, which depends on distributive services, traffic conditions and capital. But the demand of the manufacturing in Hubei for the modern knowledge-intensive service sectors is seriously insufficient. The driven effect of manufacturing on the modern service sectors is limited.

Table 3 summarizes the intersectoral total distribution coefficient of 7 producer services sectors to 18 manufacturing sectors. The results show that the provider services sector with the maximum total distribution coefficient is “repair of metal products, machinery & equipment”. Next are “finance & assurance”, “leasing & commercial services”. This reveals that that these producer services sectors in Hubei have a very close forward correlation with the manufacturing, which provides a resource support for manufacturing and promotes the development of Hubei manufacturing industry to some extent. The total distribution coefficient of “information transfer, computer services, software”, “Scientific research, polytechnic services” is significantly lower than that of other producer services, indicating that modern high-tech services have less support for manufacturing and have little driving effect on manufacturing. In addition, producer services has allocated more resources to “chemical industry”, “food manufacturing & Tobacco processing”, and “Transport equipment manufacturing”, which means that manufacturing sectors play an important role in promoting the development of these producers services sectors.

In summary, there is no close interaction between producer service and manufacturing in Hubei. But relatively speaking, the interaction between traditional manufacturing and producer services is much higher than that between advanced manufacturing and producer services. In addition, the supporting role of traditional producer services to manufacturing is higher than that of modern producer services.

4 Conclusions

In this study, the input-output analysis was used to study the linkage effects between manufacturing and producer services in Hubei. The conclusions and suggestions are as follows.

The interaction between manufacturing and producer services in Hubei is generally weak. The intra-industry transactions within the manufacturing group seem to overwhelm its backward linkages with other service groups and the demand-driven role of manufacturing to producer services is insufficient. This is not only conducive to the transformation and upgrading of the manufacturing in Hubei , but also to the expansion of the scale of producers services, as well as the improvement of the efficiency of specialization and the quality of service.

The traditional manufacturing sectors are still the pillar industry to promote Hubei's economic growth, which has a great effect of driven radiation on Hubei's producer services, such as “textile and clothing, metallurgy”, “chemical industry” and other traditional light and heavy industries.

The high-tech manufacturing industry in Hubei has not developed enough and has not produced a large driven effect. Even some Hubei superior industries, such as automobile, optoelectronic information, equipment manufacturing industry and so on, have lower backward linkages with producer services. This reflects that Hubei manufacturing industry needs to further deepen the division of labor and specialization, externalize most of service activities to firms specializing in a narrow range of highly sophisticated producer services and create opportunities and conditions for the development of modern producer services. On the other hand, it also reflects the slow development of producer services in Hubei, especially some modern knowledge-intensive services, which cannot meet the requirements of the development of advanced manufacturing sectors in Hubei.

The manufacturing in Hubei has a high degree of dependence on the traditional service sectors, and the driving effect of modern producer services on the manufacturing is far from being played, and some advanced service elements have not played a key role in the upgrading of Hubei manufacturing industry. Therefore, for the rapid and healthy economic development of Hubei, on the one hand, Hubei should further strengthen the reform and development pace of traditional services such as “wholesale and retail trades”, “Transport, storage, postal services”, “financial and insurance”, on the other hand, it should pay attention to the development of knowledge-intensive producer services such as information services, science and technology services, and improve the basic support of modern producer services for the transformation and development of manufacturing industry in Hubei.

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Design of Smart Library Monitoring and Management System Based on LoRa Wireless Network

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Abstract: LoRa (Long Range) wireless communication technology stands out in many low power wide area networks (LPWAN) technologies because of its long distance, large capacity, low power consumption and other characteristics. This paper analyzes the feasibility of the application of LoRa technology in the University smart library, and proposes the University Smart Library monitoring and management System Based on LoRa technology, including smart phone display, LoRa gateway, LoRa snesor node, and introduces these functions in detail.
Keywords: LoRa ;Sensor ;Smart Library

1 Introduction

Analyzing the history of the library, the mainstream thinks that the library is divided into the first generation library, the second generation library and the third generation library. At present, the vast majority of university libraries are still in the period of the second generation library and are actively changing to the third generation library. The second generation library has the characteristics of integration of collection and use, openness and transparency. The third generation library -- smart library. Liu Wei, director of Shanghai Library, thinks that the Smart Library relies on the smart library system to provide comprehensive business support, with the help of the Internet of things, big data, cloud computing, artificial intelligence, virtual reality and other new technologies to realize the comprehensive smartization of the library and promote the upgrading of the library [1].

With the development of Internet of things technology and its application in university library, it brings new opportunities for the development of library.

The application of Internet of things technology in the library is mainly based on sensor technology, wireless communication technology, computer technology, network technology, etc. [2], relying on temperature and humidity sensors, light sensors, CO_2 sensors and other equipment [3], to detect the environmental temperature and humidity, light intensity, CO_2 concentration and other physical parameters of the environment, realize the monitoring of the internal environment of the library, and guide librarians to regulate and control the environment in the library To ensure that users have a good and appropriate reading and learning environment [4]. In recent years, the Internet of things technology has been rapid development, LoRa as one of the wireless communication standards, because of its low cost, simple implementation, open resources and a series of advantages, it has been widely concerned by academia and enterprises. Compared with ZigBee communication standard, LoRa mainly solves the problems of limited communication distance and low power consumption. Therefore, it is the best solution to apply LoRa standard and its technical system to the smart monitoring and management of the library.

2 Feasibility analysis on the application of LoRa communication standard in University Smart Library

LoRa communication standard is developed by Semtech company, working below 1 GHz, providing 868 MHz, 915 MHz and 433 MHz [5], a new wireless communication standard specially designed for long-distance, large capacity and low-power communication [6].

At present, the main stream of university library is the integration of large space and collection. Because of the large space and large flow of people, the light intensity, temperature, humidity and CO_2 concentration in the library lacks of availability to be controlled in real time. In addition, these factors will affect the user's happiness in the library, the preservation of books in the library, and the security of the electronic room in the library.

The light intensity, temperature, humidity and CO_2 concentration in the library can be obtained by sensors, but the data obtained by sensors can be transmitted by wired and wireless means. There are 485 bus and CAN bus for wired communication, GSM and GPRS for wireless communication, ZigBee, Wi-Fi and Bluetooth for wireless communication, LoRa and NB-IoT for low-power Wan.

Although the wired communication mode has good anti-interference and easy operation, it has some disadvantages such as difficult wiring, difficult installation and maintenance, and poor scalability. Wireless communication does not need a lot of wiring, but also can use gateway nodes to gather information, access network forwarding to remote user center. Compared with wired communication, wireless communication has more advantages in library environmental monitoring, and wireless sensor network has been widely used in many fields [7-9].

ZigBee, Wi-Fi, Bluetooth and LoRa are commonly used in wireless communication. The comparison of these communication media standards is shown in Figure 1.

Method	transmission speed (M/S)	Number of connected devices	Working frequency band	Transmission distance	Power consumption	Application scope
Zigbee	0.02 ~ 0.24	2^{16} ~ 2^{64}	0.85/0.89/2.4	10 ~ 100m	1 ~ 3	Home network, control network, sensor network
Bluetooth	1 ~ 3	7	2.4	2 ~ 10m	1 ~ 100	Personal network
Wi-Fi	1 ~ 11	255	2.4	30 ~ 100m	100	Wireless local network
LoRa	0.03 ~ 0.6	Millions	0.433/0.868/0.915	15km	3	Sensor and control network

Figure 1 Comparison of Wireless Communication Technology

Compared with other wireless technologies, LoRa technology has the advantages of long-distance transmission, millions of nodes and data transmission rate as high as 0.3-60 kbs, which greatly enhances the communication quality and network capacity. At the same time, LoRa signal has strong penetration capability for buildings, which makes it more suitable for large-scale Internet of Things deployment. The special spread spectrum technology makes the communication link budget reach about 15 km and the received current is only 10 mA, which greatly improves the battery life [10]. LoRa uses a star network architecture. Compared with mesh network architecture, LoRa is the simplest network architecture with the lowest delay. The spread spectrum chip based on LoRa can realize direct networking connection between nodes and gateways to form stars. For remote nodes, relay networking can be used. LoRa uses unlicensed spectrum, and the communication protocol is simpler and more flexible, which is more suitable for small-scale deployment networks.

3 Design of LoRa Monitoring and Management System

3.1 Functional requirements analysis

The system functions of LoRa Smart Library are divided into two parts: smart service and smart management. Smart service refers to the smartization of the original traditional services of the library for users, such as self-service return of books, seat reservation, personalized recommendation of books, etc., so as to improve the user experience of reading and learning in the library. It is mainly based on the big data technology level of RFID technology. Smart management refers to the smart and mobile daily management and monitoring of the library, so as to improve the monitoring ability and management efficiency of the library. It is mainly based on the technology of the Internet of Things.

The design of LoRa library management system is based on the latter, that is, based on the Internet of things technology. Its function is to connect users, library buildings and other entities in the library through LoRa wireless network and sensor equipment to realize the smart management of Smart Library.

This paper puts forward two kinds of smart management function requirements: （1）smart management and monitoring; （2）mobile management and monitoring.

3.1.1 Smart management and monitoring

(1) Preservation of ancient books

According to Meng Xiaohong's survey on the standard of temperature and humidity in the ancient books warehouse of National Library of China in 2015, even if the constant temperature and humidity air conditioning system is adopted, the temperature and humidity compliance rate of ancient book warehouse has a large fluctuation. Among them, the standard rate of humidity ranged from 77.5% to 98.1%. In the case of large warehouse area and many indoor partitions, there are many places where the humidification is not enough or the humidity exceeds the standard, which leads to the whole body temperature and humidity not up to the standard [11]. The temperature and humidity wireless sensor is used as the node of LoRa wireless network, which is installed in every corner of the ancient books warehouse, which can effectively find the places where the temperature and humidity are not up to the standard, so as to facilitate the librarians to install small air conditioning or humidifier, and carry out continuous temperature and humidity monitoring in the later stage, so as to improve the compliance rate of ancient books preservation

environment.

(2) Fire monitoring

As we all know, fire safety is one of the core security issues of university library. The fire detector, which integrates temperature, smoke concentration and CO content sensors, is used as the node of LoRa wireless network, which can transmit fire detection data to the gateway in real time by installing it at the necessary position in the library room. Compared with the traditional CAN bus system, because of the LoRa wireless network, this system only needs to lay a large number of low-cost wireless sensors and directly connect with the LoRa gateway, which saves the complex circuit design and high-cost line laying [12], and can effectively guarantee the real-time monitoring and coverage.

(3) Optimization of reading environment

The temperature and humidity sensor and light wireless sensor are used to monitor the environment of each reading room and study room. It is connected with LoRa gateway to upload the indoor environmental data to the management terminal, providing data for air conditioning, humidifier, curtain and other smart hardware related to the library environment.

(4) Book management

At present, many libraries are using RFID tags to gradually replace the traditional barcodes. However, RFID tags still have the problem of inconsistent transmission interface [13]. Previously, ZigBee wireless network was used as the main transmission standard, and with the current LoRa wireless network can also support the identification of RFID tags [14], LoRa can become a new RFID transmission layer network standard with its high-speed and long-distance advantages. The RFID electronic tag is used to register and manage the books in the library. It is connected with LoRa gateway of each reading room to upload the inventory data of each reading room to the management terminal, which is convenient for the establishment of smart services such as self-service borrowing and returning.

3.1.2 Mobile management and monitoring

The application of Internet of things technology, from the perspective of users, buildings and library entities, carries out smart management of the library, so as to make the library and library resources smart interconnection, so as to provide users with a full range of smart services [15]. The mobile management method can help librarians to monitor and manage the environment in the library in real time at anytime and anywhere to improve the management efficiency. This paper presents a mobile smart management system based on LoRa wireless network. All kinds of sensor nodes transmit different types of monitoring data to LoRa gateway, and then the librarians obtain the monitoring data in the gateway through smart phones.

3.2 System structure design

3.2.1 Overall functional framework

The university smart library system based on LoRa is mainly composed of three modules: smart phone, LoRa gateway and LoRa node.The workflow diagram of system framework is shown in Figure 2.

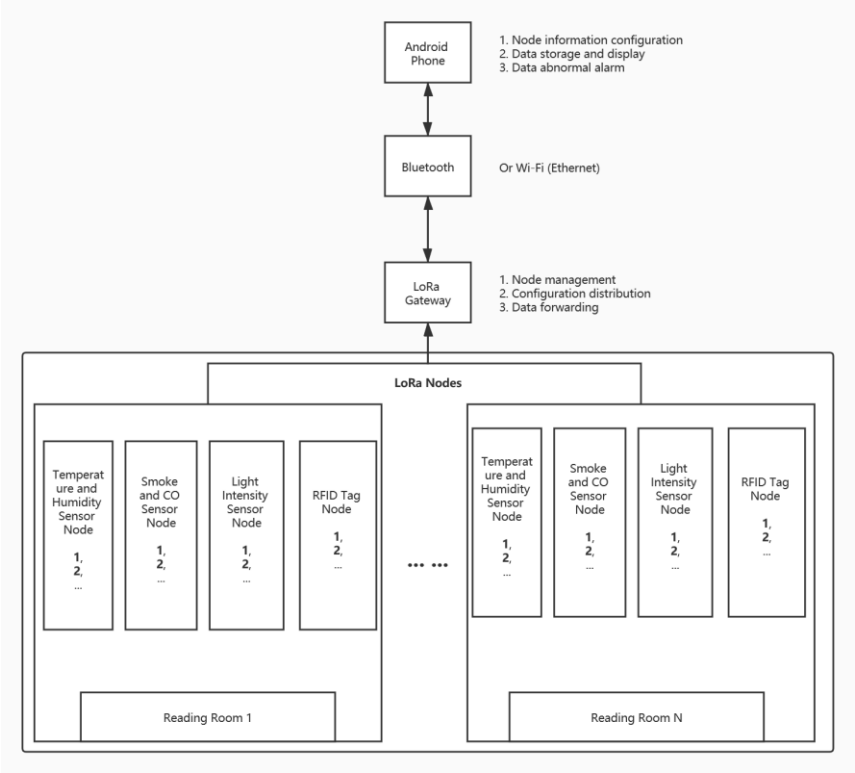

Figure 2 Intereaction Diagram of LoRa Management and Monitoring System

LoRa nodes are deployed at different locations in the library to sense the temperature and humidity of the corresponding locations and upload the collected data to LoRa gateway through LoRa. All nodes are powered by batteries, no external power supply is needed, there is no specific requirement for placement location, and it is easy to deploy. The nodes cannot communicate directly and do not interfere with each other.

LoRa gateway manages all LoRa nodes, collects the data of all LoRa nodes, analyzes and forwards the data. LoRa gateway provides Ethernet, Wi-Fi and Bluetooth communication modes. According to the use environment of the library, Wi-Fi communication and smart phone connection can be selected, and the system is flexible and convenient. At the same time, due to the long distance and large capacity of LoRa, one LoRa gateway can manage all LoRa nodes in the whole museum.

Smart phones store and display the data uploaded by LoRa gateway. It has friendly human-computer interaction and can view the temperature and humidity information of specific locations in the library in real time, providing reference basis for librarians to manage the library environment. At the same time, it provides temperature and humidity abnormal alarm function for short messages and mails. The system adopts a distributed network structure and has less coupling among layers, which is convenient for management and maintenance.

3.2.2 communication process between gateway and node

After LoRa gateway power-on initialization, upload channel information to mobile phone APP terminal; After receiving the idle communication channel selected by the mobile phone APP user and the distribution of the number of nodes of each type, the gateway sends the above information to each node in the form of broadcast, and the node analyzes the data to switch the communication channel and determine its own time slot. At the same time, each node sends data to the gateway when waiting for its own time slot, the gateway replies ACK to the node after receiving the data, the node enters a sleep state after receiving the ACK, and the timing time is up to automatically wake up and receive the broadcast data of the next gateway; If the node does not receive an ACK, it will send it again. If it still does not receive an ACK, it will stop sending and enter the sleep state directly. This retransmission mechanism can not only ensure the reliability of data transmission as far as possible, but also will not cause channel congestion. The gateway finally transmits the received data to the mobile phone terminal through Wi-Fi for storage and display processing.

The workflow diagram of nodes and gateways is shown in Figure 3.

3.2.3 communication process between mobile app and gateway

The workflow diagram of gateway and Android mobile phone APP is shown in Fig. 3. After APP is started, the gateway will be searched automatically and connected manually. Notify the gateway after successful connection. After receiving the information of successful connection, the gateway starts searching for the idle channel of the current environment and uploads the result to the mobile phone APP terminal. After receiving the relevant information of the idle channel, the mobile phone APP terminal displays it on the APP terminal in the form of a user interface (UI). the user selects the communication channel according to the actual situation, configures the number and location of each node, and sends the relevant information to the network through statistics of the mobile phone APP terminal Close. After receiving the above configuration, the gateway will reply ACK (acknowledgement character) to the APP end of the mobile phone. If the APP end of the mobile phone receives the reply, it will stop the distribution of configuration, otherwise it will be sent repeatedly. After the configuration is successfully issued, the gateway and the node switch communication channels according to the configuration, and each node confirms its own communication time slot to ensure normal communication between the node and the gateway. After the relevant configuration is completed, the real-time transmission of data from the node to the gateway to the mobile phone APP terminal can be realized. The mobile phone APP terminal analyzes and stores the relevant data in real time and updates the interface display.

The workflow diagram of APP and gateways is also shown in Figure 3.

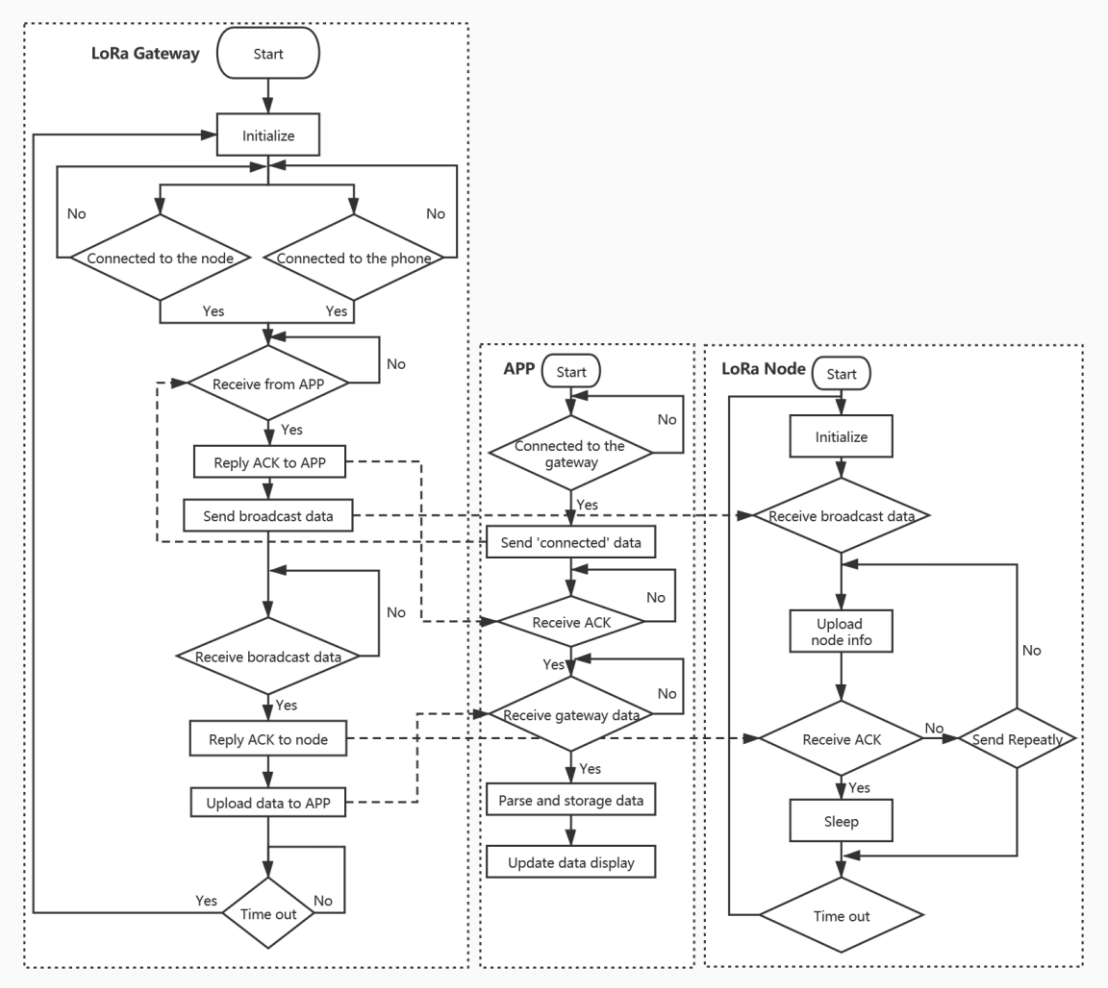

Figure 3 Workflow Intereaction Diagram of LoRa Gateway, Nodes and Android APP

4 Conclusion

This paper first introduces the current development of Smart Library and Internet of things technology. Secondly, it analyzes the feasibility of LoRa technology standard in the management and monitoring of Smart Library, and analyzes the functional requirements of smart monitoring management system in detail. Finally, combined with the characteristics of LoRa technology, a Smart Library monitoring and management system based on LoRa is proposed and designed, which is composed of mobile phone, gateway and node.

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Innovation Research on the Financial Assistance Mode for SMEs in the Post Epidemic Era

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Abstract: The development of small and medium-sized enterprises occupies a dominant position in the national economy, but there are also many problems in their development, among which financial assistance is the most important. However, the huge changes in the era of the epidemic have brought new difficulties to the financial assistance of small and medium-sized enterprises, and the manufacturing industry has been affected. Firstly, I analyze the current situation of small and medium-sized enterprises from the selection and mode of financial assistance. Then,I put forward innovative solutions combined with the characteristics of the times according to the above problems， In order to make the proposed method more targeted, I carried out a simple questionnaire survey in representative areas to verify the theoretical analysis in practice, and finally make a conclusion..
Keywords: Post epidemic era; Manufacturing; Financial assistance mode; Innovate

1 Introduction

Nowadays, a few large enterprises and most of small and medium-sized enterprises have become the basic mode of enterprises in various countries. As of 2019, there are about 120 million small and medium-sized enterprises registered in business departments in China, accounting for about 79%. They have made great contributions to the national economic development. In August 2018, the first meeting of the leading group of the State Council to promote the development of small and medium-sized enterprises put forward the judgment on the famous "56789" of China's Small and Medium-sized Enterprises for the first time. That's to say, SMEs provide 50% of the national tax revenue, create more than 60% of GDP, complete more than 70% of invention patents, provide 80% of urban employment, and contribute 90% of new employment.Small and medium-sized enterprises have been the ballast stone of China's economy since the reform and the opening-up.

However, the outbreak of the epidemic in 2020 has a serious impact on the social economy and a large number of SMEs are seriously hit, among which the manufacturing industry is the most serious. Due to the restrictions on going out and the non-fully automated characteristics of the manufacturing industry, many small and medium-sized manufacturing enterprises are trapped in the shrinking demand and shutdown, which also leads to the failure of a large number of small and medium-sized manufacturing industries in the entrepreneurial development stage. At this time, the state needs to take corresponding financial assistance measures to help SMEs start their businesses again, so as to revive the economy.

Since the epidemic, financial assistance for SMEs has become a sensitive topic scholars have fully studied the characteristics of the post epidemic era, as well as the problem of helping SMEs In view of the post epidemic era, scholars represented by Chen Gen pointed out the cash flow problems faced by SMEs under the influence of the epidemic situation in 2020, and analyzed the financing difficulties(Chen Gen,2020);the scholars represented by Yin Hong selected the representative manufacturing industry in the same period of time to study the countermeasures to help the epidemic situation(Yin Hong,2020); At the same time, there were also a large number of scholars carried out research on financing difficulties for SMEs in history. In foreign papers, Xiaoyi Li puts forward the Countermeasures of supporting core enterprises to extend their assistance to help SMEs from the perspective of supply chain(Xiaoyi Li ,2020). Fangyuan analyzes the influencing factors of SMEs' financing decision-making based on pecking order theory(Fangyuan,2019). Domestic scholars represented by Ying Zhanyu and Zhang Hongfeng have also made full research on the causes of SMEs' financing difficulties and the countermeasures from different aspects(Tang Yan,2013). However, in the face of the outbreak, due to the financial information status of some enterprises, the development direction and trend have changed under the influence of the epidemic, the original research countermeasures are not fully applicable, and the assistance process can not go on smoothly. According to the data released by China Federation of industry and commerce, nearly 95% of SMEs have never had a loan from financial institutions. That's to say there is still lack of a more efficient system model to solve the new problems, especially for the manufacturing industry which is most affected by the epidemic.

The empirical evidence highlights policy implications for countries desiring to enhance the

innovation and development of their SMEs by improving the external finance of these SMEs. (Nirosha Hewa Wellalage,2019)Therefore, in the era of big data informatization, it is particularly important to find new evaluation and assistance methods to help the secondary entrepreneurship of SMMEs. According to the current situation and needs of different types of SMEs , this paper puts forward the methods to solve the problems of selection threshold and mode involved in the financing process, and provides the most effective help to the SMEs that need the most help in the innovative mode, and contributes to the national economic recovery in the most efficient way. The purpose of this paper is to improve the countermeasures of financial assistance for small and medium-sized enterprises in the face of special changes.

2 Theoretical Support

2.1 MM theory and trade-off theory

Trade off theory is based on MM theory, and explores the impact of structure on enterprise value by relaxing some assumptions of MM theory. It holds that the optimal capital structure of an enterprise is a trade-off between the tax revenue generated by liabilities and the cost of bankruptcy. According to the analysis of the research object of this paper, if the investment enterprise has debt, when the investment decision of the management has different influence on the equity value and debt value, it is easy to break out the interest conflict between shareholders and creditors, which has a serious impact on the financing enterprises. In face of the outbreak of the epidemic, the decision-making of the investment company is more important, so it will be more cautious, and for the SMEs whose situation is difficult to predict, it is more difficult to make a choice for investment convenience.

2.2 Asymmetric information theory

In terms of industry information, SME owners have a better understanding of enterprises than banks and other financial institutions. Therefore, the latter often determines the business situation based on the former's financing decisions, and the internal and external understanding of the business value of investment opportunities or information is asymmetric. According to the theory of asymmetric information, investors and enterprises with less information will try to obtain information from the other party. Through the dissemination of information related knowledge, the party with more information will benefit. Because the size and availability of information are highly related to the size of the enterprise, the smaller the enterprise is, the more difficult it will be for the bank to obtain information and to finance. Therefore, improve the information quality of SMEs may be a feasible way to help SMEs obtain financing and solve the problem of decision-making.

2.3 Sustainable development theory

The theory of sustainable development is based on two important factors, one is the needs of the object, the other is the limitation to realize the need. In this paper, the specific meaning of these two elements refers to the need to help small and medium-sized enterprises recover under the influence of the epidemic situation, and the help constraints to realize the needs.

It is obvious that the source of the restriction is from two aspects, one is the investor, the other is the enterprise itself. For investors, according to the analysis of trade-off theory and asymmetric information theory, it mainly comes from the difficulty of decision-making, while for the enterprise itself, it comes from the instability caused by scale restriction. Only by solving these two problems can we achieve the purpose of helping.

3 Questionnaire Survey

In order to understand the actual situation and needs of secondary entrepreneurship of SMMEs in the post epidemic era, to provide more targeted assistance, and to make the survey objects more representative, we distributed 300 questionnaires to the managers of small and medium-sized enterprises through Association of small and medium sized enterprises in Wuhan, the birthplace of the epidemic, in which variables such as the duration of enterprise entrepreneurship and the type of enterprise were set 158 valid questionnaires were obtained after the invalid questionnaires were collected.

In the questionnaire, we refer to the Ministry of industry and information technology [300] No. 2011 for the positioning of enterprise scale; for the variable design of the current capital situation, we judge the duration of the current fund operation(Wang Jingren,2020), and compare the income after the epidemic with that of the same period last year. The demand variables of difficulty type and assistance form are designed as new variables to compare and know the actual demand to put forward specific assistance measures

4 The Impact of the Outbreak of the Epidemic in 2020 on SMMEs

4.1 Problems in different types of manufacturing industry

The chart shows the proportion of different types of manufacturing industry facing different problems. According to the chart, it can be seen that the main problems of various types of manufacturing industry mainly focus on the supply of raw materials, the reduction of expected orders and the pressure of loan repayment. The whole sales chain and capital chain have been impacted to a certain extent under the influence of the epidemic, and the normal operation has been seriously affected. Therefore, it is urgent to make financial remedy.

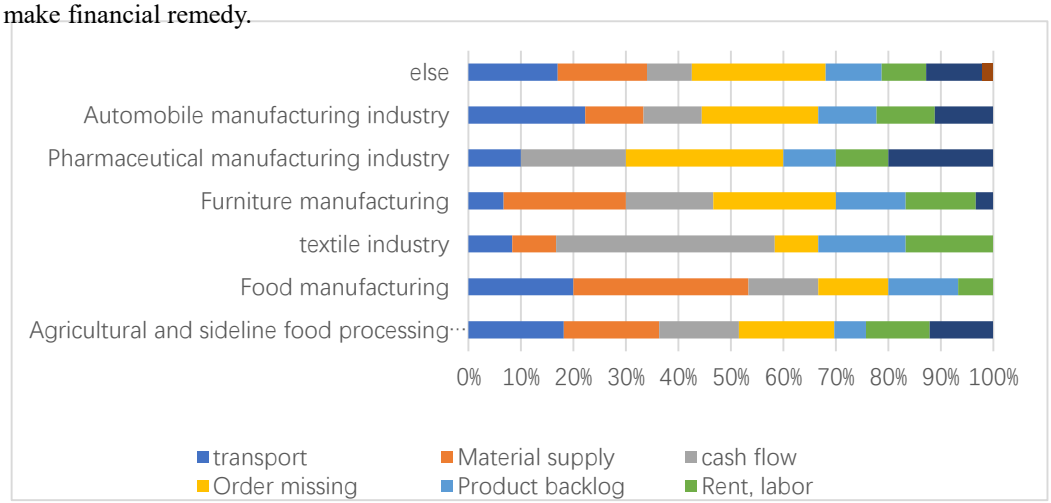

Figure 1 The Proportion of Problems in Different Types of Manufacturing

The following table 2 shows the distribution of the duration of the current manufacturing cash flow. We can see that under the original financial assistance policy, the fundamental problems of SMEs have not been effectively solved, and about 70% of SMEs still have serious capital problems. That's also shows that in the face of the outbreak of the epidemic, there is much space of improvement for the financial assistance mode of SMEs

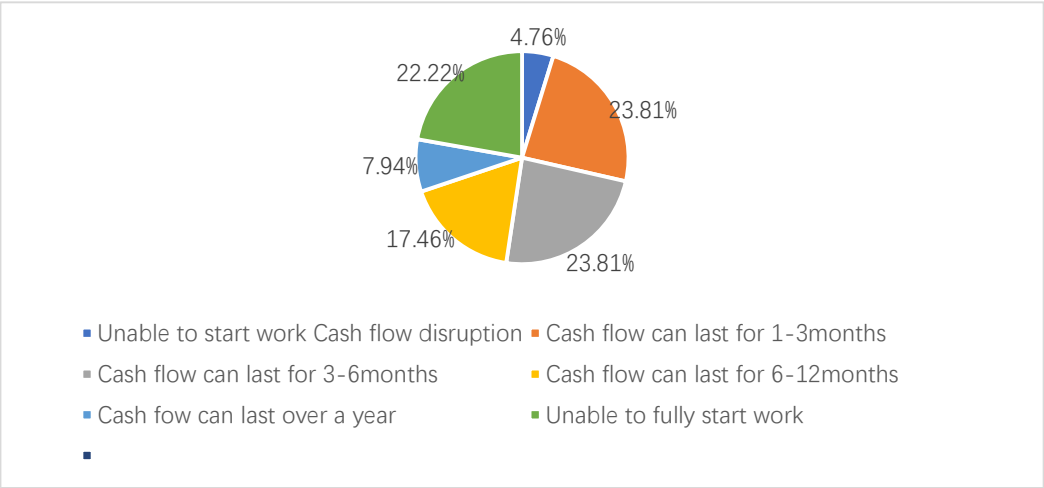

Figure 2 Cash Flow Situation of Enterprises

4.2 Analysis of a original and new financing problems

4.2.1 Decision Making Problem----the increase of financing risk leads to the financing parties not daring to raise funds

The importance of small and micro enterprises has been recognized by the society, but how to correctly position the policy and financial support is a difficult problem(Sina Finance and Economic,2020). First of all, small and medium-sized enterprises have small scale and poor individual guarantee ability, so they need to rely on the guarantee institutions established by the national government to provide guarantee

for them. Wang Jingren pointed out in the research that: the government has limited financial allocation for the guarantee agencies established by small and medium-sized enterprises,and there are some problems in the operation process, which also leads to the bank's low trust in the guarantee subject(Wang Jingren,2020) . Meanwhile, problems in the choice of guarantee will affect the profits of the bank itself.Carol Menon takes Italy's financial guarantee system as an example, concludes that the problems of guarantee will seriously affect the interests of both parts and the investment environment (Carol Menon,2020).Secondly, for the manufacturing enterprises that failed to start their own businesses for the first time, there are still "three no" problems: no statements, no credit rating, no mortgage, and lack of previous employment data to judge. It can be seen that even if there is guarantee from guarantee agencies, there still exist high risk in SMMEs' finance; at the same time, under the influence of the epidemic situation, the manufacturing industry is seriously constrained by insufficient demand and shutdown, leading to enterprises' activities cannot be guaranteed, which undoubtedly increases the financing risk and makes it more difficult to choose financing. This is the reason that financing parties dare not raise funds

4.2.2 Mode Problem: the decline of the stability of SMMEs itself leads to low financing efficiency

First, small and medium-sized manufacturing enterprises are small in scale, digital technology is not mature enough, and the sales chain is single, which makes it difficult to cope with changes. Second, the small scale of some manufacturing enterprises is related to the immature management mechanism and low degree of standardization(Gao Yujian,2020). Third, on the basis of the original low stability, they are faced with the significant impact of the epidemic situation, and almost produce and sell Every step of the process is blocked. Apart from the problem of financing by enterprises, it is also difficult to operate steadily after obtaining financing. Therefore, a single financing assistance cannot completely solve the current situation of small and medium-sized enterprises. We need to find a suitable way according to the actual situation and give diversified targeted assistance to manufacturing enterprises, so as to improve the stability of enterprise development after financing.

5 Analysis of Solutions

5.1 Decision making problems

5.1.1 Optimizing financing environment with national policies

From the perspective of the state, we can mainly improve the guarantee of small and medium-sized enterprises from the legal system. It is necessary for China's legislative authorities to clarify the responsibilities and obligations of SMEs, investors and guarantee agencies in the financing process of SMEs, safeguard the legitimate rights and interests of all parties, and then increase the illegal cost. While standardizing the behavior of SMEs,reduce the risk caused by their inability or deliberately not to repay the loan; At the same time, we also need to improve the guarantee evaluation system and increase the guarantee strength for the enterprises that are worthwhile. The improvement of guarantee quality can inject tranquilizers for financing enterprises. And the most important thing is that it can enhance the trust between the financing parties,and national interpersonal and institutional trust positively influences SME attitudes towards equity financing.(Michael Dowling,2020) Only when small and medium-sized enterprises dare to loan and financing enterprises dare to raise funds, can they increase the chances of their recovery.

5.1.2 Mega data analysis assist financing choice

In the era of mega data, we can make full use of the advantages of information tools, accurately predict the industry changes and market trends according to the leading indicators to make up for the lack of employment data(Sina Finance and Economic,2020); at the same time, the market trend of data analysis can also be used as a factor to select the most valuable financing industry, which is more efficient and feasible than relying solely on the experience of investment entrepreneurs

In addition to investors, small and medium-sized enterprises can also use digital technology to accumulate a large number of personal and enterprise behavior data. Through financial technology, the data can be transformed to help risk-control and credit-enhancement, so that SMEs can change into objects with credit evaluation and credit data from "three no" enterprises. As a result, the availability of corporate financing will be improved and financing channels will be enriched.

5.2 Mode problem

5.2.1 Analysis of the demand and status of manufacturing industry based on questionnaire

In the figure 3, the income of different types of manufacturing industry after the epidemic situation is compared with that of the same period last year, showing the approximate proportion of different financial status in different types of manufacturing

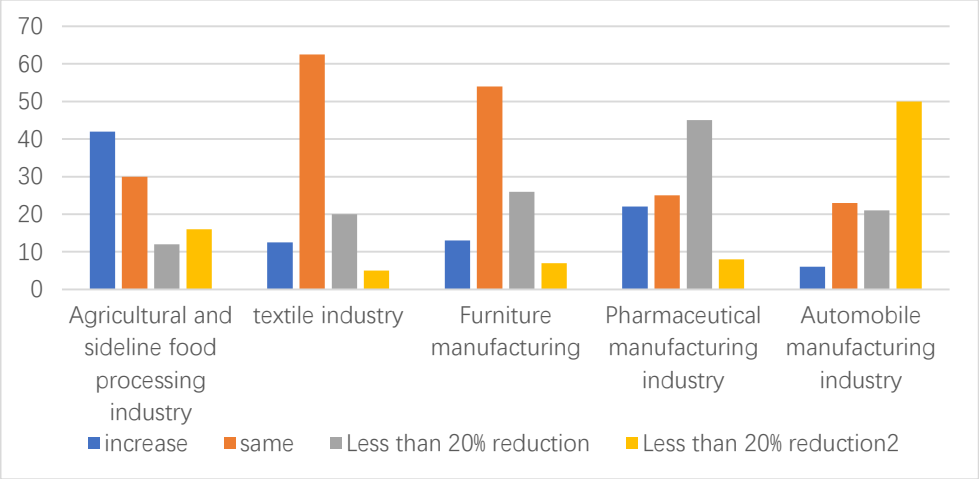

Figure 3 Comparison of the Income Situation after the Impact of the Epidemic Situation with that of the Same Period Last Year

It can be seen from the Figure 3 that the agricultural and sideline food and textile manufacturing industries related to daily life were less affected by the epidemic, and some of them had an increase in income; the total yield of the household manufacturing industry decreased by about 10%; the pharmaceutical manufacturing industry related to epidemic prevention and control had a huge demand during the epidemic period, but due to the limited staff, part of the pharmaceutical manufacturing industry was also impacted to a certain extent ,but is lower than the average level of the manufacturing industry; similarly, for the electronic equipment manufacturing industry, due to the increased demand for telecommuting and online commerce, the revenue has decreased by about 15%, which is also lower than the average decline of the manufacturing industry's profit(Yin Hong,2020).The small and medium-sized energy and material industries, such as automobile manufacturing and metal manufacturing industry, are most affected by the epidemic, and the total industry profit is lower due to technology constraints and the reduction was about 80%.

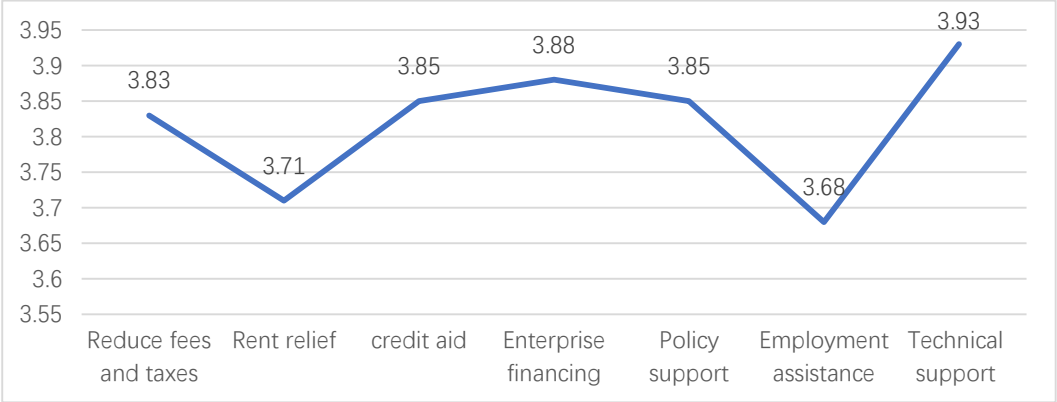

Figure 4 Average Score of Demand Degree of Assistance form (1 is the Least Degree, 5 is the Largest Degree)

According to the data analysis in Figure 3 and the line chart, we can see that, the need to help enterprises itself to solve the current problems mainly comes from two aspects.In addition to the financing needs of most enterprises, many manufacturing industries have a greater demand for the improvement of science and technology. If the development of an enterprise is compared to a train, then cash flow is the driving force, and advanced technology is a solid track. The construction of a good digital manufacturing chain can not only improve the manufacturing efficiency, save manpower and costs, but also reduce the incidence of risks caused by the lack of personnel management ability in small enterprises. Undoubtedly, it is a high-quality way to improve the stability of the development of manufacturing enterprises.

5.2.2 Solutions

According to the analysis of the above questionnaire results, it can be seen that technology and capital are important conditions to help small and medium-sized manufacturing industries to tide over the difficulties. How to combine the two to form an innovative assistance mode can be inspired by the wisdom scheme proposed by the "tongdun technology" on Xinhua. They put forward a way to build a platform based on the national government to solve the financing problem, formed a mode as "the government sets up the platform, the technology company builds the platform, and the small and medium-sized enterprises go to the platform" to help the small and medium-sized enterprises to finance.

Practice has proved that the way to build the platform is very efficient. Under the background of the outbreak of new coronavirus and the heavy damage of small and medium-sized enterprises, Yuhang District future science and technology city cooperate with “Tongdun Technology” to launch the "special edition of anti-epidemic products" and "special edition of equity investment" of small and medium-sized micro financial service platform. On the night of the launch of the innovation plate, more than 50 enterprises submitted financing demand applications, and completed a number of transactions within two days and the financing efficiency increased by 40%.(China Net,2020)

With this inspiration, we can also let investment and technology companies join the platform set up by the government organs. With the help of the platform mode, SMEs can solve the financing problems and improve the efficiency of assistance, and provide certain resources for improving the stability of SMEs at the same time. For small and medium-sized enterprises, they can make use of the advantages of the platform in data sharing, so that they can quickly find the technical support and financing support or other forms of support they need; for financial and technology companies, they can obtain more customers and reduce the cost of obtaining them.； Financial companies provide accurate credit services, save loan review time, control the non-performing loan rate, technology companies save matching time, find precise partners, and greatly improve the income of both sides. With the support of technology and capital, small and medium-sized manufacturing industry is more likely to develop steadily in the complicated post epidemic era.

6 Conclusion

In a word, in the post epidemic era, we need the cooperation of government agencies, technology companies, financial companies and SMEs themselves if we want to solve the problem of small and medium-sized manufacturing enterprises' assistance effectively, Only by making full use of the advantages of Big data Era and providing "financial plus" multi-dimensional assistance to small and medium-sized enterprises, can we help the development of small and medium-sized manufacturing industries fundamentally and lay a foundation for national economic recovery.

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Research on the Status Quo and Prospect of Manufacturing Industry in Innovation Corridor of Wuhan Optical Valley

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Abstract: By researching the innovation corridor of Wuhan Optical Valley, this paper discussed the pillar industries and spatial distribution of the manufacturing industry in Wuhan, Ezhou, Huangshi, and Huanggang. The possible problems encountered in the construction of this innovation corridor are also pointed out and analyzed. The establishment of a systematic plan for non-core carrying zone and making great use of innovation spillover are highly suggested to promote trans-regional development and cooperation.
Keywords: Innovation corridor; Optical valley; Wuhan; Manufacturing industry

1 Introduction

Nowadays the construction of innovation corridors in China is in full swing. The G60 science and innovation corridor in the Yangtze River Delta, the west corridor of Hangzhou, and the innovation corridor of Wuhan Optical Valley are all actively planned or under construction. However, the research on the innovation corridor is quite limited. According to the statistics of Wanfang data, only 286 academic papers with a keyword of innovation corridor are published by the end of September 2020. The research on the innovation corridor in China started in 2015 and increased gradually from 2017. Lan Xiaolin (2019) defined an innovation corridor as an axial area that integrated high-tech enterprises, talents, technology, information, capital, and other scientific innovation elements. Generally, innovation corridor, equipped with complex traffic arteries, can not only maintain the regional advantage, strengthen the regional resources and industrial base with all strength, but also integrate all kinds of resources, reduce the innovation "Islanding phenomenon" and further collaborative innovative cooperation among different regions, disciplines, and organizations. By studying the construction of the Ningbo innovation corridor, Wang Minrong (2017) pointed out the innovation corridor was usually featured by its advantageous regional layout, assembling of scientific and innovative elements, a superior basic condition for innovation, and so on. After carrying out a SWOT analysis of the G60 Science and innovation Corridor, Xiao Jian (2018) put forward two suggestions, namely deepening the mode of scientific and technological cooperation and optimizing the spatial layout of scientific and technological innovation.

At present, a large number of the existing academic papers take the G60 innovation corridor as the research subject, and there are relatively few relevant studies on the innovation corridor of Wuhan Optical Valley. So, this paper will take it as the research subject to probe into the current situation and development prospects of manufacturing industries in Wuhan Optical Valley innovation corridor.

2 The Status Quo of Manufacturing Industry in Innovation Corridor of Wuhan Optical Valley

Wuhan is an important industrial base in China with more than 30,000 manufacturing companies. High-tech industries in Wuhan are developing in step with traditional ones, and the city has a strong comprehensive supporting capacity. Meng Jian (2012) pointed out that Wuhan's manufacturing industry has gradually formed major advantageous industries such as steel, automobile, petrochemical industry, and electronic information after long-term development. As for the regional distribution of the manufacturing industry, steel and petrochemical industries are mainly distributed in Qingshan, automobile manufacturing industries mainly in Wuhan Economic and Technological Development Zone, and the optoelectronic information industry mainly in Donghu Development Zone.

On July 30, 2020, Wuhan East Lake High-tech Zone officially released the *An Overall Development Plan of the Core Carrying Zone in Optical Valley Innovation Corridor*, which created the blueprint for optical Valley's innovative development in the next 30 years. Through setting an innovation pattern in Hubei province, this overall development plan promotes the coordinated development among Wuhan, Ezhou, Huangshi, Huanggang, four cities linked by the Optical Valley innovation corridor. The Optical

Valley innovation corridor runs through Wuhan, Ezhou, Huangshi, Huanggang, and other counties and cities. It starts from Wuchang, Hongshan, and other resource-intensive areas of Wuhan in the west, and then extends eastward to Ezhou, Xianning, Huangshi, Huanggang, and other scientific and technological industry cluster areas to create a gradient development pattern with a three-level coordinated development from basic research, technology innovation to industrialization. In the innovation corridor, the Optical Valley is the core carrying zone.

Ezhou, adjacent to The Donghu New Technology Development Zone, is rich in mineral resources. Its proven reserves of iron ore rank the second place in Hubei Province, and its proven reserves of 31 kinds of non-metallic minerals, such as bentonite and perlite, rank the first place in the province. Therefore, it is crowned as a “cornucopia” in eastern Hubei province. With the abundant resources as the foundation of its development, Ezhou has formed a metallurgical industry cluster from iron ore mining to iron and steel smelting. In recent years, Ezhou attaches equal importance to expanding the total quantity and optimizing the industrial structure. It has initially formed five leading advantageous industries with a unique feature, namely bio-medicine, new energy, and new materials, electronic information, high-end equipment manufacturing, and modern service industry (Ge Jun, 2019).

Huanggang and Huangshi are two cities in the middle reaches of the Yangtze River. After long term development and cooperation, their industries with unique advantages have already begun to emerge. Huanggang has formed an industrial structure dominated by building materials industry, food and beverage industry, pharmaceutical chemicals industry, textile and garment industry. While Huangshi also takes non-ferrous metals industry, equipment manufacturing industry, building materials industry, pharmaceutical chemicals industry, textile and garment industry as its pillar industries.

Wuhan, Ezhou, Huangshi, and Huanggang have different advantages in their own industries, and at the same time those pillar industries can in turn fit in with the characteristics of each city. With the further integration of transportation in Wuhan city circle, cities along the innovation corridor and the surrounding areas can realize their coordinated development along with Wuhan Optical Valley. Thus trans-regional cooperation and collaborative innovation can be promoted to realize the scientific and technological development in Optical Valley. In the long run, the development of high and new technology industry in Hubei province can also be accelerated.

3 The Existing Problems and Future Prospect

Currently, the innovation corridor in Wuhan Optical Valley will take Optical Valley as the core carrying zone. The core carrying zone will learn from the previous construction experience of world-renowned innovation corridors to build a new "1133" innovative spatial layout. The surrounding cities and areas can realize advantageous complementarities and promote common development along with the core carrying zone. However, due to its spontaneity and trans-regional characteristics, this kind of trans-regional cooperation will also face many problems.

First of all, the Optical Valley innovation corridor is an innovation belt along the core carrying zone. It is expected to build 15 major innovation platforms and supporting parks, and to approve 46 technology innovation projects for key enterprises in the future. However, at present, there is a lack of systematic planning and guidance on how to realize trans-regional collaborative development in other areas outside or radiated by the core carrying zone.

At present, the Optical Valley innovation corridor mainly involves counties and cities in Hubei Province. In the long run, there will probably be more members to join the innovation corridor in order to seek deeper cooperation and further development, then systematic planning and guidance especially for areas outside the core carrying zone will be indispensable. Therefore, a set of development plans need to be formulated targeting both the core carrying zone and the non-core carrying zone.

Second, how to deal with the huge differences in economic and technological development among regions and how to make those differences a boost rather than a hindrance to trans-regional cooperation are some critical questions to answer. Take Wuhan, Ezhou, Huangshi, and Huanggang, four cities mentioned in *An Overall Development Plan of the Core Carrying Zone in Optical Valley Innovation Corridor*, for example, these four cities have huge differences in industrial development. As shown in Figure 1 and Figure 2, in 2018, there were 2651 industrial enterprises (above designated size) in Wuhan, 499 in Ezhou, 311 in Huangshi, and 116 in Huanggang. From 2016 to 2017, there was a rapid growth in the total number of industrial enterprises in Wuhan, but as for Ezhou, Huangshi, and Huanggang, the number almost remained unchanged. From 2013 to 2016, The total industrial output value of enterprises above designated size in Wuhan is more than the sum of those in Ezhou, Huangshi, and Huanggang.

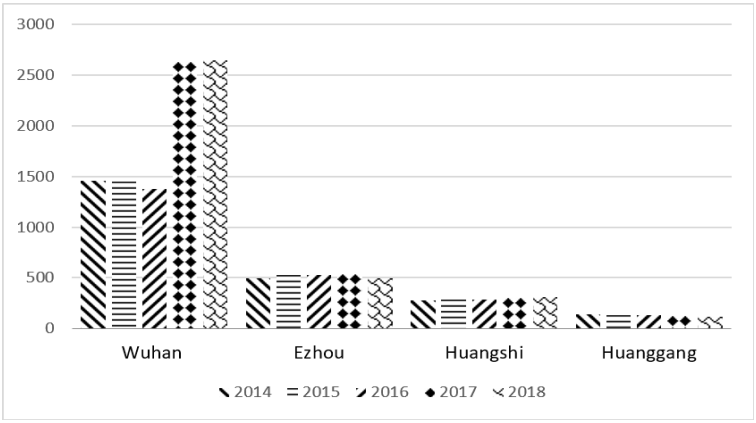

Figure 1 Number of Industrial Enterprises above Designated Size (Municipal District)

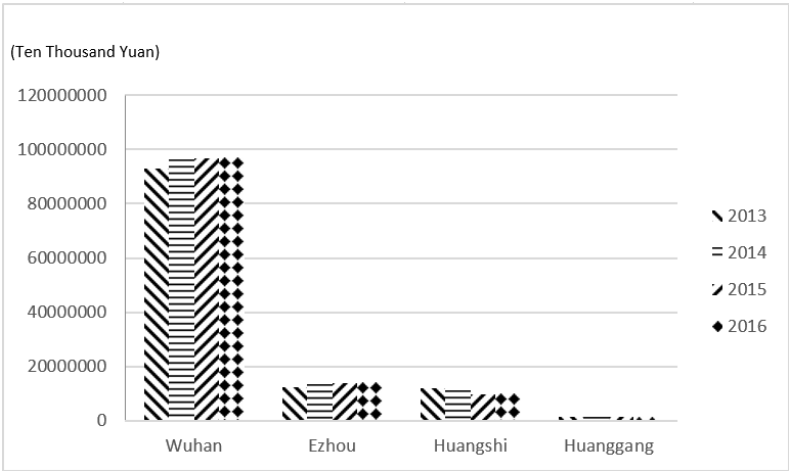

Figure 2 Total Industrial Output Value of Enterprises above Designated Size(Municipal District)

Although this huge difference in economic and technological development prevents a large number of innovation benefits flowing from the core carrying zone to other non-innovation subjects in the form of spillovers, the benefits of such trans-regional cooperation have been quite obvious. The benefits of the spillover effect can be used to promote trans-regional cooperation so that the core carrying zone can truly lead the direction of the collaborative development along the innovation corridor.

4 Conclusion

This paper discussed the pillar industries and spatial distribution of the manufacturing industry in Wuhan, Ezhou, Huangshi, and Huanggang. Although there is a huge difference in economic and technological development in the four cities, the benefits of such trans-regional cooperation have been quite obvious in the name of innovation spillovers. In order to promote the trans-regional cooperation, the establishment of a systematic plan for non-core carrying zone is highly suggested.

Acknowledgement

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Blockchain Technology and the Impact on Business Models

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Abstract: Blockchain is an innovative technology, which emerged in 2008 and presents important possibilities for application. Thus, this article aims to analyze the main characteristics, of the business models, the companies that use the blockchain. To this end, a survey was carried out based on Crunchbase, which is a market intelligence platform. Resulting in a sample of 48 companies more relevant according to the site. The next step was to make a content analysis, with the help of the Iramuteq software, of the material collected on the websites of these companies. As a result of the process, three classes of business blockchain impact were found: a distributed value structure, a governance structure, and an application structure aimed at encrypted and tokens.
Keywords: Blockchain technology; Business model; Trust; Value; Innovation

1 Introduction

The accelerated advance of technology, especially in the last decade, led to important transformations for organizations. With the emergence of the Internet, were born the "companys.com" whit models very profitable and different from traditional industries (Dasilva; Trkman, 2013). Making the discussion about business models a great topic for research about how organizations behave in the face of innovation and technological adoption processes (Botsman, 2018).

Blockchain technology emerged with the publication of Satoshi Nakamoto, about Bitcoin (Nakamoto 2008). Being the platform behind cryptocurrency, it can be defined as a distributed database (peer-to-peer), which operates through consensus of the network participants, and is able to record the entire history of exchanges, in order to guarantee data integrity and immutability (Bano et al., 2017). Making this technology relevant for many applications like the production of products and services (Hughes et al, 2019). In addition, technology is important to the other fronts of digital transformation, such as IoT (Internet of Things), Industry 4.0, and AI (Artificial Intelligence).

The application possibilities, they extend to various sectors of activity and interest to society (Tapscott; Tapscott, 2017). Standing out the process of disintermediation of the platform, in the consensus of the network (Muzammal, Qu, Nasrulin, 2019). According to Deloitte's annual report (Deloitte, 2019), which captures a perception of 1,386 leaders of organizations in 12 countries, there is a focus on understanding how this technology can impact the generation of advantages for the business model and the value chain, increasing security and mitigating operational risks. Making blockchain relevant to issues of seeking competitive advantage and innovation through technological adoption (Grayher; Klein; Prinz, 2018).

2 Theoretical Reference

The Blockchain emerged in 2008 with the publication of Satoshi Nakamoto about the cryptocurrency Bitcoin (Nakamoto, 2008). The platform is a peer-to-peer database whit works basically in some stages: 1) the beginning is a value proposition of the operation with basic registration information; 2) then a signature is assigned to each hash; 3) with transmission to the computer network that initiates the consensus process, 4) with subsequent authentication and completion of the transfer through the chaining of a new block, 5) in the historical chain of operation (Morkunas, Paschen, Boon, 2019).

Also, the technology consists of four layers that must be executed in synchronicity, they are: I) transfers between "network nodes", that is, transfers of assets (physical or digital) between the participants; II) a search for consensus with verification of transparency and credibility of the transaction, such as, for example, the Bitcoin "proof of work"; III) a computer interface where smart contracts operate; IV) and finally, a governance layer, which deals with aspects related to human interactions, social processes and how various actors produced and altered the entry of information within the blockchain (Casino, Dasaklis, Patsakis, 2019).

Swan (2015), offers three moments of technology maturity, the first phase of the so-called

"blockchain 1.0" marked by the emergence of Bitcoin and other cryptocurrencies, and which focuses on the applications of financial statistics and digital payment. The second phase, "blockchain 2.0", with the emergence of Ethereum (2014) and the smart contracts, increasing the level of applications of finance, such as the registration of securities, discounts, contracts, and actions. Making the use of platform more value. Since then, we walk, to so-called “blockchain 3.0” with the focus of applications aimed at various areas of interest to society, such as, for example, health, education, agriculture, supply chain, among others. It is important to note that blockchain technology presents challenges in its development process. In aspects like, such as the processing time during the network consensus, which requires high energy consumption. Another challenge is scalability issues in the integration with other technologies, like the IoT (Internet of Things) due to the interaction with low computational and energy capacity devices (Atzori, 2017). Also is important to comment about the need for institutional innovations for the use of blockchain, whit systems that are more open to transparency and information governance (Tapscott, Tapscott, 2017).

3 Methodology

This is an exploratory study that seeks to contribute to the discussion about blockchain and business models. For this proposal, it was searched the base of Crunchbase the 50 more relevant companies in the blockchain category. The final sample was composed for 48 companies because the website of two were inactive. Using Iramuteq software, were make textual analysis whit the Descending Hierarchical Classification process to classification the emerging themes.

4 Results and Discussion

The 48 selected companies are private (for-profit) and were classified according to 9 sectors of activity (Table 1). The first identification was the finance sector which encompasses activities aimed at cryptocurrency trading, lending, investments, and portfolio management with blockchain. This is also the sector with the highest technology maturity and the highest concentration in the companies’ sample. Highlighting initiatives such as liquidity on demand, reduction of transaction costs, and extinction of fees (companies Ripple and Terra). In information security sector, which is the second most significant of the sample, the activities are focused on cybersecurity, data resources, online privacy preservation, and identity protection through blockchain. Examples of companies are i2Chain, NuCypher, and Ledger.

Table 1 Distribution of Companies according to Identified Sectors of Activity

Sector	Number of companies	(%)
Finance	23	48%
Information security	9	19%
Media	6	13%
Information management	3	6%
Integration with other technologies	3	6%
Mining	1	2%
Biotechnology	1	2%
Governance	1	2%
Energy	1	2%
Total	**48**	**100%**

In the media sector, there are applications for the validation of streaming music services, management of advertisements on websites, game development, and platforms for sports betting. Companies like Viberate stand out in the sector for connecting events, fans, and artists in a distributed way. In the information management sector, activities related to data organization and storage are observed. As is the case with Acronis, which focuses on cyber backup and protection and Elementus with its search engines indexed to the blockchain.

Another sector identified was integration with other technologies, such as solutions to connect devices (Helium company) and management of cryptographic keys and identities (Ockam company). In the mining sector are the infrastructure activities (equipment) to processing of the blockchain network. The company Bitfury stands out with the various hardware it develops in the segment. The biotechnology

sector deals with the management of personal genomic data in a distributed way (company Nebula). And the governance sector presents applications aimed at the management of crypto assets, such as accounting and audit of digital assets (company Verady). Finally, the energy sector encompasses energy information management with blockchain (Via company).

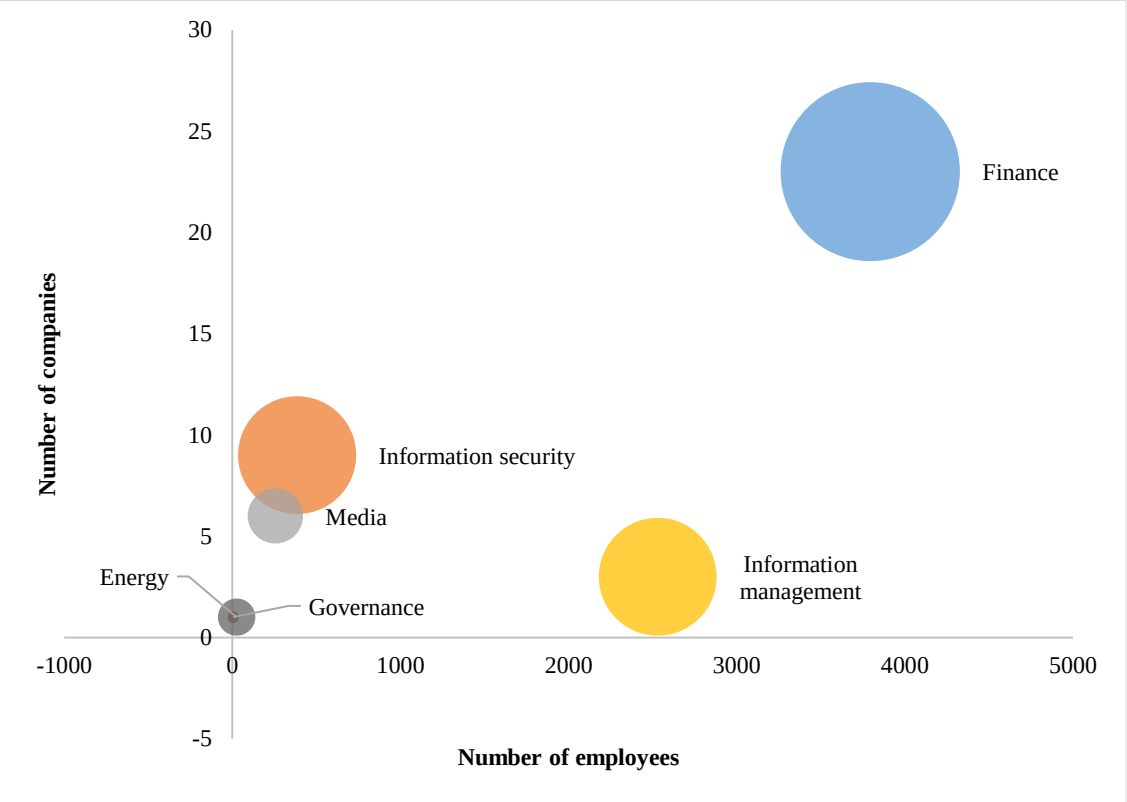

Figure 1 Distribution of the Sectors of Activity of the Companies

Is observed diversification of applications of blockchain in the ripening of the phases proposed by Swan (2015), where "blockchain 3.0" has the objective of attending Solutions aimed at different demands of society, such as governance and energy management for example. Regarding the geographic distribution of companies, 71% is in America, 25% in Europe and 4% in Asia. Based on the information on the billing range, the number of employees, and the concentration of the companies, Figure 1 was elaborated, in which it is possible to visualize the representation of this distribution. It is worth mentioning that, due to the unavailability of information about the number of employees and billing about all companies, the graphic representation of the sample is 90% (n = 43), disregarding the areas of mining, biotechnology, and integration with other technologies.

The finance sector is the largest and most profitable of all. Both in the maturity of the technology as in return and market value. In parallel, the sectors of management and information security get closer in terms of revenues. Also, the media sector has a median revenue range. Finally, the governance and energy sectors are closer in terms of the concentration of the number of companies.

Through lexical analysis, performed with Iramuteq software found a textual corpus composed of 48 texts (UCI), with 1,202 usable segments (75.88%), of a total of 1,584 segments. Indicating a significant sample, which representativeness greater the 70%. Also, there were found 5,710 occurrences, 4,303 forms, and 3,361 forms that appear only once in the entire body of the text (hapax). It was possible to identify the distribution of companies according to emerging classes of the textual corpus and x^2 (chi-square), according to the frequency of identified forms (Figure 2). Being that companies that most stood out in the Cartesian plan were: Evernym (class 1, $X^2 = 99.44$); PeerNova (class 2, $X^2 = 95.29$); ZenSports (class 3, $X^2 = 70.65$); Bitwala (class 3, $X^2 = 67.86$) and CryptoKitties (class 3, $X^2 = 66.67$).

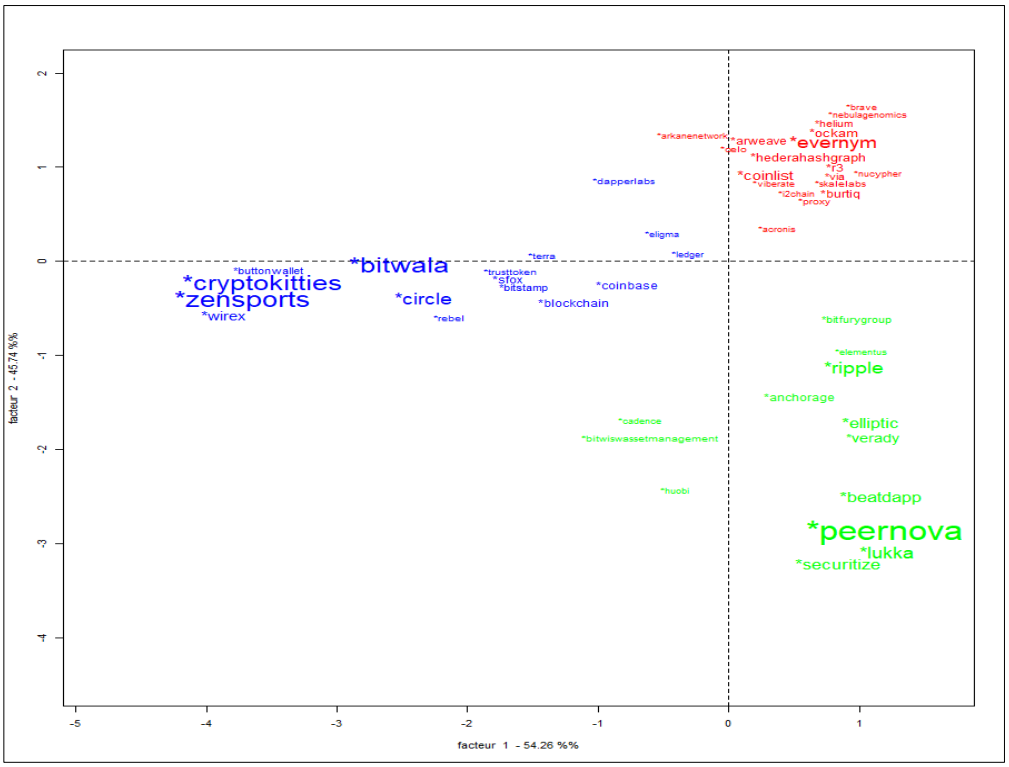

Figure 2 Distribution of Companies by Classes Emerging from the Textual Corpus

Class 1 was named "Value structure" and is formed by companies with red color in Figure 1. This class is the more representative of the sample (57.8%) and deals with blockchain as a platform that enables the connection between people and companies in a decentralized network of value. When considering the p-value (<0.05), of this class, we have as an example the Hedera company and your proof of participation for the blockchain network.

Class 2 was called “Governance structure” and is formed by companies with green color in Figure 1. This class represents 21.6% of the total approved text items. And talks about the centrality of data and assets in the blockchain, as well as the search for transparency and compliance of processes. Also, talks about regulatory issues arise for institutions, minimizing risks and costs. In this class, the companies that stand out are Bitwise that offers cryptography funds and Bitfury has created a leadership council of several organizations focused on the integrity of management for the blockchain.

Class 3 was named “Structure of crypto-actives” and is formed by the companies with blue color in Figure 1. This class represents 20.55% of the total text segments used. And talks about applications and solutions aimed at blockchain assets, especially cryptocurrencies. Highlighting for the management of tokens and digital currencies. A company that stands out in this group is Trusttoken, which is a tokenization platform for various assets. And the company Coinbase, where is possible to create a wallet that manages collectible tokens.

5 Conclusion

The Blockchain technology, it is recent and extremely innovative with your distribution structure (peer-to-peer) and capacity of historical record keeping. Through content analysis, using the Iramuteq software, we identified 3 emerging classes: structures of value, governance, and “crypto-actives”. The main contribution of the research is to contribute to the deepening of discussion about the impact of blockchain for business. It is worth mentioning, the results found should not be generalized, but they contribute to the advancement of the field, mainly from the point of view of scarce literature, for a relationship between business models and blockchain. Another important issue of the study is to observe the advancement of "blockchain 3.0", in all layers of research carried out. For example, in the management of genetic information, public transport, integration with smart devices, among others.

Research does not seek to generate conclusive results, but to collaborate with the advancement of

discussions on the theme. As future development is suggested the deepening of the results, through interviews with managers and specialists on the topic. Where the Delphi method can be applied, with rounds of interviews with the leadership of these companies. It would also be interesting to expand the size of the companies' sample. About survey limitations: use a single database to choose the sample (Crunchbase) and unavailability of access to some information even with the platform's Pro subscription.

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Professional Skills of the future for Startups in São Paulo

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Abstract: The accelerated technological advancement has rapidly changed business models and the way companies think. In less than a century, we went through three industrial revolutions, which completely changed the panorama of the competences expected from an employee. In addition, the horizontal management models practiced by startups and their formula for accelerated growth meant that the skills from the beginning of the last century were no longer a reference today. The managers state that the jobs and companies of the future have not yet been created, working with the perspective of uncertainty and accelerated changes. These factors explain the need to understand what will be necessary for a worker to be considered qualified in the future. With that been said, the question of this research is "What are the important skills for startups to meet their requirements in 2025?". For that, we have chosen for a qualitative and exploratory research, given the lack of a theoretical framework on the theme. The result indicates that the skills demanded by startups are related to human skills, which are made up of actions such as initiative, creativity, solving complex problems, innovation and active learning.
Keywords: Competence; Startups; Entrepreneurship

1 Introduction

The work environment has been changing due to new technologies, forms of production, services and business models. These changes require companies to acquire new skills to remain competitive. This phenomenon has been observed during the last four Industrial Revolutions. In the First Revolution, it was necessary for workers to move from artisanal work to more technical functions in large factories (Schwab, 2016; Oliveira, 2004). In the second one, due to the advance of electric energy and the combustion engine, the assembly line and mass production began, and the work became more technical and repetitive (Oliveira, 2004). With the advancement of computing, the third Revolution went through phases such as production automation, personal computing, the Internet and the implementation of new organizational models, which led employees to develop skills such as greater proactivity and creativity (Schwab, 2016; Silva, Silva, & Gomes, 2002). The Fourth Industrial Revolution was marked by the digitalization, automating processes and the usage of artificial intelligence, arising in the needs of multidisciplinary professionals and the ability to interact with groups of people (Schwab, 2016).

Thus, it is noticed that industrial revolutions are linked to technological advances, which change the way of production, organization, skills and how the market flows. With the ongoing technological advances, changes in the economic scenario and competitiveness in the market, companies started to search for ways to stand out from others, either through lower costs, new business models or new products/services (Mintzberg & Quinn, 2001). As a result of this high competitiveness and search to stand out in the market, Startups emerged. These are defined as young companies that, through innovation and constant research for the ideal business model, aim to become scalable quickly, that is, grow steadily, operating in environments of extreme uncertainty and, in most cases, with small capital (Andrade, Granata, & Silva, 2017; Ries 2012).

It is observed that the skills have changed and continue to change according to the needs of the market and the evolution of technologies. These needs, in addition to the high competitiveness, establish the constant search for resources to stand out among the competitors. This reality is even more accentuated for startups, once its main characteristics are the search for different market through innovation, technology and constant change of the business structure in an accelerated way, using qualified labor to meet its profile. With this scenario, the objective of the research was to understand the reality of the labor market from startups, to verify what their characteristics and challenges are, to identify what the skills required to work in this type of company are and what the profile of new talents to meet future requirements is. To this end, the following research question was elaborated: “What are the skills that startups understand that will be important to meet their requirements in 2025?”

2 Theoretical Review

2.1 Concepts and definitions of Startups

According to Andrade, Granata and Silva (2017), the term startup started to be used in the period from 1996 to 2001, in the so-called "internet of bubble" or "bubble companies dot com", which was characterized by a high variation in the stock market motivated by companies related to technology and communication. "Bubble" refers to the fact that bubbles have a high capacity for growth, as well as the high probability of popping. The term Startup is used to designate newly created profitable companies with innovative business models in any area or industry (Ries, 2012). The Brazilian Micro and Small Business Support Service (SEBRAE) (2012), on the other hand, believes that startups are companies with a high degree of influence in the development of technological capabilities and economic advances, in search of new business models. Despite the various interpretations, the concepts start from an idea related to a young company in the market, with a technological and innovative vision, operating in environments of extreme uncertainty.

Nowadays, the startup concept is recognized worldwide as having great importance in the market when it comes to innovation. One of the main points that make startups so efficient and innovative is the freedom they have to carry out their projects, without having to go through long bureaucratic processes. In addition, they usually reassess the process several times, until they find a model that presents the best possible results (Blank and Dorf, 2014).

2.2 Challenges faced by startups

Despite the characteristics of scaled up results, or ever growing results, startups have limited time and financial resources (Giardino, Wang, & Abrahamsson, 2014). According to Ries (2012), they are in an environment of uncertainty, they are new and still do not know who their customers are, being very difficult to have an accurate planning without adaptations in the future to be developed.

Another major challenge for startups, related to investors, is the lack of guarantees. Dornelas (2008) places as important barriers related to investments by startups: the economic situation in Brazil, an unstable market and high tax rates. According to SEBRAE (2017), the startup environment has four major challenges: an unstable market, influencing both in processes and capital collection; generating value, which is the ability to transform time and resources spent into money; being able to deliver a product on a large scale; and be scalable, quickly increasing revenue while costs increase more slowly. Nogueira and Oliveira (2015) point out three aspects that influence the mortality of startups in Brazil: the number of partners, the volume of capital invested and their place of installation. According to AgTech Startups Brasil (2019), 80% of startups consider raising capital for the development of their businesses as the biggest challenge. In this context, it is clear that the main challenges for startups are limited time and resources (Giardino, Wang and Abrahamsson, 2014), lack of business maturity (Ries, 2012), investment funds (Dornelas, 2008; AgTech Startups Brasil, 2019), an environment of uncertainty (Ries, 2012, Dornelas, 2008, SEBRAE, 2017), value generation; becoming scalable and financially profitable (SEBRAE, 2017).

Despite the challenges faced by startups, according to SEBRAE (2012), they are essential for the economy of Brazil, as they require little initial capital and are linked to innovation. For Ries (2012), there is an increase in technology-based companies and in the field of Information and Communication Technology (ICT). Consequently, it increases the number of Startups in the market.

2.3 Definition of skills' concepts

According to Fleury and Fleury (2001), the definition of competence is attributed to the ability or aptitude to perform an action, which is not limited to the theoretical and empirical knowledge attributed to the tasks. For Dutra (2004) there are two types of competences, general and specific. General competences are "common" characteristics, attributed to any employee of the company. In addition, specific ones are defined for each sector of the company.

2.4 Evolution of professional skills linked to industrial revolutions

To address the professional skills of the future, it is essential to detail the evolution of the work models inserted in each Industrial Revolution. According to Cavalcante and Silva (2011) the First Industrial Revolution began to happen in the textile industry and was the great precursor of capitalism. With the transition from the artisanal production system to the factory, an alienation process of the professional started to happen, because even the artisans who wanted to remain with their manufactures could not compete with the industry, due to the ability to produce on a large scale and at lower prices, forcing them to be subordinated to industry. The Second Industrial Revolution, like the first, was marked by technical innovations, with the discovery of electricity, the transformation of iron into steel, the development in communication and chemical industry, the new means of transportation and organizational models (Fordism and Taylorism). These changes brought social, political and cultural implications, leading to insecurities and changes in the power society relations (Oliveira, 2004). The

Third Industrial Revolution was fostered by the creation of the internet and technological advancement, and for that reason, it was called digital revolution. During this period, the automation of production, creation of the personal computer, internet, and implementation of new organizational models appeared, which required the requalification of professionals and led them to develop skills such as greater proactivity and creativity (Schwab, 2016).

According to Schwab (2016), the Fourth Industrial Revolution or industry 4.0 is based on the digital revolution, with the usage of technologies such as Artificial Intelligence (AI), machine learning, Internet of Things, 3D printing, nanotechnology, biotechnology, science of new materials, quantum computing, autonomous vehicles, robotics, all of connected to things and people over the internet. It will affect humanity like no other revolution has done, according to its scale, breadth and depth, systemic impact and interaction among the physical, digital and biological domains. This transformation has been happening since the beginning of the century and has already started to affect the way we relate, do business, produce and live.

For Silva, Silva and Gomes (2002) the new organizational models, together with technological innovations, require a new professional profile, with new knowledge, versatility requirement, greater proactivity and creativity. The World Economic Forum - WEF (2016) emphasizes this change in business models and the demand for new skills and competences, due to the transformations of industries, associated with fast development of technology, demography and socio-economic disturbances. Table 1 shows a list of the skills demanded in 2018, the trends of skills demanded and those not demanded in 2022. From the skills demanded in 2022, 8 are listed in 2018, with the exception of the skills "Technology design and programming" and "Analysis and systems assessment", which according to WEF (2018) highlight the growing demand for skills related to technology.

Table 1 Skills Demanded and not Demanded in 2018 and 2022

Demanded skills in 2018	Trends of skills demanded in 2022	Skills trends that will be declining by 2022
Analytical thinking and innovation	Analytical thinking and innovation	Manual dexterity, endurance and precision
Complex problem-solving	Active learning and learning strategies	Memory, verbal, auditory and spatial abilities
Critical thinking and analysis	Creativity, originality and initiative	Management of financial, material resources
Active learning and learning strategies	Technology design and programming	Technology installation and maintenance
Creativity, originality and initiative	Critical thinking and analysis	Reading, writing, math and active listening
Attention to detail, trustworthiness	Complex problem-solving	Management of personnel
Emotional intelligence	Leadership and social influence	Quality control and safety awareness
Reasoning, problem-solving and ideation	Emotional intelligence	Coordination and time management
Leadership and social influence	Reasoning, problem-solving and ideation	Visual, auditory and speech abilities
Coordination and time management	Systems analysis and evaluation	Technology use, monitoring and control

Source: WEF (2018)

It may be observed that throughout history, physical and manual skills are being migrating to basic cognitive skills.

3 Methodology

This article was developed based on an exploratory qualitative research, which aims to obtain data on what the professional skills of the future needed for Startups are to remain competitive in the face of market changes. An exploratory research, according to Vergara (2014), addresses themes and subjects with little accumulated knowledge. According to Gil (2012), an exploratory research aims to bring the researcher closer to the topic,

generating greater familiarity, so that it is possible to raise hypotheses. For Gil (2012), qualitative analysis depends on some factors, such as data collection, research instruments and sample size, as it seeks to understand the motivation of the actors involved.

Data collection was carried out through a structured questionnaire, consisting mostly of open questions, so that the motivation and insights of the interviewees could be captured. The questionnaire presented a descriptive content, orientation on the correct way to answer, and the term of guarantee of data confidentiality, following the main characteristics of a qualitative research. The survey was conducted electronically, sent via social networks (LinkedIn and WhatsApp), and aimed at founders, leaders and managers of Startups. For Creswell (2010), the data collection of a qualitative research is performed by an intentional sampling, for which the individuals are selected because they have experience with the main phenomenon. In the treatment of data, the technique of content analysis was used to understand what is being said on the subject (According to Vergara, 2014). Thus, patterns were identified, relating the results of the research in two categories of analysis, created from the theoretical reference: first, challenges of startups, and second evolution of skills. The first category was discussed in the light of its two subcategories: challenges of the business model and challenges of hiring employees. The second was divided into three subcategories: competences of the past, current time and future.

4 Presentation and Discussion of Results

For the presentation and discussion of the results, categories and subcategories were retrieved as presented in the methodology. The survey obtained 46 responses, however, only 23 were eligible, due to the middle or senior managerial position in startup requirement from interviewees.

4.1 Category 1: challenges at startups

According to Nogueira and Oliveira (2015), startups face great risks and challenges, due to their innovative nature from their business conception and the requirement for exponential growth. For the first subcategory, challenges of the business model, the results show that the two most mentioned challenges were the difficulties to hire and maintain a team of employees and capital and sales scale to maintain the startup's profitability, with 65% recurrence, each. Being scalable is one of the most important characteristics for startups, since they are looking for a business model that is profitable, repeatable of low cost (SEBRAE, 2017). When thinking about capital, according to ABStartup (2017), this is the biggest challenge facing startups, along with legal issues. However, in this research, legal issues were remembered by only 2 respondents. The third most recurrent challenge according to the answers of interviewees' speech was related to marketing, such as attracting and retaining customers and proposing an appropriate value to the market – these appeared in 43% of the responses. The challenges, such as corporate relations and the ability to develop the business, appeared only once in the results and are linked to soft skills. The second subcategory approached what the challenges found in the talent hiring process are. It is interesting to notice that the lack of financial resources and the lack of qualified labor are cited as the main obstacles in the formation of a talent team. Following, a dispute over talent in the market and a lack of confidence in the company's future were identified, as can be seen in the answers of two of the interviewees, it is difficult to find future employees "who believe in startups", as well as "[..] retain them after they start receiving several other proposals [...]''. The research shows that due to the lack of capital, most companies do not have an HR sector specialized in hiring and retaining talent, finding it difficult to "find and effectively measure that a person fits in the position during the selection process [...]", according to another interviewee. Another very mentioned challenge was the lack of qualifications found in the market, especially those related to soft skills issues, such as having "agility in mindset and openness to rapid changes", according to another manager. These qualities are very important, since startups deal directly with innovation and have the need to undergo several adaptations during the search for their ideal business model (ABStartup, 2017).

4.2 Category 2: skills development

To carry out the analysis of competences and their evolution, it was first asked what the most relevant skills in the current selection process were. In this case, in addition to the 10 skills taken from table 1, the interviewee could add other skills, which he/she deemed important, and give weights from 0 to 5 for each. The result showed that the 10 "Skills Demanded in 2018", listed by WEF (2018), are very similar to those found in this survey, as they were all among the 11 most important skills for interviewees. It is noteworthy that in addition to these 10 skills, the "Technology and programming design" was added, among the 11 most important skills demanded for 2019 in this research. Regarding the skills that they considered important in the process of selecting new talents, not listed in the questionnaire, 43.5% of the interviewees added some. Among the most outstanding skills are resilience and the ability to work as a team. In addition to these two, the "owner spirit", knowing how to seek and receive mentoring, leadership and ability to recognize and learn from error, were listed among the soft skills

(human skills) required in the selection process today. Among the hard skills (technical skills) the knowledge in analytical programming, agile methodologies and the formation of squads were added.

According to Schwab (2016) the Fourth Industrial Revolution differs from the other Revolutions, due to three factors: systemic impact, breadth and depth, and velocity. The rhythms of growth have changed, due to the interconnection of the world and the new technologies that generate other technologies, and which are increasingly improved and competent. So, growth has gone from linear to exponential level. This supports the fact that 82.6% of the interviewees believe that the skills of their employees should undergo a transformation process to guarantee the success of their company in 2025, and 95.7% that their company will not act in the same way this year.

Table 2 shows the skills that startup managers believe will be important in the future, in order of importance. In order to carry out this analysis, the score that each interviewee attributed to the skills was added. From this, a change in the order was identified in relation to the skills required in the present and those that will be required in the future, with "Creativity, originality and initiative" being more relevant, which were found in the 5th position of the skills required in the present. According to Dutra (2004), due to technological innovations a new professional profile is needed for organizations, which make up multifunctionality, new knowledge, proactivity/initiative and creativity. According to the profile mentioned by the author, these skills will be required by managers in the seek for success in 2025 at their startups.

Table 2 Desired Skill for 2025 by Startups

Skills	Sum of Note
Creativity, originality and initiative	92
Analytical thinking and innovation	91
Complex problem-solving	90
Active learning and learning strategies	90
Emotional intelligence	86
Critical thinking and analysis	82
Reasoning, problem-solving and ideation	79
Attention to detail, trustworthiness	74
Coordination and time management	73
Leadership and social influence	72
Management of personnel	70
Reading, writing, math and active listening	67
Technology design and programming	65
Quality control and safety awareness	61
Systems analysis and evaluation	60
Technology use, monitoring and control	59
Management of financial, material resources	58
Visual, auditory and speech skills	57
Technology installation and maintenance	54
Manual dexterity, endurance and precision	43
Memory, verbal, auditory and spatial skills	43

In an uncertain scenario, in which startups by interviews cannot imagine what will be happening in six years, but they mostly imagine that they will not be operating in the same way as today, it seems natural that creativity,

originality and initiative; analytical thinking and innovation; active learning and learning strategies; and emotional intelligence are the five sets of skills and aptitudes most valued for 2025 by startups managers. On the other hand, skills such as manual dexterity, endurance and precision, memory, verbal, auditory and spatial skills, technology installation and maintenance do not have much added value for managers, due to the scenario of fast technological changes and the increasingly usage of technology to assist and/or replace human labor.

5 Conclusion

In the present study, it was evident the greater demand for human skills, which are linked to the resolution of complex problems, active learning, analytical and innovative thinking at the present time, that is, in the Fourth Industrial Revolution. The few technical skills that emerge in the responses are linked to technological, logical and analytical knowledge, as well as to innovative methodologies, previously restricted to the IT universe. For the future (2025), there were no major differences observed among the most relevant skills, but the order of importance was changed. The five main sets of skills and aptitudes are related to human skills (soft skills), which support resilient behaviors to disruptive changes in the professional scenario and which will help companies to overcome uncertainties for the future. It is also noticed that the main competence deals with the professionals' ability to be creative, original and proactive, that is, how they will be able to become protagonist of the new professional and business scenario, not only following changes, but being a propellant of them. In addition, professionals with intra-entrepreneurial characteristics are expected. After all, the professional objective in the future is to be able to increase his/her own personal income, and together with company, increase both professional and company incomes.

For future studies, it is recommended to apply the unstructured questionnaire, in specific sectors of startups and large corporations, in order to have a better understanding of the reality in each universe, the motivations and obtain more insights about the skills that will be required. Among the limitations of the research, it is highlighted the difficulty of having a deep understanding of the motivations, given that the questionnaire applied was electronic. The other limitation concerns to the sample size, which despite being qualified, was reduced to justify the generalization of the findings presented here.

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Personal Values Scale: Brazilian Entrepreuners' Startups Sample Validation

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Abstract: This study aims to validate the personal values that push up entrepreneurs to idealize startups in Brazil. The research respondents are incubated at Sebrae's centers, a Brazilian support service for micro and small companies, in Alto do Tietê region, São Paulo, Brazil. The empirical quantitative research used the PQV values scale, the Portrait Questionnaire Value, which evaluates individual values based on Schwartz's model of human values. Continuing the studies of this author, this research is made considering ten types of personal values and four areas that present the following indicators: 1. Conservation (conformity, tradition and security); 2. Openness to change (self-direction, stimulation and hedonism); 3. Self-enhancement (achievement and power); 4. Self-transcendence (benevolence and universalism or philanthropy). The scale contains 40 statements and describes people with different aims, interests and aspirations. A multidimensional scale (MDS), with the aid of R software, analyzed the results in order to position the values dimensions. The hypothesis that the predominant latent values are from the openness to change area was confirmed. Thus, the conclusion is that personal values related to openness to change, such as: self-determination, stimulation and hedonism or pleasure, are latent values in the entrepreneurs interviewed. These values are related to freedom, creativity, audacity and pleasure in their projects.
Keywords: Personal values; Startups; Entrepreneurs

1 Introduction

Startups are scalable and repeatable business models, in which the main focus is to generate value for their customers through innovation. For the business model, an economic standard that generates a higher number of customers and profits, which are achieved in a short period, without a significant cost increase is used. It is believed that these entrepreneurs have a high influence on the lives of all people involved in the business and have a differentiated profile.

The concept of "Value" is easily mistaken with other concepts. In order to enlighten it, Rokeach (1973) establishes the criteria of what is not value. Thus, Value does not mean attitudes, social norms, needs, characteristics and interests. For the same author, Value is a lasting personal belief in which a specific mode of conduct or final existence state is socially preferable and desired. The author states that this definition could be explored by all social sciences. This same concept was applied and developed by Schwartz (1992; 2005; 2019) and Gouveia (2013), and will be described in the next session.

The hypothesis is that the values of "openness to change" are the most prevalent in this target audience. Therefore, empirical research is necessary to prove so. In the perspective of Schwartz (1992), startups' entrepreneurs constitute a fundamental element that reveals these individual's behavior, since values function as desirable aims, vary in importance and serve as people's life conviction. As the author claims, values express people's motivational aims and these aims will support and corroborate to a standard.

2 Theoretical Referential

2.1 Entrepreneurs and the startups

The concept of entrepreneurship has been widespread at a global level. In Brazil, it gained strength in the late 90's. This fact is linked to several reasons, but the main one is the small companies economic and social representativeness in a country's development (Nassif; Ghobril; Amaral, 2009). "There is a conviction that the countries' economic powers depend on their future entrepreneurs and on the competitiveness of their ventures" (Dornelas, 2017, p. 12). In this manner, entrepreneurship, as a natural persons' practice activity, involves key actions, such as recognizing an opportunity with business potential for exploration, which generates profitability (Baron and Shane, 2016).

This activity can start with the help of a startup. SEBRAE[5] is a national Brazilian, non-profitable institution that supports micro and small companies and encourages the opening of businesses. It offers a venue, called Business Center, open to everyone who wants to begin a startup. "A startup is a group of people looking for a repeatable and scalable business model, working in conditions of extreme uncertainty". Therefore, a startup is usually created from a combination of people and ideas. The business model has to be something amazing, once the market is dynamic and fast and there is a need for differentiation, in addition to the intense and extremely accelerated competition. (Perin, 2015, p. 10).

Then, like traditional business models, startups also need effective management, even though they have a different way to measure their development. “Startups have a destiny in mind: to create a prosperous business capable of changing the world” (Ries, 2012, p. 22). This way, it is clear that a startup level entrepreneur is different, with different characteristics from workers who submit themselves to the employee position in a traditional company. Accordingly, for Schneider (2012), the entrepreneur is someone who stands out for his/her ethical and moral values; his/her time dedicated to the business, the technologies recognition and his/her professional and personal relationships. Therefore, it is believed that the entrepreneur has a different profile and this will be researched in this study.

2.2 Personal values

According to Rokeach (1973) and Schwartz (2012), value can be defined by enduring beliefs, that is, what the individual believes. Schwartz (2005) asserts that values are what individuals have as something important in their lives.

In the same perspective of human values, Barrett (2009 apud Correa, 2012) identifies seven stages in the improvement of personal awareness. Each stage is inherent to the human condition. Individuals' consciousness expands to the necessary extent to meet those needs. Individuals who dominate this set of needs, that is, who go from one level to the other wisely, respond appropriately to all challenges of life:

- Levels 1 to 3 focus on the physical needs, emotional and self-esteem survival, that is, ego satisfaction.
- The fourth level, focus on transformation, that is, a transition from individualism to the common good. It is at this level that the ego learns to detach its fears in order to align itself with the soul.
-Levels 5 to 7 focus on the common good, that is, finding meaning in life, making a difference in the world and being in the service of society.

In short, value is a motivational construction that exceeds specific situations and actions, and governs the selection and evaluation of actions, policies, people and events. Nevertheless, Rokeach (1981, p.132) considers that “once the value is internalized it becomes, consciously or unconsciously, a standard or criterion to guide the action”. Thus, values are organized into systems and hierarchized (Rokeach, 1973; Schwartz, 2012; Gouveia, 2013).

These authors proved this validity through empirical research; in addition, they systematically prove that values are changeable variants, that is, changes occur according to the social context where the individual is inserted, which is called trans-situational, and vary in importance and serve as principles in life. Continuing the studies of Rokeach (1973), Schwartz (1992) develops the research and concludes the existence of ten universal types of values, shared into four areas, called Motivational Circle, shown in Figure 1 and explained in methodology.

Each of these values represents the aim or motivation that expresses interests, which are individualists, collectivists or mixed, represented in Table 1, the way Cammarosano et al (2014) summarized.

[5] https://m.sebrae.com.br/sites/PortalSebrae

Table 1 10 Personal Values Types

Motivational Types	Personal values envolved	Aims	Interest
Hedonism	Pleasure	Pleasure and gratification for oneself, well-being and satisfaction, avoid pain and suffering.	Individual
Achievement	Ambition, influence and intelligence	Personal success obtained through a competence demonstration, others' influence, personal and professional achievement.	Individual
Power	Social power, authority and treasures	People and resources control and social status.	Individual
Self-determination	Freedom and creativity	Independence of thought, action and option; autonomy.	Individual
Stimulation	Audacity	Excitement, novelty, change, challenges, explore, innovate, acquire new knowledge.	Individual
Conformity	Politeness and self-discipline	Control of impulses and actions that may violate social standards and expectations or can harm others.	Collective
Tradition	Tradition respect and devotion	Respect and acceptance of one's society's ideals and beliefs.	Collective
Benevolence	Loyalty and honesty	Promotion of well-being for close mates and reference and/or Family groups.	Collective
Security	Social order and familiar security	Personal integrity, harmony and stability of society, of relationships and of oneself.	Mixed
Universalism	Nature and environmental's protection and equality	Tolerance, understanding and promotion of the well-being for all in society and group, protection of the nature.	Mixed

Note: Adapted from Cammarosano et al (2014)

3 Methodology

The methodology used originally was the literature review, to better understand the concepts used. In the aftermath, applied the empirical descriptive research of a non-correlational quantitative nature, as there are no relationship variables, only an instrument that seeks to quantify the sample data and administer any statistical analysis, as explains (Malhotra, 2001). The methodology used at first was the literature review, to better understand the concepts used. After that, the empirical descriptive research of non-correlational quantitative nature was applied, once there are no relational variables, only an instrument that seeks to quantify the sample data and apply it to any statistical analysis, as Malhorta (2001) explains.

In this research, we used the scale developed by Rokeach (1973), enhanced by Schwartz (2001) and validated in Brazil by Tamayo's (2005) research group. Continuing the studies of these authors, this research is developed considering: a) ten types of personal values, as shown in Table 1; b) four centers that present the following indicators: 1. Conservation (conformity, tradition and security); 2. Openness to change (self-determination, stimulation and hedonism); 3. Self-promotion (achievement and power); 4. Self-transcendence (benevolence and universalism or philanthropy), as shown in Figure 1; c) a scale that contains 40 statements that describe people with different aims, interests and aspirations, as shown in Figure 1.

The instrument used for data collection was a questionnaire developed by Schwatz (1992), called PQV (Portrait Questionnaire Value), validated in Brazil by Tamayo (2005).

Hence, the respondents - Startups owners or idealizers, were located in Sebrae's incubators in Alto do Tiete, in the cities of São Paulo and ABC Paulista. The sample reached 33 participants, although the initial goal was to reach around 80 respondents belonging to these incubators. Participants responded to 40 statements from the PQV in which they inform, among the 10 motivational types, which are adherent to their profile. The scale considered 6 points, in which "1 looks a lot like me" and "6 doesn't look like me". Find below Figure 1, which represents the motivational circle paradigm, a model used to elaborate this research.

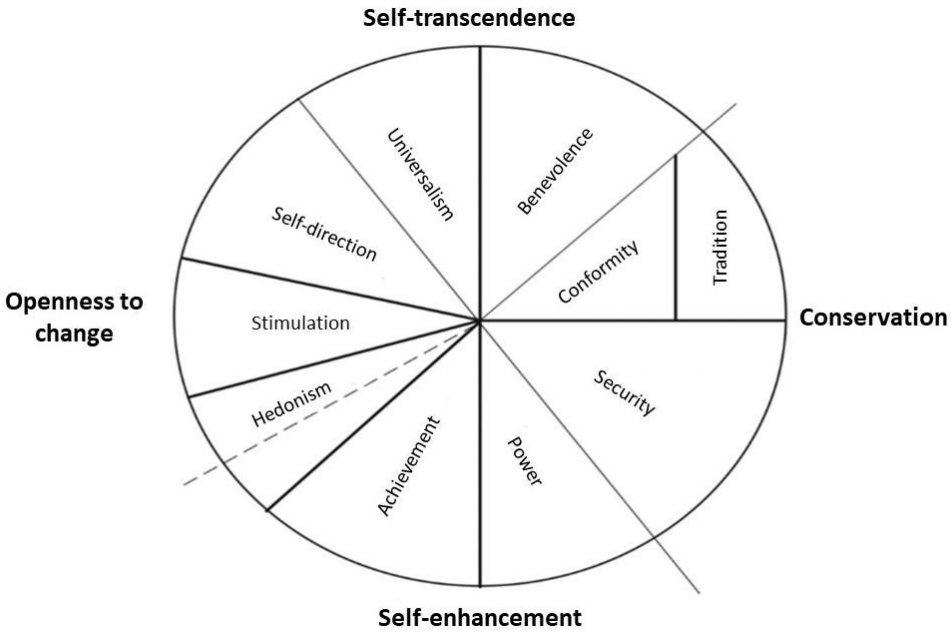

Figure 1 Motivational Circle

Note: Adapted from Cammarosano et al (2014)

4 Data Analysis

A multidimensional scale (MDS) analyzed the results, with the R software assistance, in order to determine the dimensions of values. An MDS graph was used to provide an analysis of the structure of similarities between respondents so that it was possible to meet the design of a profile of personal values shared by this group of participants. Figure 2 shows this application.

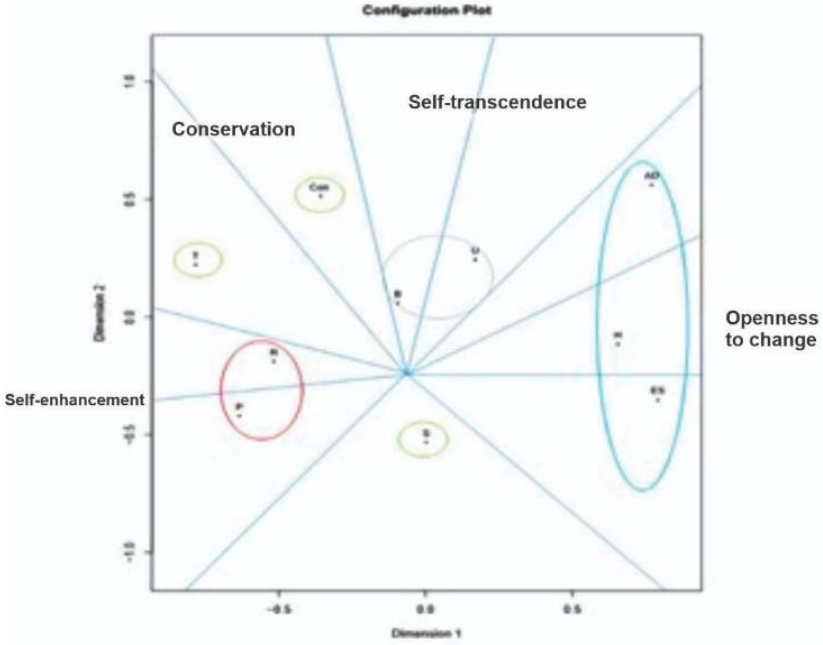

Figure 2 Values Classification

Source: Own authorship.

The figure shows that the values that approach the edges of the frame are latent and the values located near the center are the least latent.

This way, the values presented at the edges of the table are related to the openness to change motivations, which are self-determination, stimulation and hedonism. These values are related to freedom, creativity, audacity and pleasure in interpersonal projects, as shown in Figure 1.

In the sequence, values related to self-promotion are observed, once power and accomplishment are at the edge of the picture. Therefore, it can be observed that the participants seek the achievement of their personal projects. Furthermore, most of the participants have values of social power, authority and take wealthiness seriously. Ambition, influence and intelligence are equally important for these entrepreneurs, as shown in Figure 1. In the conservation area, it could be observed that the value of security diverges from its origin of conservation and is isolated in a neutral area. The security value, both personal and social, proves to be something important, but that is treated as an exception. At the edge, where this conservation area is located, traditionalism is observed. It is understood that the respondents know that it is important to follow rules and traditions, however it is possible to conclude that tradition is not essential in the conduction of their attitudes and behaviors, although they consider it. Finally, more at the center of the picture, we analyze the area of self-transcendence where it is possible to say that there is a certain concern with social causes, such as benevolence and universalism, but in a low scale in relation to other values. Cultural preponderances were not considered, which can significantly alter the analyzes results.

5 Conclusion

This research aimed to validate the personal values that drive entrepreneurs to idealize startups in Brazil. The result of this quantitative empirical research confirms the hypothesis that the latent values prevalent in the participants are from the 'openness to change' area. Therefore, the conclusion is that personal values related to the opening of change, such as, self-determination, stimulation and hedonism or pleasure, are latent values in the surveyed entrepreneurs.

These values are related to freedom, creativity, audacity and pleasure in interpersonal projects. The research used the PQV scale of values, Portrait Questionnaire Value, which assesses individual values based on Schwartz's model of human value. Continuing the studies of this author, this research is developed considering ten types of personal values and four areas that present the following indicators: 1. Conservation (conformity, tradition and security); 2. Openness to change (self-determination, stimulation and hedonism); 3. Self-promotion (achievement and power); 4. Self-transcendence (benevolence and universalism or philanthropy). The scale contains 40 statements and describes people with different aims, interests and aspirations.

Personal values are cyclical, that is, they change according to individual's life (Schwartz, 2012) setbacks. There are routine, moral and cultural circumstances that transform people and make them behave and act in a totally opposite way to what is predetermined. So, these results will never be permanent. With the application of this research it was possible to design a unique profile, however standardizing people's behavior and motivation is something circumstantial, as these values may modified according to various eventualities and situations. The environment influences the values and, as the research sample was based on Startups in the São Paulo region, it should be considered that this is a booming region when it comes to the creation of Startups, including the Alto Tiete Region, which was essential for this research and has increasingly invested in this new business model. The contribution of this research focus on a study regarding behavior of startups entrepreneurs. It is possible to extend this study to other incubators centers. In this sense, these results could be related to other constructs in other regions and countries, expanding the investigation of entrepreneurs' personal values.

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Technology Hesitation and Technology Acceptance on Behavioural Intention to Use Mobile Money in Somalia

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Abstract: Mobile money is an electronic form of money and it is widely used in countries where banking system have limited coverage. Most of the mobile money users in Somalia frequently use mobile money transfer only. The usage of mobile money payments and mobile financial services are lagging behind compared to mobile money transfer in Somalia. The problem is the low usage of mobile money services other than the mobile money transfer in Somalia. In addition, the factors that hinder people to use mobile money and their reasons of limited usage are still unclear. This article presents background on technology hesitation issues towards the use of technology (UOT) that are grounded on models of Unified Theories of Acceptance and Use of Technology (UTAUT). Technology hesitation issues are the inconvenience factors that make people hesitatant to use technology (UOT). Thus, the main purpose of this article is to investigate the major technology hesitation factors that influence the use of technology (UOT) in the context of behavioral intention to use (BIU) mobile money among Somalians. This study employs quantitative survey method. A survey questionnaire was distributed among mobile money users in Somalia. A 650 the questionnaire was distributed through online Google form. A total of 375 respondents submitted their responses and all the answers were recorded into IBM-SPSS statistics package 22 and SmartPLS 3.2.8 which were used to analyze the data and to estimate the proposed model. The results showed that THF specifically, perceived risk of financial loss and perceived risk of system errors have significant effects on behavioural intention to use mobile money. The findings of the study also indicated that Technology Acceptance Factors (TAF) including performance expectance, effort expectancy, facilitating conditions, social influence, were statistically significant towards the behavioural intention to use mobile money. This study drawn conclusion that THF needs to be eliminated, instead to introduce key success factors to increase the usage level of mobile money among Somalians. This study will enrich and add value to the limited literature review of technology hesitation and technology acceptance.

Keywords：Technology hesitation; Technology acceptance; Use of technology; Behavioural intention to use; Mobile money, Somalia

1 Introduction

Mobile money is a form of electronic money where the cash is converted into electronic digits. These digits are saved into subscriber's identity module (SIM) of the users mobile. The saved electronic digits can be easy transferred among users, purchase items, pay bills, withdraw cash by converting back into hard cash. This mobile money transfer service reduced the weight of carrying heavy hard cash and physical security risks (GSM, 1997; Van Thanh, 2000). In case of Somalia, since the collapse of the Somali central government in 1991, the traditional banking institutions has become very limited and non-existence in parts of the country. A private owned telecommunication network industry stood to fill up the gap (O. Sayid, Echchabi, & Aziz, 2012). The private telecommunication network operators (TNO) first provided fixed lines, hand cellphone and internet services that are affordable throughout the country. These TNO provide the lowest international calling rates in Africa. Due to rapid growth and accessibility of telecommunication, the industry saw an opportunity to establish mobile money transfer service (Sayid & Echchabi, 2013). Therefore, the telecommunication industry has acted to fill the disadvantaged segment by providing an alternative mobile based financial circulation service by introducing mobile money transfer service. The mobile money transfer service provided flow of money through personal cellphones, transfer between the mobile money users and electronic exchanges throughout the country (Hughes & Lonie, 2007; Karrar & Rahman, 2015). Unlike previous studies where most of them focused on technology acceptance and technology adoption adapted with different types of technology acceptance theories, this study focused on technology hesitation factors integrated with formulated technology theories and models.

In particular, this study investigates the technology hesitation factors (THF) unified with technology acceptance factors (TAF) towards use of technology (UOT) particularly behavioural intention to use (BIU) in the context of Somalian mobile money. For this purpose, constructs of the Unified theories of acceptance and use of technology (UTAUT) which have been developed by were considered suitable to back the empirical inquiry to predict behavioural intention to use technology in the context of Somalian mobile money. Unified Theory of Acceptance and Use of Technology (UTAUT)'s first version was introduced by (Venkatesh, Morris, Davis, & Davis, 2003). The authors studied previous theories of technology acceptance models. The main theories derived to form Unified Theory of Acceptance and Use of Technology (UTAUT) are technology acceptance model (TAM1-3), the model of PC utilization (MPCU), theory of Reasoned Action (TRA), social cognitive theory (SCT), the motivational model (MM), theory planned behaviour (TPB), the innovation diffusion theory (IDT), and combined of TAM and TPB (combined TAM-TPB). Unified Theory of Acceptance and Use of Technology (UTAUT) was constructed and tested through the development of these eight theories based on the acceptance and use of technology. The concept of this research is based on technology hesitation issues integrated with technology acceptance theory of UTAUT that influence the use of technology (UOT) in the context of behavioural intention to use (BIU) Somalian mobile money. Technology hesitation issues are inconvenient factors that negatively influence the use of technology (UOT). Meanwhile Technology acceptance factors are determinants that positively influences the use of technology. Figure 1 depicts the conceptual model of this research whereas Table 1 elaborates the definition each variable.

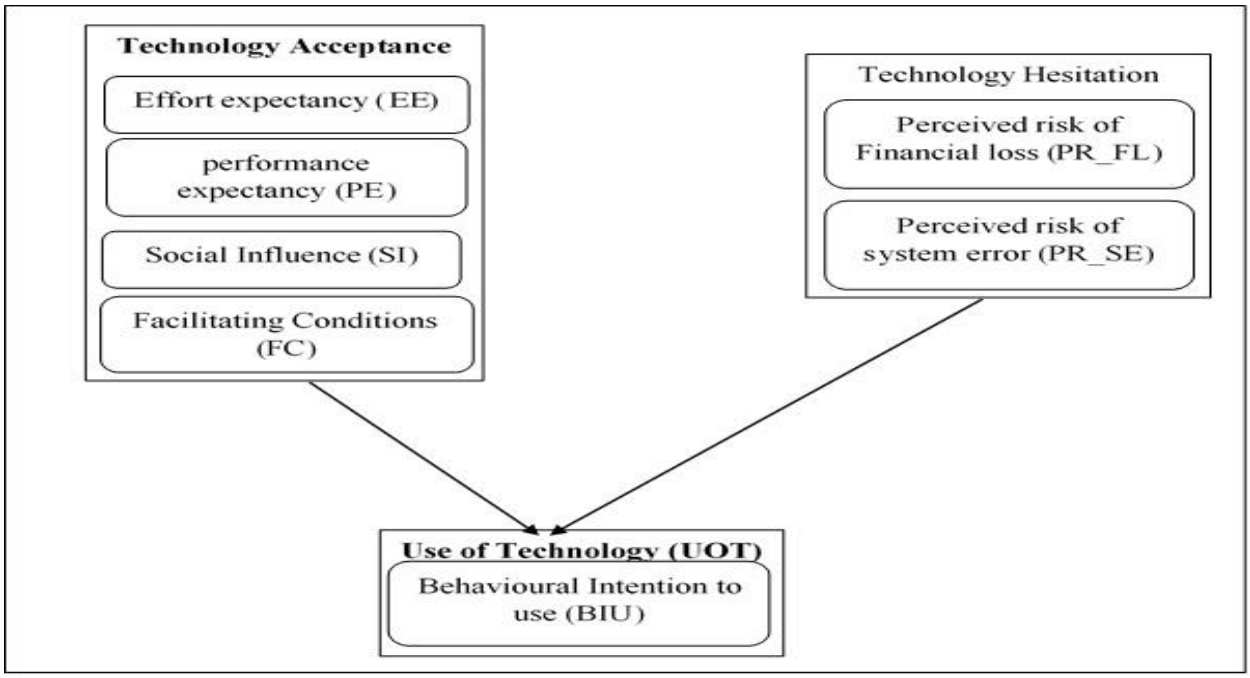

Figure 1 Conceptual Model

Figure 1 shows the conceptual model of this article. The conceptual model of this research consists of two parts. Technology acceptance issues formulated from the previous Unified theories of acceptance and the use of technology (UTAUT) extended with technology hesitation issues. Each of the technology hesitation and technology acceptance factors comprised of several constructs that were further defined in Table 1 and each constructs of technology hesitation and technology acceptance was tested against the use of technology (UOT) in the context of behavioural intention to use (BIU).

Table 1 Operational Definition of the Variables

Code	Technology hesitation & Technology Acceptance	Definition	Source
BIU	Behavioral Intention to use (BIU)	BIU is the individual's perceived probability or subjective likelihood	(Davis, Bagozzi, &

		that he/she will involve in certain behavior. Behavioral intention to use is a measure of the probability that an individual will use an application.	Warshaw, 1989; Fishbein & Ajzen, 1975)
PE	Performance Expectancy (PE)	PE is the extent to which a person considers that using technology will support him/her to attain advances in the job act	(Chang, 2012; Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012)
EE	Effort Expectancy (EE)	EE is the extent to which an individual considers that using a specific technology would be free of effort	
SI	Social Influence (SI)	SI is the degree to which an individual notice that important people have confidence that they should utilize a specific technology	
FC	Facilitating Conditions (FC)	FC is the extent to which a person believe that organizational and technical infrastructure available to help use the system	
PR	(a) Perceived risk of system errors (PR_SE), (b) Perceived risk of financial loss (PR_FL)	PR is the degree of uncertainty concerning the outcome of utilizing technology, it is also referred to the individual's believe that unexpected situation may happen	(Gerrard & Barton Cunningham, 2003; Lin, 2016)

This dataset comprises 4 tables and 2 figures that represent the statistical estimations and analysis. Figure 2 and Figure 3 present the estimation of the measurement model and structural model respectively. Table 2 depicts the construct validity evaluating the Cronbach's alpha, rh_A, composite reliability and average variance extracted (AVE). Table 3 illustrates the Fornell-Larcker criterion for evaluating discriminant validity while Table 4 displays the outer loading of the indicators of each construct. Moreover, Table 5 demonstrates the path coefficient and test of significance. Supplementary materials such as survey questionnaires, raw data, factor loading and t-significance analyses and results are all attached with this article.

2 Design, Methods and Data Analyses

A quantative research method was employed and a survey questionnaire of 650 were distributed among mobile money users in Somalia. The questionnaires were distributed through online Google form. A total of 375 respondents submitted their responses and all the answers were recorded into SPSS. IBM-SPSS statistics 22 and SmartPLS 3.2.9 were used to statistically analyse the data and evaluate the conceptual model. Several statistical techniques including Cronbach's alpha, composite reliability, average variance extracted (AVE) and discriminant validity were utilized to validate the proposed

conceptual model. SmartPLS 3.2.9 factor loading and SmartPLS 3.2.8 bootstrapping were utilized to respectively estimate the measurement and structural models of the research. The following figures and tables demonstrates the results from the analyses.

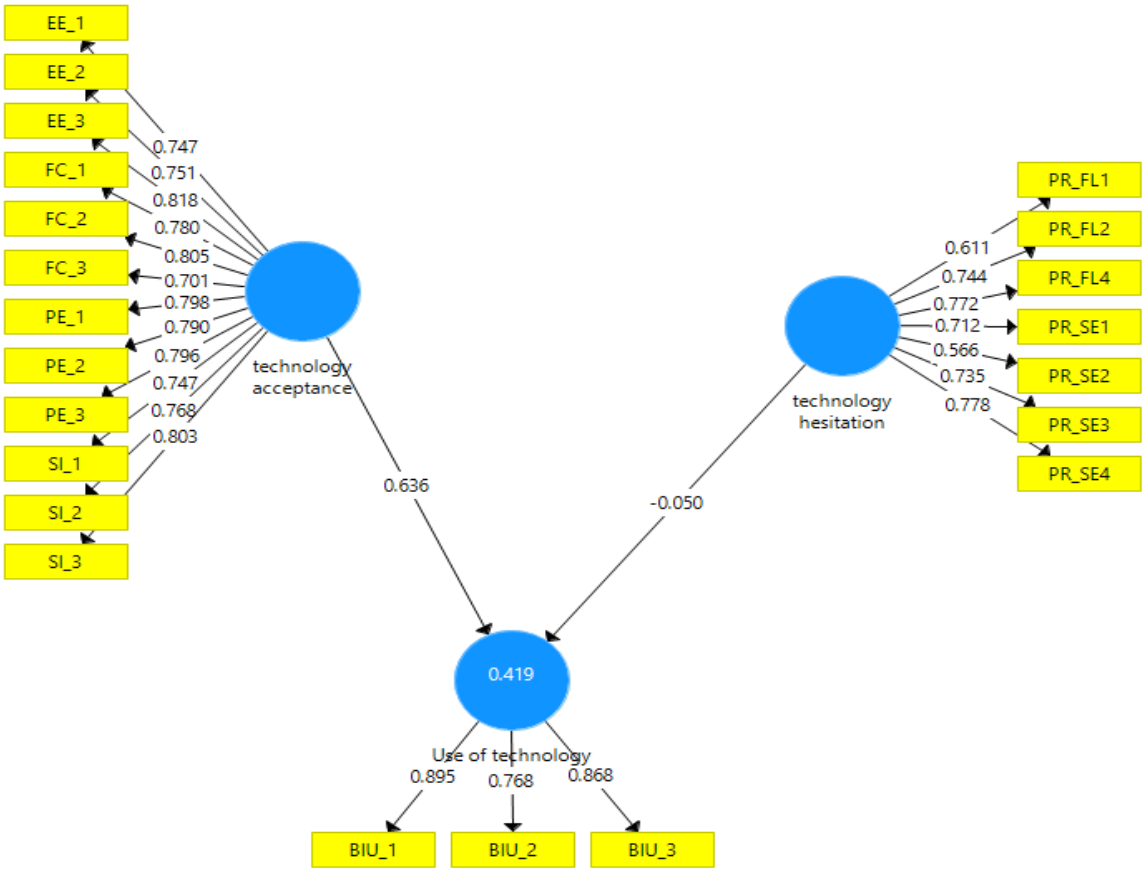

Figure 2 Estimation of Measurement Model

Measurement model (outer model) is also aimed to evaluate the outer loading of the observed variable (indicators). Outer loading which also known as loading is the association between the reflective construct and their measured indicators or variables (Garson, 2012). As illustrated in Figure 2, all of the outer lauding of the indicators of the measurement model of this study are above 0.50. This concludes that the outer loading of this study were satisfactory and acceptable. Several statistical techniques including Cronbach's alpha, composite reliability, average variance extracted (AVE) and discriminant validity were utilized to validate the proposed conceptual model. SmartPLS 3.2.9 factor loading and SmartPLS 3.2.9 bootstrapping were utilized to respectively estimate the measurement and structural models of the proposed model of this article. Figure 2 illustrates the construct validity.

Table 2 Construct Validly

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Use of technology	0.798	0.803	0.882	0.715

technology acceptance	0.940	0.941	0.948	0.602
technology hesitation	0.837	0.861	0.873	0.501

The Cronbach's alpha and composite reliability results shown in Table 2 are all above 0.70 which is the required threshold. This indicates a greater level of internal consistency between latent constructs. Technology acceptance factors (TAF) have Cronbach's alpha of 0.941 and composite reliability of 0.948, technology hesitation factors (THF) with Cronbach's alpha of 0.837 and composite reliability of 0.861 while use of technology (UOT) have Cronbach's alpha of 0.798 and composite reliability of 0.882. This means that technology acceptance factors (TAF), technology hesitation factors (THF) have almost perfect estimated reliability while use of technology (UOT) are considered very good estimated reliability. Table 2 has also shown that technology acceptance factors (TAF) has AVE value of 0.602, technology hesitation factors (THF) has AVE value of 0.501 and use of technology (UOT) have AVE value of 0.715. The stronger the AVE, the stronger the correctness and reliability of the measurement model. According to Bagozzi and Yi (1988) AVE ought to be greater than 0.50 and the cross loading which entails that a variable of a construct is half of minimum of the variance of its respective indicator. Figure 3 displays the discriminant validity of Fornell-Larcker criterion.

Table 3 Fornell-Larcker Criterion

	Use of technology	technology acceptance	technology hesitation
Use of technology	0.845		
technology acceptance	0.645	0.776	
technology hesitation	-0.164	-0.182	0.706

The outcome of the Fornell Larcker criterion of this study indicate that the square root of the AVE is higher than the correlations among latent variables as shown in the Table 3 above. Technology acceptance factors (TAF) has a correlation of 0.776, technology hesitation factors (THF) has obtained a correlation of 0.706 and use of technology (UOT) has reached 0.845 correlation with its construct. Therefore, finding of the study has fulfilled the criterion of the square root of average variance extracted (AVE) would be greater than the correlation among latent constructs. Fornell and Larcker (1981) And Hair Jr, Sarstedt, Ringle, and Gudergan (2017) stated that If the values of the square root of the average variance extracted for each determinant is higher than its correlations with other latent construct, Then there is discriminant validity between those determinants. Therefore, as shown in table 4.9 the value of each construct has higher AVE than its correlations with other construct

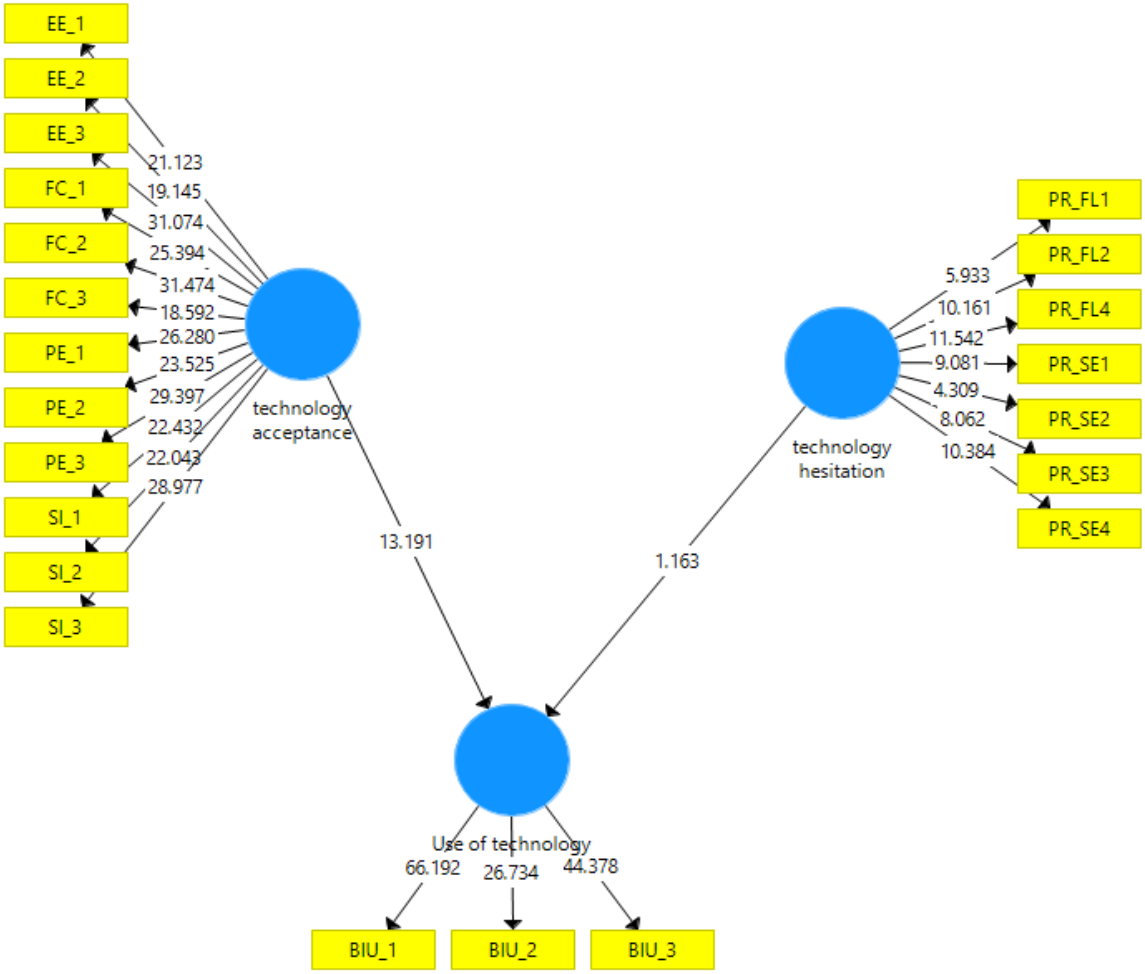

Figure 3 Estimation of Structural Model

Figure 3 shows the significance of the path coefficients between the indicators which were satisfied because they were above the required threshold value of 1.96.

3 Conclusion

Constructs of technology acceptance such as performance expectancy (PE), expected expectancy (EE), habit (HT), social influence (SI) and facilitating conditions (FC) were positively significant towards behavioural intention to use mobile money. Similarly, technology hesitation factors like perceived risk of financial loss and perceived risk of system error (PR_SE) were negatively significant towards behavioural intention to use mobile money. This data provides deeper understanding on technology hesitation issues that were not covered in previous studies. It also helps the extension of technology acceptance theories into technology hesitation models. This data will be advantageous to the extension of technology based theories and models and it will be beneficial to different types of technology acceptance, technology hesitation and the use technology. Researchers can use this dataset to further education and analyse the technology hesitation towards technology adoption and technology usage. It can also allow to extend the technology hesitation for further statistical analyses and interpretations. This dataset will be useful for

UTAUT1-3 and other technology theories and models by integrating with technology hesitation aspects. It therefore, provides deeper understanding the technology hesitation factors towards technology acceptance and technology usage.

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The Entrepreneurial Action of Incubators in the Internationalization Process of Brazilian Companies

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Abstract: The study aims to describe the action of entrepreneur incubators in the internationalization process, from theoretical formulations to the emergence of the incubators and their main findings in the internationalization process, in the period between 1997 and 2011. Faced with this goal, the problem was thus characterized: Could entrepreneurial actions of incubators contribute to the internationalization process of Brazilian small and micro? The methodological procedures were based on an exploratory research by means of qualitative method, which consisted of documentary analysis and secondary data. As a result, it was found out that with respect to the internationalization process, both the entrepreneurial action and the business incubators have a key role in increasing Brazilian exports. However, there is still not a very intense movement by both entrepreneurship and incubators regarding activities targeting for external market, and particularly in today's world suffering heavy impacts due to Pandemic crises.
Keywords: Brazilian company; Internationalization; Entrepreneurship; Incubator

1 Introduction

The international scenario already had diversified characteristics, both in Science and business:

(1)The technological innovation required by Globalization has become synonymous with competitiveness in the various productive sectors in several countries;

(2)Entrepreneurial movements arose every day bringing, on the other hand, the risk of failure;

(3)To reduce this risk, the movement of business incubators emerged, supporting new entrepreneurial projects.

As a matter of fact, the movement that emerged more than 50 years ago in the USA, characterizing itself as institutional arrangements. Although currently the term used is Business Accelerator, the consulted data sources call this type of activity as Incubators and, for this reason, this name was maintained.

In the academic sphere, among the theories that address the process of internationalization of companies and entrepreneurship, we note a connection that opens an important field of study, here called entrepreneurial action in the internationalization of companies.

This study aims to describe the entrepreneurial action of incubators in the process of internationalization of Brazilian companies, starting from theoretical formulations until the emergence of business incubators and their main results in the internationalization process. For this, a qualitative analysis was performed, through bibliographic, documentary and secondary data research.

The entrepreneurial action in the internationalization is presented in an evolutionary way, starting from the first works to the current thinking on the area under study. In this context, incubators have gained ground as promoters of development, stimulating technological innovation and encouraging the transformation of ideas into reality.

A survey on the performance of Brazilian incubators was also conducted, in order to confirm them as an ideal alternative for the insertion and success of Brazilian entrepreneurial companies.

2 Theoretical Framework

The first concepts of internationalization emerged in the 1960s, in which the company's theory ceased to be studied only from the economic point of view, to become an independent field of research. Thus, the first studies on the internationalization process focused on the theory of organizational behavior were initiated – presented below as the Uppsala Model (Hilal; Hemais, 2001).

In the concept of Dornelas (2018), it became clear that for some time there has been a moment characterized as the age of entrepreneurship. Entrepreneurs eliminate the various barriers, shorten

distances, renew concepts, create important labor and employment relationships, breaking paradigms and generating wealth for society.

Therefore, there is an extensive field of study, based on the theoretical basis developed in studies of several areas – of entrepreneurship, internationalization and marketing – in which are documented studies that focuses from the development of theories on international entrepreneurship and the factors that affect international entrepreneurship to the emergence of *Born Globals* – companies that have already been born globalized, as discussed in the item Internationalization of Companies.

3 Entrepreneurship Concept

The concept of entrepreneurship as what it is currently conceived is about 200 years old and has, over that time, accumulated several connotations in different fields of both academic and popular knowledge. It was the object of study of economists (Shumpeter, 1934), who understood entrepreneurship as necessary to comprehend economic development, through what the author called creative destruction. It targets the production of new goods and services that when offered to the market turns the capitalist engine (Dalmoro, 2008). It was also the subject of studies of behavioralists, such as MacClelland (1982), for whom people develop the need for personal fulfillment.

People undertake not only to meet personal demands, but mainly because they feel a deep need to accomplish themselves in what they do. For this, it is necessary to develop personal characteristics that favor the identification and exploitation of business opportunities (Venkataraman; Shanen, 2001). The academic literature is lavish in listing these characteristics, such as those pointed out by Dornelas (2018). It states that entrepreneurs have Special features. They are visionary, they question, they risk, they want something different, they make it happen and they undertake. Entrepreneurs are differentiated people, who have a unique motivation, passionate about what they do. They're not content to be one more in the crowd. They want to be recognized and admired, referenced and imitated, they want to leave their legacy. The same also happens with the popular imagination. Amaral, Cerretto, Nassif and Soares (2007) conducted field research with owners of food establishments, who characterized the entrepreneur as Figure 1 shows.

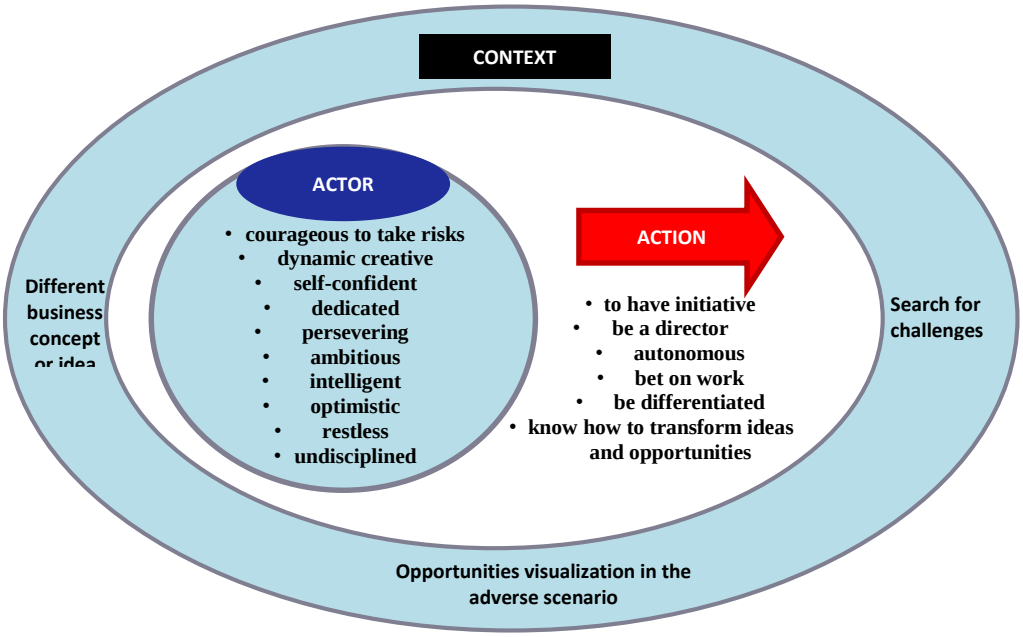

Figure 1 Social Representation of the Entrepreneur Concept

Source: Amaral; Cerretto; Nassif; Soares, 2007, p. 6.

Also in Figure 1, the relevant characteristics of an entrepreneur are highlighted: to visualize, dare, transform and perform, which suggests the ability of the entrepreneur to achieve results through a process that aims to realize his motivation to undertake.

4 Internationalization of Companies

As the company gains experience, its commitment to the foreign market increases, taking a step forward in its internationalization process (Johanson; Wiedersheim-Paul, 1975). The pioneer in explaining the internationalization process was the Uppsala Theory. According to Uppsala's model, it is likely that the company will start its external sales via export and with a limited commitment to these markets, usually geographically close to the company's host country (Hilal; Hemais, 2001). The basic mechanism of internationalization, according to Uppsala's perspective, may be characterized as dynamic in nature, in which a greater knowledge of the market and a greater mastery and control of current activities in the destination country leads to a greater commitment to the market. Similarly, the compromise of resources follows the same logic (Johanson; Vahlne, 1977).

Johanson and Wiedersheim-Paul (1975) also identified in their studies two other factors capable of influencing the internationalization process: the "psychological distance" and the "dimension of the potential market". By psychological distance they named the set of factors that cause disturbance or hinder the flow of information between the company and the market, such as language, culture, political-institutional systems, level of industrial development, trade practices and others. Regarding the dimension of the potential market, the concept refers to the size and potential of the market, which could influence the firm's interest in extending its operations to the country in question.

In Brazil, the process of internationalization of companies is still very recent, dating from the late 1960s, and was motivated by tax incentives and credits granted by the governments of the time. These incentives were available to companies, and thus the decision to use such instruments to start or even expand operations in foreign markets depended on each company (Goulart; Brazil; Arruda, 1996). Rocha (2002) confirmed that the process of internationalization of Brazilian companies had its *boom* in the 1970s, due to the export incentive policy inaugurated in the 1960s and progressively reduced, due to the high costs, in the 1980s. From the criteria of Lorga (2003) to define the motivations that induce internationalization – proactive, when companies are more protagonists; reactive, when internationalization is a response to competitive pressures – Rocha (2002) stated that, in general, the reasons for the internationalization of Brazilian companies were more reactive than proactive.

5 International Entrepreneurship

Souza, Novais and Forte (2020) understands by *Born Globals* those organizations that operate internationally, which, therefore, have a significant percentage of their revenue from sales made outside their country of origin, in the first three years of their creation and that obtain a competitive advantage in the use of resources and sales of products in several countries. Also informs that this understanding broke a stigma that this type of company should first build its business in its country of origin and, only after consolidating its condition in this market, venture internationally. The emergence of new opportunities in distant markets and the possible connections between them stimulated the emergence of entrepreneurs willing to explore them. Dib and Rocha (2009), when researching Brazilian Born Globals in the software sector, confirmed that they have a greater share of revenue from abroad than traditional companies.

The refinement of this understanding encouraged even entrepreneurs with a more local vision to be aware of the performance of companies that operate internationally, since they can become competitors locally (Oviatt; Mcdougall, 2005). These companies have aggressive strategies, sometimes using investments and external resources that enable them to enter various markets (Souza, Novais and Forte (2020). For this reason, Oviatt and McDougall (2005) consider that international entrepreneurship is a combination of activities related to innovation, pro-activity and risk aversion, confronted between national borders. In this sense, it is independent of the age, size or characteristic of the company to undertake internationally.

Macrostructural aspects added to strategic and internationalization issues refer to the concept of entrepreneur. It means that the process of internationalization will only be obtained with the entrepreneurial action of an individual who contemplates opportunities and has the skills to create and exploit them, is endowed with resources and a desire for realization which enables him to build, without risk aversion, a behavior that enables him to undertake internationally (Souza, Novais and Forte (2020).

6 Business Incubators

Antunes, Araújo and Almeida (2020) consider the incubator must prepare incubated companies to compete inside and outside the country, facing competition from the globalization of the economy. According to the Support Service for Micro and Small Enterprises of São Paulo - SEBRAESP, on its page

dedicated to Incubators, the movement of business incubators has always been linked to the entrepreneurial movement, when projects of creation of companies and support to entrepreneurs are emphasized. It emerged more than 50 years ago in the Silicon Valley region and Route 128 in the United States of America, with the first institutional arrangements similar to what are now considered "business incubators". Also, according to SEBRAESP, the current model of incubator emerged in 1959 in New York City, when a significant number of people were unemployed due to the closure of one of Massey Ferguson's factories. But it was only from the 1970s that this type of venture took its current format.

The definition of incubator, according to Antunes, Araújo and Almeida (2020, p.7) "focus on creating and operating networks to access resources and knowledge, tuning the incubator to the innovation ecosystem in which it is inserted". In addition to advising on the technical and business management of the organization, it also offers the possibility of shared services such as laboratories, telephone, internet, security, physical space, providing users greater flexibility in a motivating and encouraging climate.

For the Incubator Center of Technological Companies - CIETEC, an institution that was constituted through an agreement between the Secretary of State for Science, Technology and Development (government of the state of São Paulo), the Support Service for Micro and Small Enterprises of São Paulo - SEBRAESP, the University of São Paulo - USP, the National Commission of Nuclear Energy - CNEN (through the Institute of Energy and Nuclear Research - IPEN) and the Institute of Technological Research - IPT , incubators are organizations that have a production model that brings together the essence of entrepreneurship with the dissemination of knowledge.

7 Methodological Procedures

Thus, this study chose to use the qualitative research method, according to Godoy (1995), of exploratory character. It was chosen as a research question: how the entrepreneurial action of incubators collaborates with the process of internationalization of Brazilian micro and small companies. To solve this issue, the general objective was defined: to describe the entrepreneurial action of incubators in the process of internationalization of Brazilian micro and small companies, from 1997 to 2011. As specific objectives: verify if the incubators of companies in Brazil had an effective participation in the internationalization process; identify which activity sectors of the incubator participated in the internationalization process; analyze the degree of contribution that the internationalization process can offer to incubators.

To obtain data, a bibliographical research was initially performed, in order to locate studies that would allow a better direction of the subject, preferably sectors of activity more prone to entrepreneurial action in internationalization. Based on the set of these data, a comparative analysis was elaborated that, according to Schneider and Schmitt (1998), allowed the reproduction of the facts with a focus on the theoretical perspective and with analytical precision. Thus, a comparative data analysis was chosen in order to direct the study to a conclusive definition close to the studied reality.

8 Analysis of Collected Data

In his analysis of the Brazilian export policy for small and medium-sized enterprises, within the studied period, Guimarães (2002) considered that incubators distinguished themselves by the activity of each company: technological; traditional; mixed. In addition, he outlined a topic on the incubators of exporting companies and stated that, although stimulated by strong institutional action, there was still no record of effective participation of incubators in the internationalization process (specifically in the export of goods and services). The maximum that could happen was the supply from incubated companies to companies specialized in foreign trade *(trading companies)*, with domestic sales equated to export.

Oliveira Jr. (2013) found that only 25% of the incubators interviewed by him stated that international export trade is a priority strategic focus (for 46.4% it is secondary and for 28.6% it does not apply). Another significant finding of the Oliveira Jr.'s survey (2013) is the degree of satisfaction of the incubators interviewed in relation to the objective achieved in export promotion: 42.8% declared themselves dissatisfied/very dissatisfied; 10.7% satisfied; 10.7% neutral; 35.7% do not apply. Also, according to Oliveira Jr.'s survey (2013), 56% of the incubators interviewed do not agree/partially agree that the incubator contributes to the internationalization of incubated companies (23% totally agree; 11% do not know/do not apply).

As a way to separate respondents belonging to CIETEC (one of the largest incubators in Brazil and with self-financing capacity) and confirm/diverge from the results obtained in the total set of interviewees, the survey of Oliveira Jr. (2013) obtained an even more significant finding (regarding the

internationalization of companies): 67.6% of the respondents stated that they do not agree/partially agree that the incubator contributes to the internationalization of the incubated companies; 18.9% totally agreed and 13.5% do not know/do not apply.
Therefore, it is worth returning to Guimarães (2002), who established a new conception for the exporting incubator company.

Table 1 Distinction between Traditional Incubator and Export Incubator

FOCUS	TRADITIONAL INCUBATOR	EXPORTING INCUBATORA
Vision	Focused on the domestic market (absolute advantages)	Focused on the international market (relative advantages)
Operationalization	Company selection - product with a view to increasing efficiency and productivity, having as parameter the home environment	Company selection - product from the company's cognitive vision, in view of the potential exporter
Policy	Wide use of public resources for business management and entrepreneurship	Addition of portion of export revenue to strengthen the incubator
Results	Local and regional development with preservation of vocational values	Local and regional development with internationalization of its local values

Source: Guimarães, 2002, p. 48.

Table 1 makes it possible to verify the distinction between a traditional incubator and the exporting incubator from various approaches: in the vision approach, the traditional incubator focused on the domestic market has absolute advantages in its activity (without direct competition), while the export incubator focused on the international market will have relative advantages (due to the fierce competition of the market); under the focus of operationalization, the selection of companies will be due to the increase in efficiency and productivity (in the case of the traditional incubator in the domestic market) and the knowledge and perception of the external market in relation to the export potential of each company (in the case of the exporting incubator); the political focus aims to the use of public resources in business management (traditional incubator) and to the addition of part of the revenues obtained from exports to strengthen the business (in the case of the export incubator); in the results focus, the two forms of action aim to local and regional development, and the traditional incubator preserves vocational values and the exporting incubator internationalizes local values. The great challenge, for all actors with business incubators, became the real perception of the companies' ability to act, together with the perception of the foreign market as an option to expand activities.

9 Conclusion

Given the limitations, due to the restriction only to the CIETEC data and the research with technological-based incubators in the state of São Paulo, the overall objective of the study was achieved by verifying that there was not, within the period studied, a more intense movement of both entrepreneurship and incubators with regard to the direction of activities to the foreign market.

As for the specific objective of verifying the effective participation of incubator companies in the internationalization process, it was clear that there was a limitation by exporting incubators with regard to the incipient stage in which the surveyed companies, in relation to technological and market aspects, are located. Issues such as quality audit processes, adaptations to international standards and certifications, as well as alliances and partnerships with suppliers and distribution channels are prerequisites under development in the incubation period. With the successive development of these capabilities, the companies will achieve greater maturity and competitiveness, which often occurs only sometime after the company graduates.

Therefore, there is a great challenge, to be faced with greater propriety and objectivity, both for institutions responsible for the formation and graduation of incubated companies (inclusive governments) as well as, and especially, for higher education institutions. With the impact caused by COVID-19 in Brazil and in the world, we had practically the anticipation of 10 years, reinforcing greater importance of the entrepreneurial practice. Reinventing the processes and procedures mainly of small and medium-sized enterprises that are the most sensitive to economic effects.

Regarding the specific objective of identifying the participation of the sectors of activity of the incubated companies (Nuclei, in the CIETEC specification), within the studied period, which stood out the most in the internationalization process, it cannot be inferred that a particular sector, within the

CIETEC company centers, had a differentiated performance. That is, the best or worst export result depended more on the maturity stage of some companies than on the sector in which they operated.

For the broader objective of evaluating how the entrepreneurial action of business incubators can help companies in their internationalization processes, it was possible to verify that the results were unsatisfactory and highly dependent on several external factors, notably the activation of the entire ecosystem of innovation and entrepreneurship. This includes interaction with universities and government, the latter articulating public policies to encourage SMEs such as access to finance, tax relief and reduction of bureaucracy. Thus, the research problem has an eminently emblematic solution in order to request a joint action of several institutions, and, at the same time, direct actions of the various actors in the integration of actions for greater participation in the internationalization process.

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Research on Risk Evaluation of "Belt and Road" Investment Project under COVID-19

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Abstract: In recent years, China's "Belt and Road" strategy has achieved remarkable results, and "Belt and Road" investment projects have become an important part of China's foreign investment. The COVID-19 constitutes a public health emergency of international concern, and 56 countries along the “Belt and Road” have implemented control measures against China, which has led to many risks for investment projects along the “Belt and Road”. This paper studies the risks of “Belt and Road” investment projects under the COVID-19, builds a risk evaluation index system, including policy, economic, security, and legal risks. It uses factor analysis to verify risk indicators and proposes control measures for different investment risks It has certain reference significance for the risk evaluation and management of investment projects along the “Belt and Road” under the COVID-19.
Keywords: COVID-19; "Belt and Road" initiative; Investment project; Risk evaluation

1 Introduction

The "One Belt One Road" covers the Asia-Pacific, Eurasia, Middle East, Africa, etc., including 65 countries, with a total population of more than 4.4 billion, accounting for 63% of the world’s population, and an economic aggregate of over 20 trillion dollars, accounting for 30% of the global economy (Zhou, Yang., 2019). Since the proposal of 2013, China has carried out pragmatic cooperation with the countries along the Belt and Road, and the number of large-scale investment projects and the amount of investment in the countries along the "Belt and Road" have increased significantly (see Figure 1). From 2013 to 2018, China has along the "Belt and Road" the country's trade volume exceeds 6 trillion U.S. dollars, and direct investment totals 90 billion U.S. dollars. According to the "Economic Information Daily" statistics, more than 90% of the central enterprises have participated in the construction of the "Belt and Road", and more than 60% of the central enterprises have invested in countries along the "Belt and Road"(Wu et al., 2019). The implementation of the "Belt and Road" is a Chinese enterprise foreign trade and overseas investments provide huge opportunities for development.

Chinese companies' investment in countries and regions along the “Belt and Road” is in full swing today, but there are still foreign investment risks involving many fields such as economy, law, politics, and culture(Tan et al., 2019). It is very difficult to predict risks, and the number of investment project failures is very large(Wu et al., 2019). The main characteristics of overseas investment risks along the “Belt and Road” are the overlapping of various risks and high portfolio risks (Sangsomboon et al., 2018). Research by Zhang and others(2019) found that the main reasons for the risks of Chinese companies investing in large-scale projects in Southeast Asia are the failure to effectively deal with the concerns of stakeholders, the political risks of the host country, and resource nationalism (Zhang et al., 2019). Song(2016) analyzed the risks of PPP project in the country along the Belt and Road, calculated the weight of these risk factors combined with fuzzy analytic hierarchy process (FAHP), and sorted out the risks according to different weight values(Song et al., 2016). Zhang (2020) combined with project cases along the "Belt and Road" to establish a risk evaluation index system for 7 main risk factors and 20 secondary risk factors, and used an improved Analytic Hierarchy Process (AHP) to establish a hierarchical model to assess risks (Zhang et al., 2020). Qin(2019) based on the analysis of the risk sources of the countries along the “Belt and Road”, a factor analysis method is adopted to construct financial risk evaluation indicators(Qin et al., 2019). Tan(2019) based on the research reports of relevant institutions and think tanks on political and public safety Risk, sovereign credit risk and legal risk are classified into three categories of investment risks, and an investment risk assessment system is established on this basis(Tan et al., 2019). In summary, the research on risks of investment projects along the Belt and Road is relatively mature, which provides methods and ideas for this paper.

On January 31, 2020, the World Health Organization announced that the new coronavirus epidemic constituted an international public health emergency. 56 countries along the “Belt and Road” implemented control measures against China, which led many risks to investment projects along the “Belt and Road”. Under the COVID-19 situation, how to timely identify risks, accurately analyze risks, scientifically evaluate risks, and rationally respond to risks has become an important key to affecting the success of the

"Belt and Road" investment.

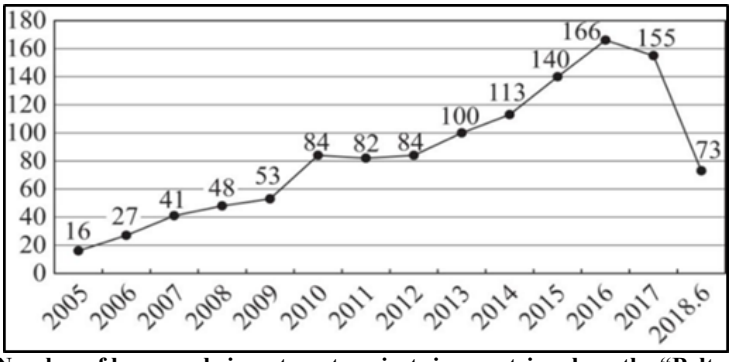

Figure 1 Number of large-scale investment projects in countries along the "Belt and Road" from January 2005 to June 2018

2 Theory and Example

2.1 Research on investment risk evaluation of "Belt and Road"

In recent years, scholars have paid more and more attention to the overseas investment and risks of Chinese enterprises in the context of the "Belt and Road" construction.

Hual(2019) took H company as an example, and constructed an analysis framework of exogenous risk, endogenous risk and process risk as the core, and dynamically evaluated the risk of foreign direct investment of Chinese enterprises, based on a questionnaire survey of H company , using a comprehensive integration algorithm, multi-dimensional evaluation of the H company's foreign direct investment risk in the context of the "Belt and Road"(Hual et al., 2019); Feng(2018) based on China's 10 key objects of investment in infrastructure construction along the "Belt and Road" As a sample, the country established a national risk evaluation indicator system that includes 5 first-level indicators and 27 second-level indicators including political risk, social risk, economic risk, financial risk, and industry risk(Feng et al., 2018).

Investment along the "Belt and Road" is an important part of China's foreign investment. Under the influence of the COVID-19, it is particularly important for Chinese enterprises to participate in the risk assessment and risk prevention and control of "Belt and Road" investment projects.

2.2 Research on risk management in COVID-19

The outbreak of new coronavirus pneumonia in 2020 caused huge losses to economic development. Under the COVID-19 situation, the main measures for enterprises to control risks are: establishing a loss assessment system, improving the evaluation mechanism, accurately measuring the mid-to-long-term adverse effects of the epidemic on business operations, and actively seeking more favorable external policies Measures(Ma et al., 2020). In terms of legal risks, Cao(2020) proposed that it is impossible to generalize whether the contract can be cancelled due to the COVID-19. It is necessary to make specific judgments based on the contract agreement, contract purpose, and performance obstacles(Cao et al.,2020); Xia(2019)used document method and Delphi method to formulate risk assessment index system, adopted comprehensive risk index model assessment method and risk matrix method to set risk judgment standards, and established a scientific and effective international cruise ship infectious disease risk assessment system(Xia et al.,2019). Hua(2020) proposed that under the COVID-19, at the government level, a comprehensive and coordinated industrial supply chain risk management and communication mechanism should be established, an event-based industrial supply chain early warning system should be established to ensure the enterprise's supply chain operation resource system(Hua et al.,2020).

The overwhelming majority of Chinese investments in the "Belt and Road" are high-risk, large-amount, long-term infrastructure, large-scale mineral and energy cooperation projects, and the risks of the "Belt and Road" investment projects caused by the COVID-19 are common to traditional overseas investment risks There are also characteristics due to the epidemic situation that require a comprehensive and comprehensive risk assessment.

3 Data and Methodology

3.1 Evaluation index system construction

This paper summarizes the previous experience of Chinese companies' overseas investment risk research, drawing on the "2017 China Outbound Investment Risk Rating Report", and the "Belt and Road"

and foreign investment risk related research literature, based on the national policies of the COVID-19, and finally The “Belt and Road” investment project risk evaluation index system is divided into four dimensions, policy risk, economic risk, management risk, security risk and legal risk, including a total of 17 evaluation indicators (see Table 1).

Table 1 Under the COVID-19, The “Belt and Road” Investment Project Risk Evaluation Index

Policy risk	Economic risk	Security Risk	Legal risks
Personnel policy risk	Financing risk	Popular opposition	Contractual risk
Cargo policy risk	Interest Rate Risk	Exclusion risk	Risk of legal changes
Tax policy risks	currency risk	Risk of racial discrimination	Access review risks
Investment policy risk	Market risk		Legal regulatory risk
Approval policy risks	Inflation risk		

3.2 Risk cause analysis

3.2.1 Policy risk

The "China National Risk Rating Report on Overseas Investment (2019)" issued by the Institute of World Economics and Politics, Chinese Academy of Social Sciences shows that the political risks of countries along the "Belt and Road" are the largest potential risks.

The policy risks brought by the new coronavirus epidemic are mainly reflected in: First, the immigration control measures for personnel, project managers or labor personnel are affected by domestic isolation or immigration control, delayed or unable to reach the country where the project is located, engaged in labor services or business management Activities; the second is the control of the trade of goods for the import of project equipment or raw materials, including port customs clearance control, inspection and quarantine requirements and mandatory items, which results in the failure of the equipment to reach its destination; the third is the policy pressure of the countries along the “Belt and Road” caused by the epidemic Foreign investors have formed regular expectations of the epidemic, will increase relevant tax rates, change the investment policies of overseas enterprises, increase the difficulty of investment approval, and will greatly increase the construction cost of investment projects and increase operational risks.

3.2.2 Economic risk

The economic foundations, the insufficient development of financial markets, the low level of resistance to economic and financial risks, and the early warning of financial risks Economic risks such as inadequate mechanisms and unstable investment returns(Tracy et al., 2017).

As a result of the current epidemic control, a large number of enterprises in China have stopped production and reduced production, and factory resumption of work has been delayed. In the short term, production activities have stalled, and the economy is facing downward pressure in the first quarter. UBS and Goldman Sachs have lowered China's economic growth forecast for the first quarter to 3.8% and 4%, respectively. Market risks have increased, inflation rates may increase, and Chinese companies have difficulties in financing. China is in the middle link in the global industrial chain, and is located at a key position in the upper middle of the “Belt and Road” production division system. For health and safety reasons, China's direct investment in countries along the "Belt and Road" may be delayed or even stopped; From the perspective of interest rate and exchange rate, in order to alleviate the pressure of economic operation, the central bank reversed the repurchase operation to release liquidity, which caused the overnight, 7-day and 3-month SHIBOR to decline to varying degrees, and the national debt interest rate also showed a downward trend, which will cause the appreciation of the RMB It is expected that there may be pressure for RMB appreciation in the international market, exchange rate fluctuations, and Chinese companies will slow down the process of foreign investment.

3.2.3 Security Risk

There are relatively few studies on the people's sentiment, history, race, ethnicity, religion, language, and customs of the countries and regions along the “Belt and Road”, but the “Belt and Road” just covers the current world culture and religion. (Andornino., 2017).

With the confirmed and suspected cases of pneumonia caused by new coronavirus infections worldwide, fear has exacerbated racial discrimination and xenophobia; some countries along the “Belt and Road” have called on their nationals to stop anti-Chinese xenophobia related to the epidemic. However, we still need to be vigilant about releasing anti-China sentiment and racial discrimination through the epidemic, as well as the possible adverse effects on the management or labor personnel of the “Belt and Road” investment projects.

3.2.4 Legal risks

The legal risks brought by this epidemic include the risk of compliance and the risk of changes in laws and regulations. Many countries along the "Belt and Road" have adopted immigration control measures and upgraded import and export inspection and quarantine management against Chinese nationals, resulting in the inability of some investment project personnel, equipment and materials to pass customs clearance, and some overseas project contracting project owners may reject contractors and Chinese subcontractors Signed a subcontracting and equipment supply contract with the supplier, which ultimately led to the failure to complete the project within the time specified in the contract.

The countries along the "Belt and Road" are concerned about the epidemic, and as the epidemic develops and changes in the host country, temporary laws, decrees, regulations or relevant administrative measures may be promulgated, and corresponding entry examination and legal supervision Changes will occur, and Chinese companies should be alert to the risk of changes in laws and regulations caused by the epidemic.

4 Result

4.1 Risk index test

In order to verify the scientific and effective evaluation index system of the identified "Belt and Road" investment projects, 217 questionnaires were issued in this study, and the respondents were located in five countries including Russia, Kazakhstan, and Singapore.

The questionnaire is collected from March to May 2020. In March, 67 questionnaires were collected, involving equipment manufacturing, construction and other industries, and the company's main business was in Kazakhstan, Kyrgyzstan and other countries; in April, 72 questionnaires were collected, involving foreign trade, machinery, transportation and other industries, and the company's main business was in Russia , Thailand and other countries; in May, 78 questionnaires were collected, involving clothing, food and other industries, the main business of the company is in Laos, Singapore, Vietnam and other countries. Among them, 203 valid questionnaires, the questionnaire validity rate was 93.55%. On this basis, the use of SPSS16.0 software to carry out the exploration of factor analysis and confirmatory factor analysis.

4.1.1 Exploratory factor analysis

In this study, using the 203 valid questionnaires recovered, an exploratory factor analysis was carried out on each item in four dimensions. Use SPSS16.0 to test KMO and Bartlett spheres. The principal component analysis is used to extract the factor load of each index in each dimension. With reference to the KMO value greater than 0.7, the Bartlett sphere test statistical value is significantly different from 0 and the maximum factor load is greater than 0.55n, and the characteristic root is greater than 1, the analysis results are shown in Table 2. It can be seen that the KMO values of the four dimensions are greater than 0.7, the Bartlett values are significantly different from 0, and the measurement items of each dimension can be combined into one factor, indicating that the constructed evaluation indicators have good reliability and validity.

Table 2 Factor Analysis, KMO and Bartlett Sphere Test Statistics of Risk Assessment Indicators of "Belt and Road" Investment Projects under the COVID-19

Policy risk	Factor load	Economic risk	Factor load	Security Risk	Factor load	Legal risk	Factor load
Personnel policy risk	0．700	Financing risk	0．784	Popular opposition	0．819	Contractual risk	0．899
Cargo policy risk	0．720	Interest Rate Risk	0．746	Exclusion risk	0．852	Risk of legal changes	0．914
Tax policy risks	0．785	Currency risk	0．700	Risk of racial discrimination	0．821	Access review risks	0．855
Investment policy risk	0．773	Market risk	0．774			Legal regulatory risk	0．758
Approval policy risks	0．643	Inflation risk	0．738				

4.1.2 Confirmatory factor analysis

Using AMOS17.0 software to carry out a confirmatory factor analysis of the risk evaluation index system of the "Belt and Road" investment projects. The preliminary analysis results show that the fitting effect of the measurement model is not good. According to the principle of the maximum value of the

correction index MI, a two-way path relationship is established between the residual variable of the explicit variable and the residual variable of the environmental protection policy risk of the explicit variable. table 3. It can be seen from Table 3 that the absolute fitting index of the model x 2 / df = 0.918, RMR = 0.081 <0.1, RMSEA = 0.000 <0.1, all meet the evaluation criteria. At the same time, the value-added fitting indexes AGFI = 0.901, GFI = 0.930, NFI = 0.934, IFI = I. 006, CFI = I. 000, TLI-1.008, RFI = 0.914, all indicators are close to 1. Moreover, the path coefficients of each dimension index are statistically significant at the level of P <0.001. The analysis results of the above various indicators indicate that the induction and division of each item in the four dimensions of the "Belt and Road" investment project risk evaluation indicator system are effective.

Table 3 Fitting Results of Internal Measurement Models in Each Dimension of the Risk Assessment Indicator System of the "Belt and Road" Investment Projects under the COVID-19

Explicit variable	Standardized coefficient	Path coefficient Estimate	Standard error S.E.	Critical ratio C.R.	Significance probability P
Personnel policy risk	.708	1.111	.140	7.922	***
Cargo policy risk	.780	1.231	.145	8.486	***
Tax policy risks	.685 1	.063	.132	8.066	***
Investment policy risk	.558	.900	.136	6.510	***
Approval policy risks	.760	1.000	—	—	—
Financing risk	.662	.781	.0849	.312	***
Interest Rate Risk	.743	1.000	—	—	—
Currency risk	.813	.905	.067	13.471	***
Market risk	.775	.758	.857	13.414	***
Inflation risk	.875	.903	.073	12.217	***
Popular opposition	.736	.875	.75	11.335	***
Exclusion risk	.951	.855	.82	10.625	***
Risk of racial discrimination	.901	.975	.071	13.667	***
Contractual risk	.743	1.000	—	—	—
Risk of legal changes	.745	.971	.091	10.781	***
Access review risks	.415	1.122	—	—	—
Legal regulatory risk	.701	.886	.075	12.358	***

5 Conclusions

5.1 Results and contributions

This paper prove that: Under the COVID-19, the risks of "Belt and Road" investment projects are political (personnel policy risk, cargo policy risk, tax policy risk, investment policy risk, approval policy risk), economy (financing risk, interest rate risk, exchange rate risk, market risk Inflation risk), security (popular opposition, Chinese exclusion risk, racial discrimination risk) and law (contractual risk, legal change risk, access review risk, legal regulatory risk) four risks.

At the same time, this study has contributions to provide 4 suggestions:

(1)Strengthen communication with countries along the "Belt and Road", demonstrate China 's confidence in winning epidemic prevention and prevention through press conferences. In response to overseas countries' concerns about the epidemic situation, follow-up progress of investment projects, existing orders and shipments, and whether related items will be contaminated by viruses, regularly report the progress of epidemic prevention and control and the latest situation of enterprise production and operation, and stabilize the countries along the "Belt and Road" Confidence in the Chinese economy and investment cooperation enterprises.

(2)Risk warning and emergency response to ensure the smooth implementation of the "Belt and Road" investment activities. Strengthen the dynamic monitoring of economic risks through G20, the

International Monetary Fund and other important international multilateral platforms, and establish and improve the “Belt and Road” investment project risk early warning and emergency response plans.

(3)Carry out education and training on the prevention and control of epidemic situation by expatriates, continuously monitor and track the health status of overseas investment project personnel, and do a good job in the ideological and stable work of the personnel.

(4)Provide legal assistance to resolve various legal risks of “Belt and Road” investment. Focus on issues such as the shortage of construction personnel, shortage of construction materials, delays in construction period, and social public opinion of countries along the “Belt and Road” caused by the ongoing epidemic.

5.2 Deficiency and prospect

In the process of the questionnaire survey, the sample size only selected a few countries with relatively large investment stocks along the “Belt and Road”. The sample size needs to be further expanded. In the future, a larger sample size can be used for classification research to observe more “One Belt” The risk commonality and difference of investment projects in countries along the “One Road” route can also be studied in depth for a typical or several comparable “Belt and Road” investment project countries, making the research results more robust.

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Short Selling and Stock Crash Risk: Based on the Mediating Effect of Accounting Information Quality

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Abstract: This paper investigates into the influence of short selling on stock crash risk and its mechanism. Using a sample of companies listed on Shenzhen Stock Exchange during 2011 to 2018, we find that short selling can reduce stock crash risk, and the inhibitory effect is a complete mediating effect through accounting information quality. It shows that the root cause of crash risk is the opacity of market information environment. Short selling makes the information reflected by stock more real, which reduces the stock crash risk from the source. The conclusions of this paper provide a evidence for standardizing information disclosure and the necessity of cultivating a transparent capital market.
Keywords: Short selling; Crash risk; Accounting information quality; Mediating effect

1 Introduction

Since the introduction of margin trading system in Chinese capital market in 2010, the impact of short selling on stock crash has been widely concerned. There are signs that stock crash risk has dropped significantly after companies entering the margin market (Tang Song, 2016). However, other scholars thought that short selling exacerbated the risk of stock crash (Chu Jian, 2016). At present, the conclusion of the impact of short selling on stock crash is not uniform. It is not convincing from the perspective of numerical correlation, so we should analyze the path of short selling affecting stock crash risk.

It is believed that the main reason for crash risk is information opaque. On the one hand, information opacity makes investors unable to know the real situation. Once the industry or company has negative information, it is easy to be over interpreted by external investors, causing market panic and the stock price to fall sharply (Yin, 2017). On the other hand, when company makes earnings management, the information opacity will increase and negative information will accumulate. As risk accumulated to a certain level, it will burst and stock crash risk happens (Piotroski, 2015). With the implementation of margin trading, Meng Qingbin (2019) proposed that short selling could restrict the irregularities of companies. Lu Yao (2016) pointed out that under short selling deterrence, managers has motive to improve the information disclosure. That is, short selling improves information disclosure and concentrated outbreak of bad news will be avoided, thus reducing stock crash risk. Therefore, accounting information quality may be the intermediary of the short selling and stock crash risk.

Based on the above analysis, this paper examines whether the introduction of short selling can reduce stock crash risk, and discuss the mediating effect of the accounting information quality. The possible contributions are revealing the fundamental path of short selling affecting stock crash risk and providing a reference for standardizing information disclosure to cultivate a transparent capital market.

2 Literature Review and Hypothesis

With short selling introduced into capital market, study shows that in the presence of short selling, misconduct such as earnings manipulation will reduce and the information efficiency is higher (Ahmed, 2020). Generally, managers have incentive to reduce the voluntary disclosure quality of negative information in order to reduce the losses caused by the rapid decline in shares (Huang Chao, 2019). Moreover, compared with non-standard companies, the securities lending companies will attract more securities analysts to follow the list, and help supervise and control the earnings manipulation behavior of listed companies. Therefore, the probability of financial restatement is lower. It can be said that the introduction of short selling mechanism is to obtain the information benefits of short selling transparency (Tyler, 2019). In view of this, the paper assumes:

H1: The short selling has improved the accounting information quality of the company.

Low information transparency is a main reason for stock collapse, including market information environment opaque (external cause) and management information disclosure manipulation (internal cause) (Quan Xiaofeng, 2016). According to the theory of asymmetric information, there are information superiority and inferiority parties in the capital market. When the superiority parties hide bad news for their own interests and cause negative information to be released collectively, the collapse will occur. Li Sufen (2020) believes that analysts can effectively reduce stock crash risk. Because outside analysts can

know more about the information. Accounting conservatism also increases information accuracy and helps with the stock price crash (Kim, 2016). Then, the hypothesis 2 is proposed.:

H2: The higher the accounting information quality, the lower stock crash risk.

The rules of margin trading can optimize the structure of underlying stocks, improve the quality of margin securities, restrain speculation, and finally reduce business risks (Cui Xuegang, 2019). So may short selling also reduce the stock crash risk directly? If the short selling can improve the accounting information quality and the high accounting information will further reduce stock crash risk, whether the mechanism of short selling reducing stock crash risk is mediated through accounting information quality? Based on the above analysis, the paper assumes:

H3a: Short selling reduces stock crash risk, and the accounting information quality has a partial mediation effect on the short selling to reduce stock crash risk.

H3b: Accounting information quality has a complete mediating effect on the short selling to reduce stock crash risk.

3 Research Design

3.1 Sample

We select the listed companies of Shenzhen stock exchange from 2011 to 2018 as initial sample. The data comes from the CSMAR database and the website of Shenzhen stock exchange. Then data are processed as follows: (1) financial companies are excluded; (2) the samples of ST, *ST and PT groups are excluded; (3) the missing samples were excluded; (4) to reduce the impact of outliers, we process the Winsorize of 1% and 99% levels of continuous variables. Finally, we obtain 11656 observations.

3.2 Measurement of variables

Refer to Hutton (2009), we choose *NCSKEW* and *DUVOL* to measure stock crash risk. The greater the value of index, the greater stock crash risk. First, we calculate $W_{i,\tau}$=Ln(1+$\varepsilon_{i,t}$). *i* represents each company. τ represents trading week, $\varepsilon_{i,t}$ is the residuals of formula (1):

$$R_{i,\tau} = \alpha_i + \beta_1 R_{m,\tau-2} + \beta_2 R_{m,\tau-1} + \beta_3 R_{m,\tau} + \beta_4 R_{m,\tau+1} + \beta_5 R_{m,\tau+2} + \varepsilon_{i,\tau} \quad (1)$$

$R_{i,\tau}$ refers to the rate of return of the company *i* at τ week. $R_{m,\tau}$ refers to the weighted average yield. Then,

$$NCSKEW_{i,t} = -\frac{n(n-1)^{3/2}\sum W_{i,t}^3}{(n-1)(n-2)(W_{i,t}^2)^{3/2}}; DUVOL_{i,t} = log\frac{(n_u-1)\sum_{down} W_{i,t}^2}{(n_d-1)\sum_{up} W_{i,t}^2} \quad (2)$$

And, *t* indicates t year, and n indicates the number of trading weeks. n_u and n_d represent $W_{i,\tau}$ of the company *t* is larger and less than the annual average yield week number.

In the relevant literature, most scholars use the modified Jones model to calculate earnings management (DA) to measure accounting information quality. And reference to Tang Song (2016), Short selling is represented by margin trading stocks. BD is the dummy variable. If the company is the margin in the year, BD is 1, otherwise it is 0.

As for other control variables, referring to Qin Zisheng (2016) and Tang Song (2016), we choose stock weekly average yield (*Ret*), stock specific return standard deviation (*Sigma*), natural logarithm of assets (*Size*), liability ratio *(Lev*), company market ratio (*MB*), *Year* and *Ind* dummy variable. The specific definition of variables is shown in Table 1.

Table 1 Definition of variables

Variable Name	Variable Symbol	Variable Definition
Stock Crash Risk	NCSKEW	See formula (2) for calculation
	DUVOL	See formula (2) for calculation
Stock Weekly Average Yield	Ret	Calculate through the weekly special rate of return of the company ($W_{i,\tau}$). See formula (1) for details
Stock Specific Return Standard Deviation	Sigma	Calculate through the weekly special rate of return of the company ($W_{i,\tau}$). See formula (1) for details
Margin Trading Stocks	BD	Dummy variable, if the company is the margin in the year, the value is 1, otherwise it is 0
Earnings Management	DA	Earnings management calculated by the modified Jones model
Natural Logarithm of Assets	Size	Natural logarithm of total assets of the company
Liability Ratio	Lev	Ratio of total liabilities to total assets
Company Market Ratio	MB	The ratio of the total market value of stocks to the total assets of the company

Year	Year	Dummy variable, if it belongs to the year, the value is 1; otherwise it is 0
Industry	Ind	Dummy variable, if it belongs to the industry, the value is 1; otherwise it is 0

3.3 Model design

To test hypothesis 1, the regression model is set up in this paper (1). As the larger the DA value, the lower the accounting information quality. So α_1 is significantly negative means that short selling can improve the accounting information quality.

$$DA_{i,t} = \alpha_0+\alpha_1 \times BD_{i,t}+Controls+FixedEffect+\varepsilon_{i,t} \quad (3)$$

To test hypothesis 2, we set the regression model (3). In this model, we expect β_1 to be positive. That is to say, the higher the accounting information quality, the lower stock crash risk.

$$NCSKEW_{i,t}/DOVOL_{i,t} = \beta_0+\beta_1 \times DA_{i,t}+Controls+FixedEffect+\varepsilon_{i,t} \quad (4)$$

To test hypothesis 3, regression model (5) is set up. When the δ_1 is significantly negative, it indicates that the accounting information quality is partially mediated by the intermediary role of short selling and stock crash risk. When δ_1 is negative but not significant, it indicates a complete mediation.

$$NCSKEW_{i,t}/DOVOL_{i,t} = \delta_0+\delta_1 \times BD_{i,t}+Controls+FixedEffect+\varepsilon_{i,t} \quad (5)$$

4.Results

4.1 Descriptive statistics

Table 2 Descriptive Statistics

Variable	Mean	Min	Max	Std Dev	Skewness
NCSKEW	-0.218	-2.118	1.365	0.404	-0.349
DUVOL	-0.14	-1.256	0.982	0.211	-0.00178
Ret	-0.00132	-0.0059	-0.000172	1.16E-06	-1.96
Sigma	0.0485	0.0188	0.109	0.000338	1.017
DA	0.0084	0.28	0.287	0.00707	0.0391
BD	0.179	0	1	0.147	1.675
Size	21.87	19.91	25.22	1.189	0.721
Lev	0.386	0.0459	0.854	0.0408	0.315
MB	2.293	0.214	10.43	3.511	1.936

Table 2 shows the descriptive statistical results. It can be seen: (1) All absolute value of skewness is less than 2, meaning that variables follow the normal distribution and the data are effective. (2) The standard deviation of NCSKEW and DUVOL are 0.404 and 0.211. There are obvious differences in stock crash risk between different sample. (3) The mean value of DA is 0.0084, showing that sample firms have earnings manipulation practice. The descriptive statistics of other variables are shown in table 2.

4.2 Regression results

In column (1) of Table 3, the coefficient of BD is -0.0099, which indicates that when the stock financing margin is issued, it will inhibit the earnings management behavior of enterprises. The smaller the accruals earnings management, the higher the accounting information quality. That is, short selling can significantly improve accounting information quality of enterprises. Hypothesis 1 has been confirmed. Because the introduction of short selling has made the company subjected to external supervision, thus restricting the behavior of information disclosure manipulation.

Column (2) and column (3) of Table 3 is the result of hypothesis 2. The coefficient of DA to stock crash risk are 0.0923 and 0.0739, with significant level of 10%. It shows that the accounting information quality is negatively related to the crash risk. Hypothesis 2 is confirmed.

Table 3 Regression Results of Models

	(1)DA	(2)NCSKEW	(3)DUVOL	(4)NCSKEW	(5)DUVOL
Constant	-0.291***	0.459***	0.814***	0.125	0.627***
	(0.0250)	(0.167)	(0.121)	(0.186)	(0.134)
BD	-0.00990***			-0.0675	-0.0367
	(0.00242)			(0.0180)	(0.0130)

DA		0.0923*	0.0739*		
		(0.0689)	(0.0497)		
Ret	11.25***	230.2***	139.7***	230.8***	140.2***
	(3.361)	(25.01)	(18.04)	(24.99)	(18.03)
Sigma	0.638***	6.664***	3.702***	6.542***	3.651***
	(0.198)	(1.474)	(1.063)	(1.473)	(1.063)
Size	0.0144***	-0.0349***	-0.0460***	-0.0189**	-0.0370***
	(0.00111)	(0.00727)	(0.00524)	(0.00823)	(0.00594)
Lev	-0.0458***	-0.0938***	-0.0580**	-0.112***	-0.0690***
	(0.00489)	(0.0363)	(0.0262)	(0.0363)	(0.0262)
MB	0.00232***	0.0295***	0.0120***	0.0324***	0.0137***
	(-0.000708)	(0.00436)	(0.00314)	(0.00442)	(0.00319)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Column (4) and column (5) of Table 3 is the result of testing the relationship between short selling and stock crash risk. The coefficients of BD are -0.0675 and -0.0367, but they are not significant at the level of 10%. So short selling can not reduce stock crash risk directly. Hypotheses 3b is refused.
According to figure 1, the short selling has no significant and direct effect on stock crash risk. Short selling can significantly improve the accounting information quality. The higher the accounting information quality, the lower stock crash risk. Therefore, the accounting information quality has a complete mediating effect on short selling to suppress stock crash risk. Hypothesis 3a is confirmed.

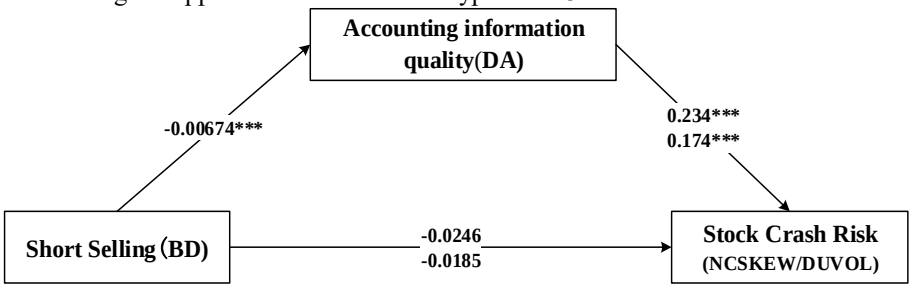

Figure 1 Mediating Effect of Accounting Information Quality

5 Conclusion

Taking the listed companies in Shenzhen stock exchange for 2011-2018 years as samples, this paper investigates the impact of short selling on stock crash risk and discusses its mechanism. We found that short selling can reduce stock crash risk, and this inhibition is mediated by the accounting information quality completely. Although the introduction of short selling can reduce stock crash risk from the final results, the underlying reason lies in the opaque information environment. Only by standardizing corporate behavior and disclosure of information in the capital market can we reduce stock crash risk from the source. Finally, since the literature has established the important role played by accounting information quality, the results of this research may be limited to solve the problem. Thus, it would be interesting to conduct further research focused on how to standardize corporate behavior and improve accounting information quality to reduce stock crash risk.

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The Effect of COVID-19 on Tanzanian Tourism: A Management Perspective

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Abstract: The tourism sector is currently one of the hardest-hit by the outbreak of COVID-19, with impacts on both travel supply and demand. This represents an added downside risk in the context of a weaker Tanzanian economy. The study contributes to our understanding on how Tanzanian tourism industry is adapting it operations as a response to COVID-19 and mitigating the effects of the pandemic crisis. A face to face interview of a total 658 respondents was conducted from four regions that are known for their tourism attraction. A qualitative data collection was analyzed through the assistance of nominal measurements scale and analyzed for their reliability and validity. Recommendations were also put forth to authorities and stakeholders in the industry.
Keywords: Tourism; Crisis management; COVID-19; Tanzania

1 Introduction

The most recent data reported in World Travel and Tourism (2017) shows that the direct contributions of the tourism industry to Tanzania's total GDP and employment was 4.7 percent (US$ 2.1 billion) and 3.9 percent (470,500 jobs), respectively and contributed about 21.4 and 8.7 percent of total export earnings (US$2,446.6 million) and investment (US$ 1.2 billion), respectively (WTTC – Tanzania, 2017). At this average a year, tourism has brought Tanzania the largest amount of foreign currency in the past 3 years. Thus, it is not surprising that the tourism sector is one of Tanzania's three growth sectors, and the second largest foreign exchange earner after agriculture.

However, due to the pandemic crisis it have reduced the need to embark on a holiday and the rise of trepidation especially in third world countries where it is known for lack of preventing tools and prevention measures of this deadly virus (COVID-19). It is important for Tanzania to take essential holistic strategic perspective measures during crisis time particularly emphasize for those destinations which are characterized by high shares of tourism in their overall economic with necessary prerequisite activities for maintaining sustainability of both workers in the sector and the overall economy.

Thus, from the above brief introduction the authors reviewed and analyzed previous studies that are related to tourism and crisis management and introduced a qualitative data collection where interviews were conducted.

2 Literature

In today's globalized world, risks and challenges have intransitively with ease of travel and faster movement of knowledge, goods, finance, as well with diseases. People are drifting from one place to another in search for work, better life, as well as leisure.[6] It should be known in the twenty-first century, three immense drivers of change to the tourism industry are climate change, terrorism and global health emergencies. All these are well known factors countries have experienced one or more of, as shown Figure 1.

The tourism industry in Tanzania, like no other industry, depends on the creation of favorable image in order to sell their products because it cannot be seen or touched before purchasing it (Salazar and Graburn, 2014). Consequently, the only way for a potential tourist to assess the quality of a tourism destination is by relying on the images and testimonials about a place. Crisis can negatively impact the image of a tourism destination (Sausmarez, 2013).

[6] UNWTO. International tourism growth continues to outplace the global economy. 2020.

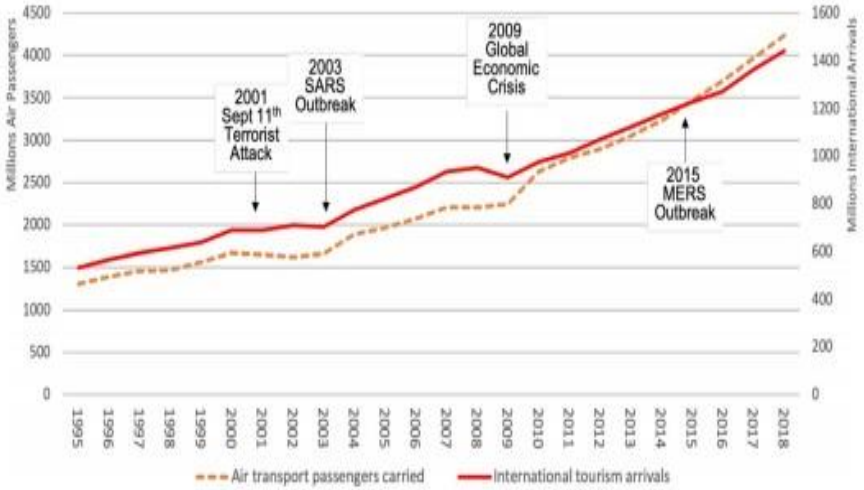

Figure 1 Impact of Major Crisis events on Global Tourism

Data source: World Bank (2020a, 2020b)

Burkle (2006) stated the relationships between pandemics and travel are pivotal to understanding health security and global change. With studies tending to focus on individual country impacts, there has not been the same appreciation of the systemic effects of pandemics (Brown et al., 2016). Siu and Wong (2004) revealed the studies of SARS from a tourism context and reported that the overall economic impact for Hong Kong was not as severe as expected, but that travel, tourism and retail were substantially affected as a result of the short-term decline in visitation. Moreover , in 2009, swine flu was defined a pandemic, resulted in approximately 284,000 deaths worldwide (Viboud & Simonsen, 2012). Russy and Smith (2013) investigated the effects of the pandemic on tourism in Mexico, suggesting that losing almost a million overseas visitors over a five-month period translated into losses of around US$2.8 billion, with European markets being the slowest to return. In Africa, the Ebola outbreak has been recognized as creating negative perceptions and uncertainty for African destinations that were affected by Ebola (Maphanga & Henama, 2019; Novelli et al., 2018).

There is an importance of taking a strategic perspective through crisis management which in general can be described as "measures of all types which allow a business to cope during sudden crisis or danger situation that may impact the economy and social interaction of tourist destinations. In order to return as quickly as possible to normal business routine" (Scott, D, et, al. 2019) suggested strategic crisis management with the goal to reduce risk and boost willingness when crisis occur, (Ritchie, 2018) portrayed combining tourism-specific insight with concepts from other disciplines may spotlight a sustainable tourism and more perspective that can be used to make tourism more environmentally, socially and economically beneficial. In this manner, tourism activities should be focused on resource management in which all economic, social and aesthetic requirements are fulfilled (Macarena Lozano-Oyola, 2012).
There are note worthy initiatives by the Tanzanian authorities to come back strong from pandemic crisis, the most current one is to be launched on 1st July 2020 by the Minister for Natural Resources and Tourism, Dr Hamisi Kigwangalla is a 'Domestic Tourism Promotion Initiative (DTPI)' targeted to raise domestic tourism from locals and foreigners living in the country. This initiative will include an array of cultural and sporting events but also training of the youth across the country in various areas in the tourism value chain delivery (Tanzania Daily News, 2020).

More and more tourists are having faith in the Tanzanian's management of the COVID-19 crisis and the country is experiencing an influx of visitors since it opened it doors in June 2020. The stakeholders in tourism are adapting and complying with regulations issued by the government; such as COVID-free certification by all visitors, screening of every visitor, active designated isolation centers, tourism facilities display of COVID-19 free zone poster, hiring and training a COVID-19 Liaison Officer also a Tourism COVID-19 Response Team has been put in place all these are new features as part of the Standard Operating Procedures.[7]

[7] Further Africa. Zanzibar's tourism resumes as Tanzania is declared Corona virus-Free. 2020.

3 Methodology

For the purpose of this study, the notional approach was taken where 10 academic publications directly related to the issue of pandemic crisis and the effects to tourism have been reviewed. Qualitative data collection was also employed through semi-structured interviews were a total of 658 local residence from tourist regions (Ngorongoro, Serengeti, Mikumi and Moshi) were interviewed. The respondents were not stratified with regard to their religion, gender or age, although it was recognized that this would doubtful influence their perceptions and opinions, it was felt that the variety would enrich the data rather than detract from it.

The objective of the survey was to explore the views of selected individuals rather than to obtain an absolute set of data. In order to fulfill the practical aim of this study, the researchers developed a rating scale that is easy to interpret towards improving the sustainability of tourism activities in designated location. The selected questions within this framework, were based on YES or No response.

Table 1 below provides an overview of the survey questions developed and issued to respondents. The focus of every questions was to comprehend, capture and bring out the perspectives of how sustainability tourism in the destination area without the rise of discrimination or marginalization of the foreign tourist and asking respondents to rate their overall satisfaction for each item.

4 Analysis

Like any other industry, tourism faces modifications which are stirred with technological, social and environmental changes. Sustainable new concepts of tourism have emerged that understand tourism on a different and more social-responsible and educative way.

The data collection includes two range of aspects, the awareness of the pandemic and the socioeconomic impact. We aimed to use a single source to measure all the target destinations to ensure uniformity in the results obtained.

According, to the data the reliability and validity data are summarized in table 2. The model provides an acceptable overall adjustment, namely, chi-square = 67.188; degrees of freedom = 24; normed fit index = 0.942; comparative fit index = 0.977 and root mean square error of approximation = 0.041.

In the analysis the slightly higher of the awareness of the deadly COVID-19 virus proportion (94.5%) is notable. Largest group of tourist are from the western countries (63.8%). Domestic tourism is quiet low (10.9%) due to fear of gathering during this time. The importance of foreign tourism has been emphasized by the government and prove to be of a tremendous importance to the Tanzanian economic growth at large and individual household incomes. With regard to the economic situation, the majority of respondents were dependant of the tourism sector as their source of employment (82.9%). The data also showed that the respondents believe tourism management have properly organized and arranged necessary precautions and resources for tourists (59.2%). However, on the question of " if they are happy to contact with a foreign tourist" data varied as from Ngorongoro (10.9%), Moshi (38.3%), Serengeti (40.8%), and Mikumi (13.9%).

Table 1 List of Questionnaire

Questions	Mikumi		Ngorongoro		Serengeti		Moshi	
A . Awareness Questions	Y	N	Y	N	Y	N	Y	N
Do you understand about Covid19?	√		√		√		√	
Do you understand how is it spread?		√	√		√		√	
Are you aware of the prevention measures?	√		√		√		√	
Do you prefer western treatment?	√		√			√	√	
Do you prefer traditional treatment?	√		√		√		√	
Do you know any person contracted with the virus?	√		√		√		√	
Are you satisfied with government effort about COVID 19	√		√		√		√	
Are you aware of any measure the government have taken on tourism management?	√		√		√		√	
Do you think tourism board have well educated their staff on how to handle tourism during time of COVID-19?	√		√		√		√	

B. Socio-economic Questions				
Are tourists satisfied with the price and quality during this time?	√	√	√	√
Is the tourism business the base and of your income?	√	√	√	√
Are there less tourists compared to before COVID-19?	√	√	√	√
Are the tourists appropriately handled by the management?	√	√	√	√
Do you think the local Nyungu prevention method should be done to all arriving tourists?	√	√	√	√
Are you happy to contact with a foreign tourist?	√	√	√	√
Will you be willing to assist a foreign tourist?	√	√	√	√
In case of emergencies are there any isolated area planned for tourists?	√	√	√	√

Moreover when analyzing tourism management the respondents were officials who work in tourist hotels and are the people who have direct contact with the tourists, their response was that not all hotels are in operation or opened during this time of (65%) and ones that are open have no enough equipment like masks, sanitizers and ambulance for emergency to care for tourist during this time (32%). However, the five star hotels which mostly are private owned are well equipped and nearly all of them are opened (88%) after the announcement of the government to reopen business operations.

Table 2 Reliability and Validity Values

Factor	Construct Reliability		Validity	
	Coefficient Alpha	Composite Reliability	Discriminant Validity	Convergent Validity
Tourism Business	0.682	0.789	0.690–0.814	0.658–0.805
Resource availability to tourist	0.776	0.777	0.748–0.852	0.684–0.728
Local residence awareness	0.762	0.797	0.684–0.800	0.740–0.759

5 Conclusion

The tourism industry in Tanzania has greatly suffered during the COVID-19, with an estimate of 480,00 people going jobless this year if the pandemic continues (The Citizen, 2020). The country has suffered a sizable loss in tour operations as airlines were grounded and tourism activities had to be shut down.[8]

We recommend that the authorities involved to enforce and implement additional crisis management strategies that expand and strengthen digital footprint and good reputation. Including but not limited to making sure that all the tourists that visit Tanzania will leave their testimonials that could influence more tourist travel decisions. Documentaries or short videos could be recorded to show the real situation as the tourists enjoy their stay in Tanzania, you what they say “a picture is worth a thousand words”. Continual improvement, quick response, and management of quality, safety, and reputation of the tourism sector have great potential benefits not only to the Tanzanian economy but also individuals heavily depending on tourism industry.

In conclusion, the government is successful in mitigating the effects of COVID-19 in the country and we have seen great measures taken and how the sector’s stakeholders are adapting to new Standard Operating Procedures (SOPs) to ensure sustainability and safety. The result is that more tourists are flowing back in Tanzania confident with the safety measures in place and the sector is slowly recovering.

[8] Further Africa. Tanzania’s measures to protect its tourism industry. 2020.

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Economic Policy Uncertainty, Stock Ownership and Stock Price Crash Risk

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Abstract: Using a sample of Shanghai and Shenzhen A-share listed companies from 2009 to 2018, this paper studies the impact of economic policy uncertainty on stock price crash risk. The results show that the increase of economic policy uncertainty will significantly increase the risk of stock price collapse, which indicates that economic policy uncertainty is one of the incentives for risk of collapse. Compared with non-state-owned enterprise, the positive correlation between economic policy uncertainty and stock price crash risk is more significant in state-owned equity enterprises.

Keywords: Economic policy uncertainty; Stock ownership; Crash risk; Principal-agent theory

1 Introduction

There are frequent fluctuations in China's stock market due to policy changes. Studies by some scholars have shown that the consequences of economic policy uncertainty may have three aspects: affecting the development of macro-economy, leading to misconduct of the enterprise and increasing the level of stock market volatility (Bake et al, 2016). In recent years, scholars have focused their research on the uncertainty of economic policy. They believed that the uncertainty of economic policies significantly enhanced the risk characteristics of the stock market, aggravated the correlation between stock returns and the level of volatility, which provided the possibility for the outbreak of extreme risks (Lei Likun et al, 2018). In addition, Cui Xin (2018) found that "uncertainty of economic policy" is a very important speculative factor, and its exposure will trigger investors' speculative behavior, thus exacerbating the risk of stock price crash and collapse. Shan Lu et al. (2019) found that the uncertainty of economic policy caused the decline of market confidence and increased the volatility of stock prices. Thus, one of the key points of the study of economic policy uncertainty is the stock market.

Reviewing previous research literature, it can be found that the research on economic policy uncertainty focuses on discussing the impact of economic policy uncertainty on enterprise behavior (Zhao Meng et al, 2020), stock yield (Zhang Weili et al, 2017) and stock price volatility (Lei Likun et al, 2018). There is little literature on the relationship between economic policy uncertainty and stock market risk. In view of this, this paper selects A-share listed companies from 2009 to 2018 as the research object to study the impact of economic policy uncertainty on stock price crash risk. In addition, due to the different sensitivities of state-owned enterprises and non-state-owned enterprises to policies, this paper will further investigate the differences in the relationship between economic policy uncertainty and stock price crash risk in enterprises with different equity properties.

2 Theoretical Analysis and Research Hypothesis

From the study of the risk of stock market crash, we can see that the reason for the risk of stock price collapse lies in the management's cover up of bad news. The uncertainty of economic policy affects the risk of stock price collapse from two aspects: principal-agent and information asymmetry. First, when the uncertainty of economic policy is relatively high, the uncertainty of external environment is also increasing (Dongyang Hao et al, 2018), and the prediction and supervision of management behavior is more difficult. Management may pursue private gains through inefficient investments and conceal negative news if future projects lose money. Secondly, higher economic policy uncertainty aggravates the external environment changes faced by enterprises. This exacerbates the information asymmetry between the company and the market and makes it more difficult to supervise the management (Feiyang Cheng et al, 2020). It can be seen that self-interest management has enough motivation to cover up bad news such as investment failure until bad news accumulates to the ceiling that the company can accommodate and centrally releases into the market and triggers the risk of collapse. This paper proposes hypothesis 1:

H1: other conditions remain unchanged, the higher the uncertainty of economic policy, the higher the risk of stock price collapse.

State-owned enterprises' purpose is to fulfill their national mission and policy tasks, so their operation is more sensitive to policy changes (Singh Jewellord Nem et al, 2018). Based on this, the paper puts forward the hypothesis 2:

H2: compared with non-state-owned enterprises, the positive correlation between economic policy uncertainty and stock price crash risk is more significant in state-owned equity enterprises.

3 Research Design

3.1 Data sources

This paper selects the data of Shanghai and Shenzhen A-share listed companies from 2009 to 2018 as the original samples, and the initial samples are screened according to the following principles: (1) excluding all listed companies in financial industry; (2) Excluding 2009-2018 has become ST or ST* company; (3) excluding samples with less than 10 observed value. After the above screening procedures, 21087 sample observations were obtained. Except for the EPU, all the data are from the Tai'an database.

3.2 Variable definition

Referring to Kim et al., we choose NCSKEW and DUVOL to measure the risk of stock crash. First, we use the weekly earnings data of each year's stock I to make the following regression:

$$R_{\mathrm{i,t}} = \alpha_0 + \alpha_1 R_{\mathrm{m,t-2}} + \alpha_2 R_{\mathrm{m,t-1}} + \alpha_3 R_{\mathrm{m,t}} + \alpha_4 R_{\mathrm{m,t+1}} + \alpha_5 R_{\mathrm{m,t+2}} + \varepsilon_{i,t} \quad (1)$$

$R_{\mathrm{i,t}}$ represents the return rate of cash dividend reinvestment considered by stock i in week i; $R_{\mathrm{m,t}}$ represents the weighted average weekly market return rate of the outstanding market value of all stocks in week i. Next, we convert the residual term logarithmically in this paper.

$$W_{\mathrm{i,t}} = \ln(1 + \varepsilon_{i,t}) \quad (2)$$

Then, the following variables are constructed to indicate the risk of stock price crash.

$$NCSKEW_{\mathrm{i,t}} = -\frac{\mathrm{n(n-1)^{\frac{3}{2}}}\sum W_{i,t}^3}{\mathrm{(n-1)(n-2)}(\sum W_{i,t}^2)^{\frac{3}{2}}} \quad (3)$$

$$DUVOL_{\mathrm{i,t}} = ln\left\{\frac{\mathrm{(n_u-1)}\sum_{DOWN} W_{i,t}^2}{\mathrm{(n_d-1)}\sum_{UP} W_{i,t}^2}\right\} \quad (4)$$

Among them, n is the number of weeks a stock trades in a year; n_u represents the specific weekly return rate of the stock I, and $W_{\mathrm{i,t}}$ represents the number of weeks that the average return rate of the stock W_{i} is higher than that of the year.

The uncertainty index of economic policy: on the basis of the EPU index jointly released by Stanford University and the University of Chicago, the annual monthly average is calculated and then the logarithm is taken to measure the economic policy uncertainty of the year. The larger the index, the more uncertainty about economic policy that year. Referring to Cui Xuegang, we control the following variables: Size, Lev, ROA, TOP1, BM, SIGMA, RET, TURNOVER, ABACC and RETURN. In addition, we also control the impact of year and industry.

Table 1 Variable definition table

variable name	variable definition
NCSKEW	Negative return skewness coefficient: represents the size of the risk of collapse. The higher the value, the greater the risk of stock price crash
DUVOL	Volatility ratio: represents the risk of a crash. The higher the value, the greater the risk of a crash
lnEPU	Economic policy uncertainty: take the log value of the annual monthly average economic policy uncertainty index
SOE	Nature of equity: value is 1 if the enterprise is a state-owned enterprise, otherwise it is 0
SIZE	Company size: the natural log of the company's total assets at the end of the year
LEV	Asset-liability ratio: the ratio of total liabilities to total assets at the end of the period
ROA	Return on total assets: ratio of net profit to average balance of total assets
TOP1	Shareholding ratio of the largest shareholder: the ratio of the number of shares held by the largest shareholder to the total equity of the company
BM	Book-to-market ratio: the ratio of total assets to the stock market value at the end of the year
SIGMA	Volatility of share price return: the standard deviation of a company's specific return rate for the week of the year

RET	Average stock price return: Weekly average stock price return over a year
TURNOVER	Stock turnover rate: The ratio of the current year's turnover rate minus the previous year's turnover rate to the current year's turnover rate
ABACC	Corporate transparency: Absolute discretionary accruals based on a modified Jones model
RETURN	Return on stocks: The annual return on stocks
YEAR	Virtual variable of the year: determine the value of data time of the year is 1, otherwise it is 0
IND	Industry dummy variable: when it is determined to be the industry data, the value is 1; otherwise, it is 0

3.3 Regression model

This paper selects A share listed companies as the research sample, and the explanatory variable is the risk of stock price crash. The negative variable bias coefficient (NCSKEW) and the Earnings Fluctuation Ratio (DUVOL) are used as the explanatory variables. The explanatory variable is the uncertainty of economic policy, and is measured by the average value of the monthly average economic policy uncertainty index (lnEPU). The model was constructed by multiple regression analysis to verify H1, as shown in model (5):

$$NCSKEW_{i,t}/DUVOL_{i,t} = \alpha + \beta_1 lnEPU_t + \gamma Controls_{i,t} + \varepsilon_{i,t} \quad (5)$$

In order to verify the impact of different nature of enterprises on the relationship between economic policy uncertainty and stock price crash risk, the nature of equity is used as a moderator variable, and a multiple regression analysis is added to the model to verify H2, as shown in model (6):

$$NCSKEW_{i,t}/DUVOL_{i,t} = \alpha + \beta_1 lnEPU_t + \beta_2 lnEPU_t * SOE_{i,t} + \gamma Controls_{i,t} + \varepsilon_{i,t} \quad (6)$$

4 Empirical Test and Analysis

4.1 Descriptive statistics

Table 2 reports the descriptive statistical results of the main variables in this paper. The average value of NCSKEW is -0.264, the minimum value is -2.187, the maximum value is 1.349; the average value of DUVOL is -0.178, the minimum value is -1.287 and the maximum value is 0.938. To a certain extent, this shows that there is a significant difference in the risk of stock price collapse.

Table 2 Descriptive statistics of major variables

	N	mean	p50	sd	min	max
NCSKEW	21,087	-0.264	-0.228	0.644	-2.187	1.349
DUVOL	21,087	-0.178	-0.178	0.459	-1.287	0.938
lnEPU	21,087	5.375	5.200	0.539	4.594	6.132
ABACC	21,087	0.0690	0.0452	0.0759	0.000773	0.422
ROA	21,087	0.0418	0.0382	0.0566	-0.190	0.208
SIZE	21,087	22.15	21.98	1.272	19.85	26.06
LEV	21,087	0.438	0.434	0.208	0.0526	0.892
BM	21,087	0.608	0.606	0.239	0.120	1.114
TOP1	21,087	35.17	33.31	15.02	8.720	74.98
SOE	21,087	0.409	0	0.492	0	1
RETURN	21,087	0.145	-0.0368	0.610	-0.593	2.558
TURNOVER	21,087	-0.218	-0.0317	0.797	-3.208	0.835
RET	21,087	-0.00120	-0.000939	0.000934	-0.00514	-0.000147
SIGMA	21,087	0.0464	0.0437	0.0170	0.0173	0.102

4.2 Regression analysis

From (1) and (2), we can see that when the explained variable is NCSKEW, the corresponding coefficient of lnEPU is 0.152, which is significant at the 1% level. When the explained variable is DUVOL, the corresponding coefficient of lnEPU is 0.0732, which is significant at the 1% level. This indicates that the uncertainty of economic policy is positively correlated with the risk of stock price crash, that is, the higher

the uncertainty of economic policy, the greater the risk of stock price crash, which supports the hypothesis H1 of this paper.

From (3) and (4), we can see that after adding the moderating variable of stock ownership, the coefficient of lnEPU * SOE is significantly positive at 1% level. The positive correlation between economic policy uncertainty and stock price collapse risk is more significant in state-owned equity enterprises, supporting the hypothesis H2 in this paper. There are two reasons. First, compared with non-state-owned enterprises, state-owned enterprises are more sensitive to policy changes because their primary purpose is to complete the national mission and policy tasks. Second, state-owned enterprises have a close relationship with the government and are more likely to enjoy various policy preferences. As a result, when state-owned enterprises are confronted with negative external environment impacts, their stock prices will be more affected than non-state-owned enterprises.

Table 3 Regression Results of Models

VARIABLE	(1)NCSKEW	(2)DUVOL	(3)NCSKEW	(4)DUVOL
lnEPU	0.152***(0.0214)	0.0732***(0.016)	0.136***(0.022)	0.0633***(0.017)
lnEPU*SOE			0.0185***(0.002)	0.0113***(0.001)
SIZE	-0.0471***(0.005)	-0.0470***(0.004)	-0.0374***(0.006)	-0.0411***(0.004)
LEV	-0.0426(0.029)	-0.0203(0.021)	-0.0167(0.029)	-0.00436(0.021)
ROA	0.535***(0.091)	0.388***(0.065)	0.447***(0.092)	0.334***(0.0656)
TOP1	-0.000823***(0.000)	-0.000430**(0.000)	-0.000380(0.000)	-0.000158(0.000)
BM	-0.0853***(0.029)	-0.00774(0.020)	-0.103***(0.028)	-0.0187(0.021)
SIGMA	7.153***(1.278)	3.866***(0.913)	6.565***(1.276)	3.505***(0.912)
RET	235.6***(23.06)	131.2***(16.41)	229.0***(22.98)	127.1***(16.37)
TURNOVER	-0.0288***(0.007)	-0.0207***(0.005)	-0.0286***(0.007)	-0.0206***(0.005)
ABACC	0.232***(0.059)	0.122***(0.043)	0.199***(0.060)	0.102**(0.043)
RETURN	-0.0472***(0.012)	-0.0664***(0.009)	-0.0488***(0.012)	-0.0674***(0.009)
YEAR	YES	YES	YES	YES
IND	YES	YES	YES	YES
Constant	-0.0896(0.162)	0.380***(0.119)	-0.155(0.161)	0.340***(0.119)
Observations	21,087	21,087	21,087	21,087
R-squared	0.082	0.086	0.086	0.090

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

4.3 Robustness test

In order to improve the credibility of the empirical test, and further reference to Callen and Fang method, the difference between the downlink and uplink frequency of the company's stock returns (CRASH) is used to measure the risk of share price collapse.

The results show that the regression coefficient between lnEPU and CRASH is 0.0285, which is significant at 1%, indicating that economic policy uncertainty is positively correlated with the risk of stock price crash. After the equity property was added into the model as a moderator variable, the regression coefficient of the cross-multiplication term was 0.00228, which was significant at 1%, which verified the hypothesis H2. In general, they are consistent with the regression results above, indicating that the results are robust.

5 Conclusions

We select the data of Shanghai and Shenzhen A-share listed companies from 2009 to 2018 as original samples to study the impact of economic policy uncertainty on stock price crash risk. The study found that the higher the uncertainty of economic policy, the greater the risk of stock price collapse. Further research shows that the positive correlation between the uncertainty of economic policy and the risk of stock price collapse is more significant than that of non-state-owned enterprises. It can be seen that the frequent introduction of economic policies aggravates the uncertainty of economic policy. Under the uncertainty of economic policy, listed companies will hide some adverse news to the company, so that they can get more investment. This makes these bad news of the company unable to release in time, and the risk of share price collapse will be greatly improved.

Therefore, regulators can consider reducing the frequency of economic policy to a certain extent, stabilizing the market by strengthening the stock market system construction, actively promoting the implementation of short selling mechanism, and providing more abundant risk prevention tools for all kinds of investors. At the same time, we must pay attention to state-owned enterprises. Strengthen the supervision of state-owned enterprises, because the risk of stock price collapse is the sudden release of negative news for the company, causing the company's future stock price to collapse. Strengthening the supervision of state-owned enterprises can reduce the principal-agent problem, thereby reducing the risk of share price collapse.

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Scheduled Disclosure Lags of Annual Report, Auditor Industry Specialization and Audit Quality

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Abstract: Based on the empirical data of China's 2014-2018 A-share listed companies this paper establishes a multiple linear regression model to study the relationship between Scheduled disclosure lags and audit quality. We found that the longer the time lag is, the higher the audit quality is, and the Auditor industry specialization restrains the negative correlation between scheduled disclosure lags of annual report and audit quality. These findings reveal the low efficiency of the current audit market and provide a basis for further improving the professional services of auditors in China.
Keywords: Scheduled disclosure lags; Auditor industry specialization; Audit quality; Audit input

1 Introduction

Any efficient market cannot be separated from the input-output attention. Audit market is also the same, domestic and foreign scholars are very concerned about the audit efficiency. Audit quality is an important part of audit output. Some scholars think that effective audit input is the guarantee of audit quality (Lobo and Zhao, 2013), when the audit input cannot play an effective role, the audit quality will become worse with the increase of audit input (Blankley et al. , 2014) , other scholars also show that the more audit input, the higher the quality of the audit output (Li Wei et al. , 2018).This paper measures the audit input by scheduled annual report disclosure lags. The existing studies have shown that the longer the annual report disclosure lag of companies with internal control weakness or higher agency costs (Azami and Salehi, 2017) , this will cause companies to receive non-standard audit opinions in the future (Chan and Luo et al., 2016) , that is, the longer the annual report disclosure time lag, the lower the audit quality. Then in the game between auditors and customers, auditors do not occupy a dominant position, and often have to accept the scheduled disclosure time set by listed companies. Under this background, is the relationship between audit input and audit output still valid?

Auditors with industry specialization have developed higher audit skills and specialization due to the audit experience of several companies in the industry (Jaggi and Mitra et al., 2015) , and can effectively find out industry-specific problems. Based on the background of reporting company financial reports in the United States,Cao and Chen et al. found that having the Big Four auditors can greatly reduce the adverse consequences of late reporting(Cao and Chen et al.,2016). However, whether this phenomenon exists in China remains to be studied. In addition, some auditors have industry specialization due to their rich clients, which leads to poor independence of these auditors (Song Zilong and Yu Yumiao, 2018) . Can auditors with industry specialization use their industry specialization to make up for the annual report? The low efficiency of scheduled disclosure time lag is the problem studied in this paper. Based on the above issues, in the context of China's unique annual report appointment disclosure system, this paper uses China's A-share non-financial listed companies from 2014 to 2018 as a sample to study the impact of the time lag in annual report scheduled disclosure on audit quality and the role of auditor industry specialization.

The main contributions of this paper are: Firstly, it enriches the research on audit input and output. This paper is based on China's unique listed company information disclosure system, which is rarely studied abroad; secondly, it expands the research on audit quality by the industry specialization of auditors. Most of the existing literature directly studies the influence of auditor industry specialization on audit quality. This paper changes the perspective to study the regulatory role of auditors' professional specialization.

2 Research Hypothesis

2.1 Scheduled disclosure lags and audit quality

The time lag of appointment disclosure will make auditors perceive the company's earnings management, and managements will also conduct earnings manipulation based on the auditor's expectations (Commerford and Hermanson,2016) , and tend to conceal earnings manipulation, fearing that auditors will reveal their conduct, and hoping that auditors will finish the audit business as soon as

possible (Luo Wenbo and Li Minxin,2019)[, this will inevitably lead to a shorter time lag for the disclosure of annual reports and bad audit quality. However, the shorter the time is, the shorter the time for the auditor to design the audit process is, and the more likely the management is to engage in earnings manipulation. When this signal is captured by the auditor, the auditor will pay more attention to risk and increase the level of audit effort. Based on the above analysis, the first hypothesis is put forward as follows:

Hypothesis 1: After controlling for other factors, scheduled disclosure lags of annual report is negatively correlated with audit quality.

2.2 Scheduled disclosure lags, auditor industry specialization and audit quality

Audit quality is the joint probability that the auditor finds and reports the misstatement and fraud of the client company. Industry specialization enables auditors to use their specialized industry audit skills to better understand customer business characteristics, transaction processes, internal control systems, and so on combined with the characteristics of the customer's industry, design more reasonable and efficient audit procedures and collect more appropriate audit evidence (Li Sifei et al. , 2014). When the auditor is ready to issue a non-standard audit opinion, the client will discuss with the auditor to achieve a change from a non-standard audit opinion to a standard audit opinion (Lai Yuyun and He Yun , 2018), in order to gain more time for discussion, management deliberately delays the scheduled disclosure of annual reports, and auditors with industry specialization often compromise with client companies to preserve their industry specialization, which can also have a negative impact on audit quality. However, the cost of losing industry specialization is greater. Based on the above analysis, the second hypothesis of this paper is proposed:

Hypothesis 2: All other things being equal, auditor industry specialization have a negative moderating effect on the negative correlation between scheduled disclosure lags and audit quality.

3 Sample Selection and Study Design

3.1 Sample selection

In this paper, we select A-share listed companies from 2014 to 2018 and these data are processed as follows: (1) Companies in financial industry are excluded; (2) Companies in ST, PT and delisting are excluded; (3) Eliminate the sample of companies whose financial data are missing; (4) To avoid the influence of the extreme value, the extreme value of all continuous variables above and below 1% is shortened. After the above procedure, 9932 sample observations were obtained. All the data come from CSMAR database except audit quality data collected and sorted by hand. This paper uses STATA 14.0 for data processing and statistical analysis.

3.2 Variable definition

3.2.1 Audit quality

The Audit Quality (QUAL) is a proxy variable that uses the adjusted Jones model to calculate the discretionary accruals.

$$\frac{TA_{i,t}}{A_{i,t-1}} = \alpha_1\left(\frac{1}{A_{i,t-1}}\right) + \alpha_2\left(\frac{\Delta REV_{i,t} - \Delta AR_{i,t}}{A_{i,t-1}}\right) + \alpha_3\left(\frac{PPE_{i,t}}{A_{i,t-1}}\right) + \varepsilon_{i,t} \quad (1)$$

Among them, $TA_{i,t}$ is the total accrual item, $\Delta REV_{i,t}$ is equal to the current year operating profit minus the cash flow generated by operating activities; $\Delta AR_{i,t}$ is the difference between the accounts receivable of the current year and the accounts receivable of the previous year; $PPE_{i,t}$ is the original value of the fixed assets at the end of the current year; $A_{i,t-1}$ is the total assets at the end of the previous year; i and t represent the sample company and year respectively. The residuals of the model (1) are calculated, and the controllability accruals under the modified Jones model are obtained. This paper uses the absolute value of controllable accrued profit to measure the earnings quality. The bigger the value is, the worse the earnings quality is.

3.2.2 Scheduled disclosure lags

As the annual report pre-disclosure system provides that listed companies can change the published annual report pre-disclosure time. In order to exclude the influence of the change of the pre-appointment disclosure time on the research results, this paper chooses the first pre-appointment disclosure time to measure (Yu Yumiao et al. , 2016).

3.2.3 Auditor industry specialization

This paper uses the industry market share method to estimate the auditor industry specialization. As shown in model (2) (Zhao Yi et al ,2020) , IMSR represents the market share that is given to the customer

to calculate the total revenue. In this paper, dummy variable is used as explanatory variable. If IMSR is greater than or equal to 10%, i firm is defined as having industry specialization in K industry, and DummyIMSR value is 1, otherwise, it is not considered as having industry specialization, and its value is 0. The proxy variable of the auditor industry specialization is the firm industry specialization.

$$IMSR_{i,k} = \sum_{i,\,j=1} REV_{i,kj} \,/\, \sum_{i=1} \sum_{j=1} REV_{i,kj} \qquad (2)$$

3.3 Selection of control variable

This paper takes company Size, asset and liability ratio (Lev) , total net profit margin (ROA) as control variables and adds them into the regression model(Yu Yumiao et al. , 2016; Bae et al ,2017).Finally, in order to control the influence of different years and industries, the paper also sets the virtual variables of years and industries. The definition and interpretation of specific variables in the main regression are detailed in Table 1.

Table 1 Variable Definitions

Variable type	Variable name	Variable symbol	Variable description
Explained variable	Audit Quality	*ABSAQ*	According to model (1)
Explanatory variable	Scheduled disclosure lags	*Lags*	Natural logarithm of the number of days between the first scheduled disclosure date and the financial statement date
Moderator	Auditor industry specialization	*DummyISMR*	According to model (2)
Control variable	Company Size	*Size*	Natural logarithm of total assets at yearend
	asset and liability ratio	*Lev*	Total liabilities / total assets
	Net profit margin on total assets	*ROA*	Net profit / total assets
	Audit fee	*AuFees*	Natural logarithm of audit fee
	Quick Ratio	*Quick*	(Current assets at the end of the period inventory / current liabilities at the end of the period
	Level of corporate governance	*Commit*	The number of the Special Committee of the Board of Directors of the auditee in the reporting period
	Company growth	*Growth*	The rate of increase in operating income for this year as compared with that of the previous year
	Non-compliance	*Illegal*	Take 1 when the company under review in the reporting period, otherwise 0
	Operating profit	*Profit*	take 1 When the business profit of the unit under review is Greater Than 0, otherwise take 0
	Annual dummy variable	*Year*	Set by year
	Industry dummy variable	*Industry*	According to the 2012 version of the CSRC industry classification code settings, use a classification code

3.4 Model design

For Hypothesis 1, a multiple linear regression model is proposed to test the relationship between scheduled disclosure lags and audit quality:

$$\begin{aligned} ABSAQ_{it} = {} & \beta_0 + \beta_1 Lags_{it} + \beta_2 Size_{it} + \beta_3 Lev_{it} + \beta_4 ROA_{it} + \beta_5 AuFees_{it} + \beta_6 Quick_{it} \\ & + \beta_7 Commit_{it} + \beta_8 Growth_{it} + \beta_9 Illegal_{it} + \beta_{10} Profit_{it} + \sum Year + \sum Industry + \varepsilon_{it} \end{aligned} \qquad (3)$$

For Hypothesis 2, we add Dummy and interactive Lags * DummyIMSR to model (3) to verify the moderating role of auditor profession specialization in the process of the impact of scheduled disclosure lags on audit quality, as shown in model (4) .

$$\begin{aligned} ABSAQ_{it} = {} & \beta_0 + \beta_1 Lags_{it} + \beta_2 DummyIMSR_{it} + \beta_3 DummyIMSR_{it} * Lags + \beta_4 Size_{it} + \beta_5 Lev_{it} \\ & + \beta_6 ROA_{it} + \beta_7 AuFees_{it} + \beta_8 Quick_{it} + \beta_9 Commit_{it} + \beta_{10} Growth_{it} \\ & + \beta_{11} Illegal_{it} + \beta_{12} Profit_{it} + \sum Year + \sum Industry + \varepsilon_{it} \end{aligned} \qquad (4)$$

4 Empirical Results

4.1 Descriptive statistics

Table 2 illustrates the descriptive statistical results for each variable. QUAL is audit quality, measured in absolute terms by the residuals in the modified Jones model, with an average of 0.063. The median age of scheduled disclosure lags is 4.554 and 95 days before the natural logarithm, suggesting that more than half of listed companies choose to release their annual reports in April each year, putting enormous pressure on auditors, it also puts the ability of auditors to the test. The industry specialization DummyIMSR has an average value of 0.277, indicating that 27.7 per cent of auditors have industry specialization, suggesting that China's market share of auditors is high. The sample companies still have big difference in Size and Quick, which will influence audit quality to some extent.

Table 2 Descriptive Statistics

Variable	Sample size	Mean	Standard deviation	Minimum	Median	Maximum
QUAL	9932	0.063	0.067	0.001	0.043	0.384
Lags	9932	4.554	0.221	3.611	4.605	4.787
DummyIMSR	9932	0.277	0.447	0	0	1
Size	9932	22.340	1.259	19.960	22.170	26.040
Lev	9932	0.446	0.204	0.062	0.439	0.895
ROA	9932	0.037	0.055	-0.177	0.033	0.204
AuFees	9932	13.730	0.653	12.61	13.620	16.050
Quick	9932	1.632	1.743	0.166	1.099	11.520
Commit	9932	3.941	0.446	2	4	5
Growth	9932	0.194	0.518	-0.575	0.099	3.565
Illegal	9932	0.023	0.149	0	0	1
Profit	9932	0.863	0.344	0	1	1

4.2 Regression analysis

4.2.1 Scheduled disclosure lags and audit quality

The columns (1) and (2) in Table 3 are the regression results of the relationship between scheduled disclosure lags and audit quality to verify H1. Column (1) is the relationship between scheduled disclosure lags and audit quality when controlling only industry and annual effects without any other control variables. The Coefficient of lag is positive (0.008, t = 2.46) .To further illustrate this result, other variables affecting audit quality are added. As shown in column (2) of Table 3, the lag coefficient of Lags is significantly positive (0.006, t = 2.07), which further illustrates the negative correlation between the time lag of annual report booking and audit quality.

4.2.2 Scheduled disclosure lags, auditor industry specialization and audit quality

The moderating effect of auditor profession specialization is examined in column (3) and (4) of Table 3. Column (3) examines the moderating role of auditor profession specialization in the relationship between scheduled disclosure lags and audit quality in a situation where industry and annual effects are controlled only. The regression coefficient of Lags*DummyIMSR was significantly negative (- 0.0235, t =-2.62). With the further addition of the relevant control variables, as shown in column (4) of Table 3, the regression coefficient of Lags * DummyIMSR is still significantly negative (- 0.0138, t =-0.01) , indicating that the effectiveness of audit input of auditors with industry specialization is better than that of auditors without industry specialization. The results support the hypothesis 2.

Table 3 Regression Results

QUAL	(1)	(2)	(3)	(4)
Lags	0.0133*** (2.08)	0.0153*** (2.62)	0.0148*** (2.31)	0.0155*** (1.99)
DummyIMSR			0.0002** (1.64)	0.0016** (1.32)
Lags*DummyIMSR			-0.0235** (- 2.62)	-0.0138** (- 2.01)
Size		-0.0142*** (- 7.60)		-0.0138* (- 7.36)
Lev		0.0740*** (7.82)		0.0727*** (7.65)

ROA		0.1123*** (3.75)		0.1162*** (3.87)
AuFees		0.0169*** (6.22)		0.0181*** 0.0181 * * (6.37)
Quick		0.0028 (5.42) (5.42)		0.0028*** (5.38)
Commit		-0.0023 (- 0.83)		-0.0025 (- 0.87)
Growth		-0.0173* (- 2.94)		-0.0027*** (42.79)
Illegal		0.0096 (61.14)		0.0094 (1.11)
Profit		-0.0234 (- 5.08)		-0.0233*** (- 5.06)
Constant	0.0163 0.52	0.0588 (1.31)	0.1900 (- 0.60)	0.0247 (0.52)
Industry/Year	Control	Control	Control	Control
Observations	9932	9932	9932	9932
Adj-R^2	0.0093	0.2005	0.0098	0.2007

Note: * * * 、 * * 、 * Are Significant at 1% , 5% and 10% respectively (double tail) ;

4.3 Robustness test

To ensure the validity of the estimates, the following tests are performed:

Firstly, the conclusion of this paper is still valid by replacing the Dummy variable with the continuous variable without virtual processing (Zhao Yi et al., 2020). [14]

Secondly, we replace the proxy variable of audit quality (Luo Wenbo and Li Minxin, 2019) [10] and carry out Logistic regression. Taking whether financial restatements will happen in the next two years as the proxy variable of audit quality, a value of 1 indicates that the auditor did not find any material misstatement in the statements during the year of audit, but the audited entity will restate the annual report in the future. Since many parts of major misreports that were not found in that year will be discovered within two years after the disclosure of the statement value of 0 means that no restatement has occurred within the next two years of the audited report. The regression results with the results of multiple regression is the same as above, the above conclusion is still valid.

5 Conclusion

This paper uses scheduled disclosure lags of annual report to study the relationship between scheduled disclosure lags and audit quality. The study found that the longer the scheduled disclosure lags, the worse the audit quality. This relationship is inhibited when auditors with industry specialization participate in the audit, that is, auditors with industry specialization can use their own industry specialization to make up for the damage. This conclusion is still true when using multiple variables to measure audit quality and using multiple models for estimation. Therefore, we need to pay attention to the signaling effect brought by scheduled disclosure in the market. However, this paper is not enough to fully demonstrate the relationship between annual report disclosure delay and audit quality, only considering the impact of scheduled disclosure delay on audit quality, in fact the actual disclosure delay will also have an impact on audit quality, We need to consider the impact of both on audit quality. So future research can focus on the difference in auditor behavior by analyzing the different effects of auditor industry specialization on audit quality in early disclosure, on-time disclosure and delayed disclosure.

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Audit Oversight, Property Right Nature and Inefficient Investment

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Abstract: Based on the data of Shanghai and Shenzhen A-share listed companies in China from 2013 to 2018, this paper makes an empirical study on the relationship between audit oversight and inefficient investment, and discusses whether the influence varies with property right nature. The results show that audit oversight can improve inefficient investment, and compared with overinvestment, it has a more significant mitigation effect on underinvestment. Further research shows that audit oversight can better restrain the overinvestment of state-owned enterprises, while alleviating underinvestment in non-state-owned enterprises.
Keywords: Audit oversight; Overinvestment; Underinvestment; Property right

1 Introduction

Inefficient investment of Chinese listed companies is ubiquitous, which not only causes the secondary optimization of resource allocation, but also seriously damages the long-term development of enterprises themselves. Audit, as an important external supervision mechanism, can transmit information independently and provide investors with valuable information. According to information economics, enterprises need to disclose the accounting information audited by independent auditors to the capital market, so as to cater to the investors and eliminate the adverse problems caused by information asymmetry(Nawawi et al.,2018). Park S (2017) and Boubaker S (2018) proved that the stronger audit oversight is, the easier it is to reduce the frictional cost of external financing, thus improving the investment capacity of enterprises and alleviating inefficient investment. Due to the great differences between China and western developed countries in economic system and capital market environment, Chinese scholars have carried out a series of empirical studies with Chinese listed companies, but most of them are based on accounting information disclosure and take audit oversight as the intermediary variable or moderator variable to study(Tian Kunru et al.,2015; Zhang Limin et al.,2017). Chen Xichan (2018) have directly explored the relationship between audit quality and investment efficiency, and confirmed that the type of audit opinion and the size of the accounting firm can inhibit inefficient investment. It means that audit oversight can affect the corporate investment efficiency, but the impact path is single.

In fact, audit oversight can also improve investment efficiency by easing financing constraints (Zhang Junmin et al.,2019), which provides a new way to study the relationship between audit oversight and investment efficiency. Basic on this, this paper uses Richardson's investment residual model to measure the degree of inefficient investment, and tests the relationship between audit oversight and inefficient investment through the path of "audit oversight - financing constraint - investment efficiency". In addition, property rights theory holds that different enterprises have different organizational patterns, Therefore, this paper groups listed companies according to their property rights, so as to further enrich relevant literature on audit oversight and investment behavior under the role of the system.

2 Theoretical Analysis and Hypothesis

2.1 Audit oversight and inefficient investment

Inefficient investment refers to the behavior that the actual investment expenditure of an enterprise is inconsistent with the optimal investment level, which mainly has two forms: underinvestment and overinvestment (Qi Chen et al.,2019)

The principal-agent theory holds that the existence of market friction and the separation of ownership and management will cause agency problems between managers and shareholders as well as between shareholders and creditors. On the one hand, the pursuit of maximization of interests between managers and major shareholders is bound to generate interest conflicts. Managers are more likely to invest in projects that increase their self-interest in order to achieve on-the-job consumption, and pursue short-term profit maximization, leading to overinvestment (Li Yanxi et al., 2017). As an important part of external governance, audit institutions can effectively help shareholders to supervise and restrain managers' business behaviors, and urge managers to avoid high-risk investments and choose sound investment strategies, thus alleviating the first category of agency conflicts. On the other hand, compared with shareholders, creditors bear greater investment risks, and shareholders tend to blindly overinvest in order to maximize their own interests. By combining with internal supervision, audit oversight can reduce the

degree of information asymmetry and improve the rationality of resource allocation of listed companies, thus alleviating the second kind of agency conflict and restraining the over-investment of enterprises.

According to the information asymmetry theory, the information dominant party will seek extra income by taking advantage of the information it already has, which will lead to the interest bias (Zhang Junmin et al., 2019). As the creditor of the information inferior party, the adverse selection will increase the external financing cost of the enterprise, and force the enterprise to give up some projects with positive net present value, thus leading to the underinvestment. The enhancement of audit oversight can effectively alleviate the information asymmetry between enterprises and external investors, and its signal transmission function can further reduce the external financing cost, help enterprises to obtain sufficient capital for investment, and alleviate the underinvestment. Accordingly, the following hypothesis is proposed:

Hypothesis 1: Audit oversight can mitigate inefficient investment, that is, audit oversight is helpful to restrain overinvestment and alleviate underinvestment.

2.2 Audit oversight, property right nature and inefficient investment

According to modern property rights theory, economic organizations with different property rights have different behavioral characteristics in economic activities, so the research on inefficient investment behavior of companies should consider the property right nature(Zhao Yi et al.,2020). For state-owned listed companies, their property rights are virtual, which is more complex than the principal-agent relationship of private enterprises, and there are defects in the governance mechanism of "softness of budget constraint". Moreover, the government can directly intervene in managers' investment decisions and provide favorable investment conditions for enterprises whose behaviors become more aggressive, then the overinvestment becomes more serious. On the contrary, non-state-owned listed companies will face many restrictions in raising funds from Banks and other financial institutions, leading to a shortage of funds for investment activities and prone to underinvestment. In addition, as the investment consequences of non-state-owned listed companies are mostly borne by themselves, their decisions are more cautious than those of state-owned enterprises. Therefore, the inefficient investment behaviors of companies with different property rights are different, that is, the overinvestment is more obvious in state-owned companies, while the underinvestment is more obvious in non-state-owned companies.

As an independent third party, audit institutions conduct external supervision on enterprises, and their influence on the investment behavior of the two types of enterprises is significantly different. For state-owned listed companies, their control chain is long and information distortion is serious(Jinchuan Shi et al.,2018). As an important basis for government shareholders to evaluate management investment activities, audit oversight can curb the overinvestment of enterprises in a certain extent. However, the audit work of state-owned enterprises mainly focuses on the audit and verification of state-owned assets and economic responsibilities. The scope of audit subjects is complex and the workload is large, so the efficiency of audit oversight work is limited. For non-state-owned enterprises with clear property rights, the management is usually composed of major shareholders or managers appointed by them, and there are fewer levels of principal-agent, so the audit oversight has more space to inhibit the inefficient investment behavior(Xingqiang Du et al.,2018). Moreover, compared with state-owned enterprises, non-state-owned enterprises are more dependent on the signal transmission function of audit oversight, which is conducive to alleviate the underinvestment. Based on the above analysis, the following hypotheses are proposed:

Hypothesis 2: The role of audit oversight in alleviating overinvestment is mainly reflected in state-owned enterprises.

Hypothesis 3: The role of audit oversight in alleviating underinvestment is mainly reflected in non-state-owned enterprises.

3 Research Design

3.1 Samples and data sources

This paper takes Shanghai and Shenzhen A-share listed companies from 2013 to 2018 as the research object, and the following sample data were excluded: (1) Special financial insurance industry enterprises and ST, * ST companies; (2) The company whose debt ratio is more than 100% and is actually insolvent; (3) Samples with missing data or outliers. To reduce the influence of extreme values, all continuous variables were winsorize at the level of 1% to 99%. After the above elimination, a total of 9263 valid observations were obtained. The research data required are all from CSMAR database.

3.2 Key variables

3.2.1 Inefficient investment

According to the expected investment model of Richard (2006), formula (1) is used to calculate the expected investment level of the company, and the residual estimated was used to measure the inefficient investment (positive value means overinvestment, negative value means underinvestment). The higher the absolute value of residual, the more serious the problem of inefficient investment.

$$Inv_{i,t} = \alpha_0 + \alpha_1 Cash_{i,t-1} + \alpha_2 Size_{i,t-1} + \alpha_3 Lev_{i,t-1} + \alpha_4 Growth_{i,t-1} + \alpha_5 Ret_{i,t-1} + \alpha_6 Age_{i,t-1} + \alpha_7 Inv_{i,t-1} + \sum Ind + \sum Year + \varepsilon \quad (1)$$

Where $Inv_{i,t}$ represents the investment level of the I company in Year T, and the independent variables are cash holdings (Cash), company size (Size), assets liabilities ratio (Lev), increase rate of business revenue (Growth), excess return (Ret), company age (Age), and fixed industry and time effect. In order to reduce endogeneity, variables were treated with one-step delay.

3.2.2 Audit oversight

Most literatures show that the international "Big Four" accounting firms are much better than other accounting firms in auditing supervision quality due to their large scale and perfect auditing procedures. Considering that audit oversight is the key explanatory variable, in order to make the conclusion more reliable, this paper references the research results of Tian Kunru (2015) and Zhang Junmin (2019), and selects accounting firm size (Audit) and audit opinion type (Opinion) to measure Audit supervision.

3.2.3 Property right nature

Referring to the research of Zhao Yi et al. (2020), this paper divided the samples into two groups according to the property rights, namely the control group of state-owned and the control group of non-state-owned listed companies, and investigated them respectively, so as to compare the impact of audit oversight on investment efficiency among enterprises with different property rights characteristics

3.3 Methodology

After effective measurement of investment efficiency, model (2) is adopted to test hypothesis 1:

$$Ineff_{i,t}\ (Over\_Inv_{i,t},\ Under\_Inv_{i,t}) = \alpha_0 + \alpha_1 Audit_{i,t-1} + \alpha_2 Opinion_{i,t-1} + \alpha_3 Share_{i,t} + \alpha_4 FCF_{i,t} + \alpha_5 Size_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 Lev_{i,t} + \alpha_8 Growth_{i,t} + \alpha_9 Tobin's\ Q_{i,t} + \sum Ind + \sum Year + \varepsilon \quad (2)$$

Where the explained variable $Ineff_{i,t}$ is the absolute value of the estimated residual calculated in model (1), which represents the inefficient investment part of the company. Audit and Opinion are the explanatory variables. To further study the effects of the nature of property rights, this paper group the samples to test hypothesis 2 and hypothesis 3. The specific definitions are listed in Table 1.

Table 1 Variable Definition

Variable types	Variable	Variable name	Variable Definition
Explained Variable	Ineff	Investment difference	The absolute value of the estimated residual calculated in model (1)
	Over_Inv	Overinvestment	The positive estimated residual calculated in model (1)
	Under_Inv	Underinvestment	The negative estimated residual calculated in model (1)
Explanatory Variables	Audit	Accounting firm size	Value 1 if the accounting firm is one of the “Big Four”, otherwise 0
	Opinion	Audit Opinion Type	Value 1 if the accounting firm provides a non-standard unqualified opinion, otherwise 0
Control Variables	Share	Ownership concentration	Shareholding ratio of the largest shareholder
	FCF	Free cash flow	EBIT(1-T)+Depreciation-Capital expenditures-Increases in net working capital
	Size	Company size	Log(total assets)
	ROA	Return on assets	Net profits/total assets
	Lev	Assets liabilities ratio	Total liabilities/total assets
	Growth	Increase rate of business revenue	(Revenue growth/total revenue of the previous year)×100%
	Tobin's Q	Q value	Market value/net assets
	Ind	Industry	Industry dummy variable
	Year	Year	Year dummy variable

4 Empirical Analysis

4.1 Descriptive Statistics

Table 2 lists descriptive statistical results of key variables. The amount of overinvestment sample is 3,143(33.93%) and the amount of underinvestment sample is 6,120 (66.07%), indicating that under-investment is worse than overinvestment in China's listed companies. Where the average value of overinvestment is 0.074, it means that the expected investment is higher than the optimal investment expenditure level by 7.4% and the maximum value reaches 98.4%. The mean of underinvestment was -

0.038, that means only 3.8% of the optimal level of capital investment expenditure. It shows that in China's capital market, inefficient investment is ubiquitous, and the degree of overinvestment is more severe than the degree of underinvestment.

Table 2 Descriptive Statistics of Key Variables

Variables	Obs	Mean	Std	Min	Max
Ineff	9263	0.050	0.074	0	0.984
Over_Inv	3143	0.074	0.116	0	0.984
Under_Inv	6120	-0.038	0.032	-0.382	0
Audit	9263	0.063	0.243	0	1
Opinion	9263	0.024	0.154	0	1

4.2 Empirical results and analysis

Table 3 (1) reports the regression results of all samples of listed companies. It can be seen that the correlation coefficient between accounting firm size and audit opinion type and inefficient investment is negative, and the coefficient is significantly different from zero at least at the significance level of 5%, which indicates that audit oversight can restrain inefficient investment in the whole sample of listed companies. In addition, the statistical significance and economic significance of the regression coefficient of audit opinion type and inefficient investment are both higher than accounting firm size, which may be because the public audit opinion has a better signal transmission function in the capital market and has a greater impact on the investment efficiency. (2) and (5) are the regression results of audit oversight and overinvestment and underinvestment respectively. The results show that the regression coefficients of the two measurement indicators of audit oversight and underinvestment are higher than their regression coefficients of overinvestment, which indicates that high-quality audit oversight is more conducive to the alleviation of underinvestment. The reason may be that the phenomenon of inefficient investment in listed enterprises in China is more serious. Audit supervision can reduce the degree of information asymmetry and more easily improve the problem of inefficient investment caused by financing constraints, while the inhibition effect of audit oversight on overinvestment mainly depends on the internal governance of companies with more stringent conditions. This is basically consistent with the previous analysis, and hypothesis 1 is supported.

Table 3 (3), (4), (6) and (7) report the regression results of audit supervision and two types of inefficient investment behaviors after grouping enterprises according to property rights characteristics. In the case of overinvestment, (3) is the group of state-owned enterprises, and (4) is the group of non-state-owned enterprises. The regression coefficient of state-owned enterprises is higher than that of non-state-owned enterprises, while the result of underinvestment is the opposite. This indicates that the role of audit supervision in restraining overinvestment is mainly reflected in state-owned enterprises, while the role of mitigating underinvestment is mainly reflected in non-state-owned enterprises. Hypothesis 2 and hypothesis 3 are verified.

Table 3 Regression Results

Variables	Full sample (1)	Over_Inv			Under_Inv		
		Full sample (2)	State-owned (3)	Non-state-owned (4)	Full sample (5)	State-owned (6)	Non-state-owned (7)
Audit	-0.013**	-0.015***	-0.016***	-0.014**	-0.022**	-0.011**	-0.019**
	(-2.32)	(-2.76)	(-3.69)	(-2.17)	(-3.88)	(-2.28)	(-2.36)
Opinion	-0.017***	-0.026***	-0.019***	-0.018**	-0.043***	-0.025***	-0.031**
	(-3.16)	(-4.03)	(-2.88)	(-2.12)	(-4.47)	(-3.22)	(-2.19)
Share	-0.101*	0.192***	0.006**	-0.102**	0.096***	-0.023	-0.039
	(-1.83)	(3.08)	(2.26)	(-2.14)	(4.92)	(-1.48)	(-0.52)
FCF	0.234***	0.153***	0.014*	0.158	0.015**	0.107**	0.016*
	(11.76)	(5.41)	(1.83)	(1.35)	(2.49)	(2.34)	(1.90)
ROA	0.018	-0.090	-0.180**	-0.157**	0.001	-0.001	0.007
	(0.97)	(-1.24)	(-2.11)	(-2.16)	(0.05)	(-0.08)	(0.64)
Growth	-0.002*	0.003*	0.009***	0.002***	-0.001***	0.001	-0.006***
	(-1.97)	(1.86)	(9.24)	(8.70)	(-26.67)	(1.24)	(-2.89)
Size	0.013	-0.028	0.007**	0.000	0.003***	0.003***	0.002**
	(0.26)	(-1.04)	(2.43)	(0.05)	(7.20)	(7.03)	(2.53)
Lev	0.019**	-0.118***	0.024	0.024	0.012***	0.007**	0.011***
	(2.31)	(-6.96)	(1.29)	(1.26)	(4.75)	(2.46)	(3.19)

Tobin's Q	0.002***	0.008***	0.004**	0.009***	-0.001***	-0.001**	-0.001***
	(3.80)	(4.08)	(2.34)	(4.73)	(-3.25)	(-2.37)	(-4.59)
Year	control	control	control	control	control	control	control
Ind	control	control	control	control	control	control	control
Constant	-0.042**	-0.027*	-0.146***	0.047*	-0.114***	-0.113***	0.031**
	(-2.29)	(-1.97)	(-5.05)	(2.04)	(-11.72)	(-9.73)	(2.26)
Observations	9,263	3,143	2,084	1,059	6,120	2,413	3,707
R-squared	0.575	0.638	0.557	0.543	0.619	0.582	0.577

Note: ***, ** and * are significant at the 1%, 5% and 10% levels, respectively (double tail)

5 Robustness Test

In order to check on the reliability of the conclusion in this paper, the sensitivity analysis is the following: For the sake of overcoming the problems existing in the model of systemic deviation, based on Richardson model, regression residuals were grouped, and the minimum and maximum 10% samples in each group were removed respectively to estimate the degree of investment efficiency. The robustness test results are basically consistent with those in Table 3, so it is considered that the output results of the model in this paper are reliable. Due to space limitation, it is not listed.

6 Conclusion

Through empirical research on the relationship between audit oversight, property right nature and inefficient investment of enterprises, this paper draws the following conclusions: The enhancement of audit oversight can help enterprises to restrain overinvestment and alleviate underinvestment, and the inhibition effect of audit oversight on enterprise underinvestment is stronger; Audit oversight plays a different role in enterprises with different property rights, that is, audit oversight has a stronger inhibiting effect on overinvestment in state-owned listed companies, while it has a more significant mitigating effect on underinvestment in non-state-owned listed companies.

According to the above, this paper puts forward the following suggestions: Enterprises can improve internal governance structure and consciously engage high-quality accounting firms to enhance audit oversight, exert the linkage effect of audit and corporate governance and reduce financing constraints and agency conflicts; China should guide and regulate the development of accounting firms and other intermediary institutions so that they can give rein to external supervision, and strengthen the construction of information environment, establish a sound enterprise information disclosure mechanism to increase the efficiency of resource allocation of listed companies.

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Managerial Overconfidence, Property Rights and Audit Fees

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Abstract: Traditional economics has always used rational brokers as the premise to study audit costs, but the behavioral economics that has emerged in recent years believes that there is limited rationality in the decisions made by managers. Managerial overconfidence will increase the risk of financial misstatement and ultimately affects audit fees. Taking a-share listed companies in Shanghai and Shenzhen stock exchanges from 2010 to 2018 as research samples, this paper empirically tests the impact of managerial overconfidence on audit fees by constructing regression models, and further studies the differences of the impact degree of managerial overconfidence on audit fees under different property rights. The results show that the managerial overconfidence is positively correlated with audit fees, and the managerial overconfidence of state-owned listed companies has a stronger influence on audit fees than that of non-state-owned listed companies. This conclusion is helpful to deepen the understanding of the influencing factors of audit fees and has some policy implications on how to improve management supervision.
Keywords: Managerial overconfidence; Behavioral economics; Audit fees; Property rights

1 Introduction

Principal-agent theory of the cause of enterprise ownership and management separated from each other, as the main body, the interests of the different distribution exists the principal and the agent was destined to a certain extent, the conflicts of interest, as a third party of certified public accountants audit can play a very key role in coordination, can solve various problems caused by the information asymmetry. Simunic was the first to study the influencing factors of audit fees, he used the audit cost pricing model to determine the influencing factors of audit fees, such as audit risk and accounting firm size (Simunic,1980). Since then, audit fees have always been an important content of audit theory research, and scholars at home and abroad have conducted in-depth research in this field.

The existing literature mainly studies audit fees from two perspectives: listed companies and accounting firms. The influencing factors of listed companies mainly include the size of corporate assets, corporate earnings management, and corporate financial risks. When the scale of corporate assets is large and the level of internal control is relatively low, the level of earnings management will be higher, which will significantly increase audit risk and audit fees (Gaber et al., 2019). Because it is difficult to quantitatively analyze the impairment loss of corporate goodwill and the difficulty of auditing increases, it is necessary to add part of the audit fees as a risk premium, which also affects the audit fees (Ye Jianfang et al., 2016). The main factors affecting audit fees of accounting firms include firm size, experience and reputation. Compared with the non-international big four accounting firms, the international big four bear greater legal responsibilities, and auditors have greater motivation and ability to increase work intensity to improve audit quality, so higher audit fees are required in return. Studies by scholars have shown that the size, experience and reputation of accounting firms are positively correlated with audit fees (Steven et al., 2015; Kang Meng, 2019).

In recent years, some scholars have begun to introduce the characteristics of senior executives into the research on factors affecting audit fees. Senior executives with audit background tend to real earnings management, firms will increase audit fees in order to reduce audit risks (Cai Chun et al., 2015). Studies by scholars have shown that when executives have financial expertise, the inherent risks of the enterprise can be reduced, and audit fees will be reduced accordingly (Kalelkar and Khan, 2016). Due to the influence of traditional economic theories, the premise of these studies is to treat the managers of audited companies as rational economic people. However, behavioral economics that has emerged in recent years believes that managers have the psychological characteristics of overconfidence, which makes their decisions contrary to the hypothesis of rational economic man (Malmendier and Tate, 2015). As a cognitive bias, overconfidence represents the decision-making psychology of executives, which is manifested in excessively high predictions on the prospects and expected returns of their investment projects, which increases the company's financial risks and affects the audit fees (Hribar et al., 2015). However, based on behavioral economics, there is still a lack of systematic research on the personal psychological characteristics of executives, especially the impact of managerial overconfidence on audit fees. Current research on managerial overconfidence mainly focuses on the impact on internal company

decision-making, such as impact on corporate mergers and acquisitions, investment and financing decisions (Liang Tongying et al., 2020).

Therefore, based on the behavioral finance theory, this paper empirically examines and analyzes the influence of the managerial overconfidence on audit fees from the perspective of the irrationality of senior executives. At the same time, considering the ownership system of China's economic market, this paper further studies the influence of the nature of corporate property rights on the relationship between the managerial overconfidence and audit fees. The research conclusions of this paper are helpful to deepen the understanding of the influencing factors of audit fees and provide reference for the formulation of management supervision policies.

2 Theoretical Analysis and Hypothesis Development

2.1 Analysis of the impact of managerial overconfidence on audit fees

In economics, the hypothesis of "rational man" is one of the important hypotheses in the traditional financial field, while the overconfidence theory is a cognitive bias against the hypothesis of "rational man". Behavioral economics believes that when dealing with difficult things, people will always over-trust their own cognition and judgment, and over-confident in their own knowledge, abilities, decision-making, and information they possess. This excessively optimistic psychology is easy to make irrational decision-making behaviors. The research results show that the senior management of the enterprise usually has a long-term overconfidence psychology. The cognitive bias of individual managers directly affects corporate behavior, and the impact of cognitive bias of managers' overconfidence is particularly significant. Through existing literature research and analysis, it can be seen that overconfident executives show a stronger willingness to invest capital, which directly leads to overinvestment or inefficient investment. They tend to overestimate the profitability of investment projects and underestimate their risks, and adopt a blindly optimistic attitude in estimating the future operating returns of companies (Dashtbayaz and Mohammadi, 2016). Overconfident enterprise managers usually adopt more aggressive accounting policies, which makes certified public accountants take into account the audit risks directly related to the company's financial statements, especially the large risk of intentional error reporting. Generally, the audit risk of listed companies will increase the litigation risk that the competent auditor may face, which will require the audit client to pay a higher audit premium.

In order to reasonably and effectively control the risk situation in the audit process, certified public accountants need to increase their workload to collect more audit data and evidence. Relevant academic research results show that the enterprise managers overconfidence behavior, will positively influence enterprise surplus management, such as audit clients is the accounting information quality problems such as lack of reliability, financial fraud, you need to spend more time, to expand the scope of the audit, and carry out the corresponding substantive testing. The increase of audit cost and litigation risk will increase audit fees to some extent. Accordingly, this paper proposes the first hypothesis:

H1: Other things being equal, managerial overconfidence will significantly increase the audit fees of the company.

2.2 Analysis of the influence of property right nature on the relationship between managerial overconfidence and audit fees

The property right system is the core of the modern enterprise system. There are also significant differences in the incentive effect and constraint mechanism of the enterprise behavior subject under different property rights. In the context of China's transition economy, the government has significant control over the economy but insufficient supervision, which is especially obvious in state-owned listed companies. In state-owned listed companies, the absence of owners makes it difficult for managers to be effectively supervised and controlled. In addition, the control of insiders leads to the continuous increase of managers' decision-making power. Therefore, executives of state-owned listed companies are more likely to show the psychological characteristics of overconfidence and make irrational corporate decisions. In addition, the high salary incentive for managers in state-owned listed companies leads to a higher degree of behavioral bias caused by managers' overconfidence. However, there is no absence of owners in non-state-owned listed companies, external supervision can be fully implemented, and their overconfident decision-making behavior can be effectively restrained. Therefore, compared with non-state-owned listed companies, executives of state-owned enterprises are more likely to show the characteristic of overconfidence. Based on this, this paper proposes hypothesis 2:

H2: The managerial overconfidence of state-owned listed companies has a stronger influence on audit fees than that of non-state-owned enterprises.

3 Research Design

3.1 Sample selection and data sources

In this paper, 2010-2018 is selected as the time selection interval of samples, and a-share listed companies in Shanghai and Shenzhen are selected as the research samples. The data are mainly from CSMAR database, and are processed according to the following rules : samples with unrecognized or missing property rights are eliminated; remove all company samples of ST and *ST; samples of listed companies in finance and insurance industry are excluded; remove samples with missing financial data; winsorize was processed at 1% and 99% percentile to eliminate the influence of extreme values. At last, 21,792 sample data were obtained, EXCEL and statistical software STATA14.0 was used to process and analyze the data.

3.2 Research variables

3.2.1 Audit fees

Audit fees include fees charged by accounting firms for undertaking client audit services and fees for providing clients with services such as bookkeeping and consulting services. According to the research purpose of this article, drawing on relevant domestic and foreign research, select the natural logarithm of the total audit fee disclosed in the company's annual report as the dependent variable.

3.2.2 Managerial overconfidence

Overconfidence refers to a kind of not directly carries on the observation and measurement of cognitive biases, academia for enterprise managers overconfidence has yet to agree on the metrics, existing literature through the analysis of characteristics of managers and managers behavior two ways for studying the measures (Yi Jingtao et al.,2015). In this paper, the change of the number of company shares held by senior executives is used as its replacement variable, and the relative compensation of senior executives is used as the replacement variable to test the robustness of the next step.

3.2.3 Property rights

In order to further test the impact of executive overconfidence under different property rights on audit fees, a dummy variable of property rights is introduced. If the sample enterprise is a state-owned enterprise, it is assigned a value of 1, otherwise it is assigned a value of 0.

3.2.4 Control variables

This paper selects 12 control variables to control the impact of other factors on audit fees. Mainly include net receivable, net inventory, return on assets, company size, asset-liability ratio, company age, dual Role of the Board Chairman, audit opinion, current ratio, operating cash flow revenue ratio. In order to improve the robustness of the regression results, the annual and industry effect variables are controlled in the regression analysis. The specific definition of the variable is shown in Table 1.

Table 1 Variable Definition

Variable Name	Variable Symbol	Variable Definitions
Audit Fees	Audit	The natural log of audit fees
Managerial Overconfidence	Over	Changes in executive shareholding, the number of executive shares held is increased from the previous year and assigned a value of 1, otherwise the value is 0; Executive compensation ratio, the sum of the top three executive compensation/all executive compensation
Property Rights	State	Dummy variable, the state-owned enterprise value is 1, otherwise the value is 0
Net Receivables	Rec	Net receivables/total assets
Net Inventory	Inv	Net inventory/total assets
Return on Assets	Roa	Net profit/total assets
Company Size	Size	The natural log of total assets
Asset Liability Ratio	Lev	Total liabilities/total assets
Company Age	Age	The number of years the company has been listed as of the end of the year
Dual Role of the Board Chairman	Dual	Dummy variable, if the chairman and the manager are combined , take 1, otherwise the value is 0
Audit Opinion	Opinion	Dummy variable, standard unreserved value 0, otherwise the value is 0
Current Ratio	Crr	Current assets/current liabilities
Operating Cash Flow to Revenue Ratio	Roc	The ratio of net cash flow from operating activities to operating income
Year/Industry	Year/Ind	Dummy variable, the sample belongs to a certain year or industry to take 1, otherwise the value is 0

3.3 Model design

According to the above theoretical analysis and research hypothesis, in order to study the correlation between the managerial overconfidence, property rights and audit fees, the following multiple regression model is constructed. Wherein, Controls are all control variables. Meanwhile, in order to improve the robustness of regression results, annual and industry effect variables are controlled during regression analysis. Hypothesis 1 is validated if the regression coefficient obtained by stata regression analysis is significantly positive. At the same time, in order to distinguish the degree of influence of managerial overconfidence on audit fees under different property rights, the whole sample is divided into groups according to property rights for regression. If the regression coefficient of state-owned enterprises is significantly greater than that of non-state-owned enterprises, hypothesis 2 holds.

$$Audit_{i,t}=\beta_0+\beta_1 Over_{i,t}+\sum\beta_2 Controls_{i,t}+\sum Industry+\sum Year+\varepsilon_{i,t}$$

4 Empirical Results Analysis

4.1 Descriptive statistics

Table 2 shows descriptive statistics of the main variables. It can be seen from Table 2 that the maximum, minimum and standard deviation of audit fees are 16.29, 12.43 and 0.711, indicating that there is a certain gap between audit fees disclosed by different listed companies in their annual financial statements. Among the 21,792 data observations, managerial overconfidence accounted for about 42.2% in the sample companies. The average property right nature is 0.374, indicating that 37.4% of China's listed companies are state-owned listed companies. The mean value and standard deviation of company size are 22.05 and 1.302 respectively, indicating that the sample data is highly dispersed and the size of each company varies.

Table 2 Variables Descriptive Statistics

Variables	N	Mean	Median	SD	Min	Max
Audit	21792	13.700	13.590	0.711	12.430	16.290
Over	21792	0.422	0.000	0.494	0.000	1.000
State	21792	0.374	0.000	0.484	0.000	1.000
Rec	21792	0.118	0.094	0.105	0.000	0.469
Inv	21792	0.149	0.114	0.141	0.000	0.731
Roa	21792	0.043	0.040	0.054	0.194	0.200
Size	21792	22.050	21.870	1.302	19.500	26.050
Lev	21792	0.420	0.410	0.212	0.047	0.922
Age	21792	10.240	9.000	7.092	0.000	25.000
Dual	21792	0.270	0.000	0.444	0.000	1.000
Opinion	21792	0.027	0.000	0.163	0.000	1.000
Crr	21792	2.646	1.701	2.953	0.275	19.370
Roc	21792	0.083	0.076	0.193	0.742	0.703

4.2 Multiple regression analysis

Table 3 lists the results of multiple linear regression. The second and third columns respectively represent the regression results of managerial overconfidence and audit fees under OLS and fixed effects. The results show that the F-statistic value of the regression equation under the ordinary least square method reaches 392.2 and R^2 is 0.639; the F-statistic value of the regression equation under the fixed effect model reaches 1451 and R^2 is 0.598, indicating that the whole regression equation fits the characteristics of the original data well and has statistical significance. In the two regression methods, the regression coefficient of Over variable is 0.016 (t=2.59) and 0.013 (t=3.38) respectively, and both of them are significantly positive at 1% level, indicating that, other conditions being unchanged, the managerial overconfidence is significantly positively correlated with the audit fees Hypothesis 1 is established in this paper.

Taking into account the difference in property rights, on the basis of the above regression analysis, the research samples are further divided into state-owned enterprises and non-state-owned enterprises for regression respectively. The results are shown in the fourth and fifth columns of Table 3. In the group of state-owned enterprises, the coefficient of Over and Audit is significantly positively correlated at the 1% confidence level, while in the group of non-state-owned enterprises, the coefficient is not significant. This

shows that only in the listed companies whose property rights are controlled by the state, the managerial overconfidence will have a significant impact on the audit fees. In other words, under different property rights, the managerial overconfidence has different effects on audit fees. The managerial overconfidence in state-owned listed companies has a stronger influence on audit fees than that of non-state-owned listed companies, hypothesis 2 holds.

Table 3 Results of Multiple Linear Regression

Variables	Audit (OLS)	Audit (FE)	Audit (State owned)	Audit (Non-state owned)
Over	0.016***	0.013***	0.018***	0.009
	(2.59)	(3.38)	(3.55)	(1.47)
Rec	0.163***	0.133***	0.419***	0.068
	(4.54)	(3.15)	(5.93)	(1.28)
Inv	-0.190***	-0.066**	-0.081	0.012
	(-6.36)	(-2.07)	(-1.60)	(0.30)
Roa	-0.169***	-0.029	-0.005	-0.018
	(-2.67)	(-0.63)	(-0.07)	(-0.31)
Size	0.423***	0.348***	0.332***	0.340***
	(139.30)	(76.05)	(43.02)	(55.39)
Lev	-0.037	0.050**	-0.065*	0.071**
	(-1.59)	(2.31)	(-1.85)	(2.55)
Age	0.001	-0.015	-0.058***	0.007
	(1.32)	(-1.06)	(-3.54)	(0.30)
Dual	0.023***	0.002	0.008	-0.003
	(3.39)	(0.35)	(0.66)	(-0.36)
Opinion	0.189***	0.092***	0.057***	0.096***
	(9.99)	(7.08)	(2.80)	(5.68)
Crr	-0.007***	0.003***	0.001	0.005***
	(-5.01)	(2.67)	(0.49)	(3.90)
Roc	-0.086***	0.007	-0.011	0.035**
	(-4.99)	(0.59)	(-0.61)	(2.35)
Year/Ind	Control	-	-	-
Year/Ind FE	-	Control	Control	Control
Constant	4.287***	7.208***	8.969***	6.806***
	(57.94)	(18.69)	(16.51)	(11.64)
Observations	21,792	21,792	8,152	13,668
R-squared	0.639	0.598	0.587	0.604
F	392.2	1451	526.4	908.2

***P<0.01,**P<0.05,*P<0.1

4.3 Robustness test

In order to enhance the reliability of the previous empirical test, this paper conducts the following sensitivity analysis: (1) For the measurement method of managerial overconfidence, the relative compensation of executives is used as a substitute variable, and it is brought back into the model for empirical testing; (2) Managerial overconfidence may have a lagging effect on the quality of accounting information, which in turn affects auditors' assessment of the company's audit risk, leading to a lagging effect of audit fees. Therefore, the use of managerial overconfidence lagging one period as an explanatory variable. The final conclusion is basically consistent with the previous article, the specific data is limited to space and is not listed.

5 Conclusions

5.1 Research conclusions

This paper takes China's A-share listed companies in Shanghai and Shenzhen stock exchanges from 2010 to 2018 as the research object, empirically tests the impact of managerial overconfidence on audit fees, and at the same time, combined with the unique institutional background of China, examines the impact of different property rights nature on the relationship between them. The empirical results show that : (1) Managerial overconfidence significantly increases audit fees. Overconfident managers will underestimate the future risks brought by investment and increase the risk of future misreporting of the company. In order to avoid possible audit risks, the auditor will charge a higher risk premium to compensate for the audit risk, and the audit fees will be corresponding. improve. (2) The managerial

overconfidence of state-owned enterprises has a greater impact on audit fees than non-state-owned enterprises. Due to soft budget constraints and absence of owners, the state-owned listed companies have not only pursued their management goals, but also maximized their interests. The overconfidence of their management is deeper and their impact on company decisions is more significant.

However, there are still some deficiencies in this paper, because the behavioral finance theory started late in China, the analysis and research of relevant theories are relatively few, and experts and scholars at home and abroad have not reached an agreement on the evaluation index of managerial overconfidence. In this paper, the changes of executive shareholding commonly used in domestic and foreign studies are used to verify the hypothesis, and the relative compensation of senior executives is selected for the subsequent robustness test. Although the two methods reach a consistent conclusion, the empirical results still have certain risks.

5.2 Policy suggestions

Improve the recruitment and performance evaluation system of senior executives, strengthen the supervision of senior executives. The company should constantly strengthen the training and assessment of senior executives, establish a sound decision-making mechanism, and form a mechanism of mutual supervision between the board of directors and the management, and further verification by external auditors. In the process of the selection and evaluation of the company's managers, whether there is overconfidence is included in the assessment project, and according to their personal resume and economic education background, whether there is a related tendency is judged, so as to avoid their motivation to manipulate accounting policies due to some income indicators.

Improve the supervision system for SOEs and further deepen their reform. China is in the era of transition economy. In the absence of state-owned enterprise owners, there is a lack of effective supervision and restriction on senior executives, which is more likely to lead to the phenomenon of senior executives' overconfidence. Therefore, state-owned enterprises should try their best to avoid the dual role of the Board Chairman leadership structure, form a sound internal governance and external supervision mechanism. Further implement the separation of government and enterprise, reduce the risk of corporate governance, prevent managers from having too much power, and reduce the damage to corporate value caused by the cognitive deviation of senior executives.

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Measuring of Employee Reaction to Organizational Change

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Abstract: Examining employees' reaction to organizational change using employees' perception about organizational change variables was the aim of this study. The independent variables are perceived organizational support, perceived procedural justice, perceived fear of consequences of a change, perceived self-confidence for learning and development, perceived trust in management and perceived Need for change and the dependent variable is reaction to change. The study used quantitative data by using survey method and structured survey questionnaires were distributed to 359 (three hundred fifty nine) Employees of Mekelle Revenue and Custom Authority (MRCA). Besides this Random sampling technique used to select the employees as respondent. SPSS employed to analysis the data. Pearson's correlation matrix was used to show the relationship' between the dependent and the independent variables. The researcher also used multiple regression tools to examine the effects of independent variables on dependent variable. The multiple regression result indicates that, perceived organizational support, perceived procedural justice, perceived self-confidence to learning and development, perceived trust in management and perceived need for change have negative and significant effect on resistance to change while it is positive and significant effect on support to change. Unlike this perceived fear of consequence of change is positive and significant effect on resistance to change whereas it is insignificant to support to change. The result of this study suggest that measuring reaction of employees is important for effective organizational change and further studies are important to solve the problems.
Keywords: Organizational change; Perception; resistance to change; Support to change; Reaction to change

1 Introduction

Employee's reaction to organizational change is one of the important issues in change management studies. Workers may have a positive or negative recognition/mentality towards change. Hierarchical change looks at the abilities of directors, representatives and workplace. It influences worker perspectives and practices in view of moving a circumstance from the known to the obscure, which can develop vulnerability, strain and nervousness among representatives (Shah, N.,& Irani, 2010).

In The case of Ethiopia, change implementation and management activities was prominent since 1994 when result based performance management system implemented. However, strengthened with the implementation of Business Process Reengineering (BPR) Moreover, subsequent change tools implemented in the public firms afterwards. These include BSC, ISO Standards, and other change management strategies. Although some change management studies exist in the country they give little concern to employees 'reaction towards organizational change rather most of them focus on change management tools.

Accordingly the researcher motivated to investigate this prominent point With preliminary assessment conducted the researcher came to know that MRCA has implemented change tools after 2009 which may include BPR, BSC, and ISO Standards. As the researcher's observes informally before conducting the study there is a problem in understanding employee's perception before implementing the change initiatives. Therefore, undertaking this topic in MRCA was worth enough to the researcher. Accordingly, this study examined employees 'reaction to organization change.

2 Literature Summary and Hypothesis Formulations

Many studies have shown that most change processes failed. Beer & Nohria (2000, p. 88) say that: "the brutal fact is that about 70% of all change initiatives fail". According to Decker et al. (2012), failure rates may be as high as 93%. One of the most commonly cited reasons for failure of organizational change is resistance employee to organizational change (Edmons, 2011; Rajnoha et al., 2016; Lines et al., 2015; Aleksic et al., 2015; Androniceanu & Ohanyan, 2016). These authors examine in particular the reasons and ways to overcome the resistance of employees. Edmonds (2011) found out that the resistance of employees to organizational change was mainly due to fear from the unknown. Lines et al. (2015) addressed the ways to overcome resistance to organizational change, and they also looked at change management factors. On the other hand, (Kash, 2014) describes success factors of

changes based on existing models of changes. Many authors describe these factors differently.

The sixty years quantitative studies reviewed by (Oreg et al., 2011) recognizes factors that impacts employees‘ reaction to organizational change which includes that pre change antecedent, change antecedent and change consequence. There are numerous variables within these three factors. The variables that examined in this study discussed below.

2.1 Perceived organizational support

Organizational members who saw their workplace as for the most part unsupportive were bound to have critical responses, experience the ill effects of negative feelings, and eventually reject change. A worker who considers the organization as supportive is likely to return the gesture. When perceived organizational organization support is high, workers are more likely to engage in organizational citizenship behavior (Pernica, 2011)

H1: There is an immediate association between hierarchical help and representative's response to authoritative change

2.2 Perceived procedural justice

Regardless of the overabundance of studies in the field of value over the latest twenty years, the substantial hypothetical information today for the most part relies upon the Equity Theory of Adams in 1965. As per this hypothesis, people in the associations consistently will in general contrast their endeavors and gains and the others' endeavors and gains (Ince et al., 2011).

H2: having Good procedural equity result a positive effect toward workers response to organizational change

2.3 Dread of consequences of a change

Dread is normally considered as a factor that triggers representatives protection from change’(Kotter and Cohen, 2012). Resistance to change attributed to employees dread of poor outcomes, and realization of pitfalls with the change. On a few events, researchers considered change beneficiaries 'responses to changes that involve negative results, for example, Downsizing, a more prominent outstanding burden, expanded employment unpredictability, or loss of occupation control.

H3: Dread of consequence of change and employees reaction to change has a reciprocal relation

2.4 Self-assurance for learning and improvement

Vithessonthi（2008)stated that workers self -assurance to learning and improvement is important factor to support or resist the change in the organization. which means workers who have high level of self-assurance to learning and improvement may take the change as an opportunity to acquire new skill on the other hand workers with low degree of fearlessness to learning and improvement may perceive organizational change as a threat.

H4: Self-assurance for learning and improvement is positively associated with employee’s reaction to organizational change

2.5 Trust in the board

Trust in the board is a significant variable, which included in internal context factors that states by (Oreg et al., 2011). Change beneficiaries who revealed holding significant levels of trust in the executives, who see the board as strong, and who feel regarded, were increasingly open to recommended changes and detailed a more prominent eagerness to help out the change. It is recognized as a basic component of hierarchical change and best accomplished through counsel, interest and strengthening as in (Katsaros et al., 2014).

H5: Trust in management has a direct relation with employee’s reaction to organization change

2.6 Perceived need for change

Exploration on authoritative change has recommended that a legitimate correspondence from the executives will in general assist workers with understanding a circumstance and a requirement for hierarchical change, subsequently encouraging change procedures and decreasing representatives' protection from change (Kotter and Cohen, 2012). It is valuable to take note of that according to representative's perspective; the setting where authoritative change happens will in general apply an impact on workers 'impression of requirement for change.

H6: need for change is emphatically connected with workers response to authoritative change

Depending on the literature and formulated hypothesis above the study will have the following conceptual framework?

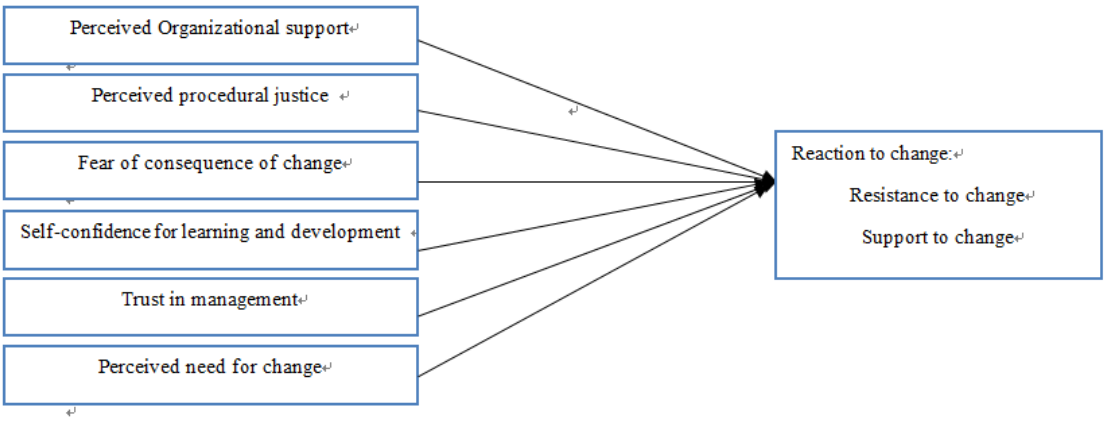

Figure 1 Conceptual Framwork

3 Method

3.1 Participants and data collection procedures

The data obtained through a self-administrated questionnaire to MRCA employees of seven public intuitions. Questionnaire were distributed to 359 public employees, The researcher used sample size determination formula developed at University Park by Jeff Watson, Research Assistant, and Cooperative Extension & Outreach for calculating the sample size required.

3.2 Measurement scale

All questionnaires in this study are measured by using a five – point Likert scale which expressed by strongly disagree (1), disagree (2), neutral (3), agree (4) and strongly agree (5). Statistical Package for Social Science (SPSS) software employed to analyze and present the data by using different statistical tools. Descriptive analysis, correlation analysis and multiple regression analysis statistical tools employed to analyze the data. According to (Abebe, 2016)as cited in (Bekele et al., 2014) the mean score below 3.39 was considered as low, the mean score from 3.40 up to 3.79 was considered as moderate and mean score above 3.8 was considers as high correlation coefficient can range from-1.00 to +1.00. The value of -1.00 represents a perfect negative correlation.

While a value of +1.00 represents a perfect positive correlation. A value of 0.00 correlations represents no relationship in multiple regression analysis takes into account the inter-correlations among all variables involved. This method also takes into account the correlations among the predictor scores. Multiple regression analysis more than one predictor is jointly regressed against the criterion variable.

$$RC=\beta 0+\beta 1POS+\beta 2PPJ+\beta 3TM+\beta 4FCC+\beta 5SCLD+\beta 6PNC+e$$

$$SC=\beta 0+\beta 1POS+\beta 2PPJ+\beta 3TM+\beta 4FCC+\beta 5SCLD+\beta 6PNC+e$$

Mathematically, $$\boldsymbol{Yi=\beta 1+\beta 2X2+\beta 3X3+\beta 4X4+\beta 5X5+\beta 6X6+\beta 7X}$$

Where Y is the dependent variable- reaction to change X2, X3, X4, X5, X6 and X7are the explanatory variables (or the repressors) β1 is the intercept term- it gives the mean or average effect on Y of all the variables excluded from the equation. Although its mechanical interpretation is the average value of Y when the stated independent variables are set equal to zero β2, β3, β4, β5β6**,** β7 refer the coefficient of their respective independent variable which measures the change in the mean value of Y, per unit change in their respective independent variable

4 Data Analysis Results and Discussions

Table 1 Results of Descriptive Analysis

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
RC	359	1	5	2.18	.917
SC	359	1	5	3.80	.895
POC	359	1	5	3.78	1.102
PPJ	359	1	5	3.52	1.022
FCC	359	1	5	2.49	.992
SCLD	359	1	5	3.88	.990
TM	359	1	5	3.89	1.175
PNC	359	1	5	3.68	1.055

Table 1: indicates employee‘s perception towards the change, mean score of perceived organizational support, perceived procedural justice, perceived need for change have moderate mean (3.78, 3.52, 3.68) respectively. which indicates that employees of MRCA believes that they get moderate level of support from their organization they also think there is moderate level of procedural justice as well as their need for undertaking the change is moderate. Self-assurance for learning and improvement and trust management has largest mean, which is (3.88, 3.89). It indicates that, employees of MRCA have high self-assurance for learning and development, they trusted their manager highly, and their standard deviation show slightly different. This was perceived need for change (1.055), and perceived procedural justice (1.022), perceived organization support (1.102) and trust in management (1.175) unlike these variables, self-assurance for learning and development has low standard deviation which is (0.990), fear of consequence of change has low mean score (2.49) with standard deviation (0.992) While the dependent variable reaction to change which expressed by employee‘s resistance to change and support to change mean assessment show 2.18 and 3.80 respectively. As cited in (Abebe, 2016) the mean score beneath 3.39 was considered as low, the mean score from 3.40 up to 3.79 was considered as moderate and mean score above 3.8 was considers as high. according to this information resistance to change scores low mean and support to change was lied on high mean which means the employees in MRCA have low resistance to change rather they support the change.

Table 2 Results of Inferential Statistics

		Correlations							
		RC	SC	POC	PPJ	FCC	SCLD	TM	PNC
RC	Correlation	1							
	Sig. (2-tailed)								
	N	359							
SC	Correlation	-.824**	1						
	Sig. (2-tailed)	.000							
	N	359	359						
POS	Correlation	-.624**	.574**	1					
	Sig. (2-tailed)	.000	.000						
	N	359	359	359					
PPJ	Correlation	-.592**	.538**	.356**	1				
	Sig. (2-tailed)	.000	.000	.000					
	N	359	359	359	359				
FFC	Correlation	.591**	-.511**	-.447**	-.325**	1			
	Sig. (2-tailed)	.000	.000	.000	.000				
	N	359	359	359	359	359			
SCLD	Correlation	-.430**	.381**	.271**	.250**	-.192**	1		
	Sig. (2-tailed)	.000	.000	.000	.000	.000			
	N	359	359	359	359	359	359		
TM	Correlation	-.837**	.707**	.562**	.521**	-.490**	.298**	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		
	N	359	359	359	359	359	359	359	

P N C	Correlation	.371**	.402**	.204**	.317**	-.250**	.301**	.289**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	
	N	359	359	359	359	359	359	359	359

**. Correlation is significant at the 0.01 level (2-tailed).

Where:

RC = resistance to change
SC= Support to organizational support
Pos = perceived organizational support
PPJ = Perceived Procedural justice
FCC = Fear of consequence of change
SCLD = Self Confidence for learning and development
TM = Trust in management
PNC = Perceived need for change

As table 2: indicates there is negative, significant and substantial correlation between perceived Organizational support and resistance to change ($r = -0.624$, $p < 0.01$), and there is positive, significant and substantial correlation between perceived organizational support and support of change ($r = 0.574$, $p < 0.01$). The other correlation result showed that perceived procedural justice and resistance to change has negative, significant and substantial correlation ($r = -0.592$, $P < 0.01$), and perceived procedural justice and support of change are in a substantial way correlated positively and significantly ($r=0.538$, $p<0.01$),Fear of consequence of change was the other variable in the Study the result of correlation for this variable indicated that Fear of consequence of change positively, significantly and in a substantial way correlated with resistance to change ($r=0.524$, $p<0.01$) and negatively, Significantly and in a medium way correlated with support for change($r=-0.477$, $p<0.01$). .Self-confidence for learning and development also negatively, significantly and in a medium way correlated with resistance to change ($r=-0.430$, $p<0.01$) and has positive, significant and medium correlation with support of change($r=0.381$, $p<0.01$), employees will support if they have self-confidence for learning and development otherwise they will oppose the change. Trust in management negatively, significantly and in a very strong association correlated with resistance to change($r=-0.837$, $p<0.01$) very strong association, negative and significant correlation with support of change (0.707, $p<0.01$). The other finding of the study shows that Perceived need for change negatively and significantly correlated in medium range with resistance to change ($r=-0.371$, $p<0.01$), and correlated positively, significantly and in a medium way with support of change ($r=0.402$, $p<0$.

Table 3 Regression Results for Resistance to Change

1. Model summary

Model	R	R2	Adjusted R2	F	Sig
	.893a	.798	.795	231.700	.000b

2. Beta coefficients

Model	Un-standardized B	Std. Err.	Standardized	T	Sig
(Constant)	5.419	.151		35.879	.000
POS	-.147	.024	-.177	-6.025	.000
PPJ	-.135	.026	-.150	-5.172	.000
FCC	.091	.023	.099	3.948	.000
SCLD	-.138	.024	-.149	-5.724	.000
TM	-.449	.025	-.574	-17.754	.000
PNC	-.049	.023	-.056	-2.134	.034

As we can understand from table 3 Standing from the result of the above, multiple regression analysis the value of F statics 231.700 at 6 and 352 degree of freedom is statically significant at 95% confidence. Which implies that model is statically significant .Additionally; R^2 of the model is .798, which shows that approximately 79.8 of variance in independent (resistance to change) can be explained by the linear combination of the independent variables.

Table 4 Regression results for Support to change

1.Model Summary

Model	R	R2	Adjusted R2	F	Sig
	0.786a	0.617	0.611	94.538	.000b

2.Beta coefficients

Model	Un-standardized B	Std.Err.	Standardized	T	Sig
(constant)	.714	.203		3.518	.000
POC	.174	.033	.214	5.310	.000
PPJ	.138	.035	.158	3.956	.000
FCC	-.048	.031	-.053	-1.532	.126
SCLD	.102	.032	.112	3.131	.002
TM	.317	.034	.416	9.348	.000
PNC	.121	.031	.143	3.933	.000

Table 4 shows the result of multiple regressions analysis the estimation of F statics 94.538at 6 and 352 degree of freedom is statically significant. Furthermore, the R2 of the model is 617, which shows that around 61.7% of the variance in dependent variable (support to change) can be clarified by the direct blend of the autonomous variable.

Table 5 Summary Results of Hypothesis

Hypothesis	Mean score	Descriptive results		Correlation result for resistance to change	Correlation result for support to change	Regression result for resistance to change	Regression result for support to change
		Std. Deviation	Level of relation				
H1	3.78	1.102	Moderate	-ve	+ve	Statically significant	Statically significant
H2	3.52	1.022	Moderate	-ve	+ve	‘’	‘’
H3	3.68	1.055	Moderate	+ve	-ve	‘’	‘’
H4	3.88	0.99	High	-ve	+ve	‘’	‘’
H5	3.89	1.175	High	-ve	-ve	‘’	‘’
H6	3.87	1.164	high	-ve	+ve	‘’	‘’

Managing Organizational change is difficult task, because it can create a sort of exhaustive negative feeling as a rule contains pressure, misery, uneasiness and other negative feelings. Mekelle revenue and customs authority can perform effective organizational change by conducting the following activates.

(1) Fear of progress fundamentally ascends through misconception about the change. To stay away from such issue MRCA ought to acknowledge about the change essential from workers and after that the top administrator of the organization can choose about the progressions that the organization merits

(2) Teaching, offering preparing to representatives about the progressions that the organization may confront/merit later on time is essential to know workers about the change and to make a functioning and successful interest during the hour of progress

(3) Sharing great experience of viable association change made by other association is significant and afterward relating that involvement in culture and nature of the association is vital.

5 Conclusions

The result of the descriptive statistics indicates employee‘s perception towards the change, mean score of perceived organizational support, perceived procedural justice, perceived need for change have moderate mean (3.78, 3.52, 3.68) respectively which indicates that employees of MRCA believes that they get moderate level of support from their organization they also think there is moderate level of procedural justice as well as their need for undertaking the change is moderate. Self-confidence for learning and development and trust management has largest mean which is (3.88, 3.89) it indicate that, employees of MRCA have high self-confidence for learning and development and they trusted their manager highly. and their standard deviation show slightly different which was perceived need for change (1.055), and perceived procedural justice (1.022) and perceived organizational support (1.102) and trust in management (1.175) unlike these variables, self-confidence for learning and development has low standard deviation which is (0.990), fear of consequence of change has low mean score (2.49) with standard deviation (0.992).

While the dependent variable reaction to change which expressed by employee‘s resistance to change and support to change mean assessment show 2.18 and 3.80 respectively. resistance to change scores low mean and support to change lied on high mean which means the employees in MRCA have low resistance to change rather they support the change.

From the results of correlation analysis, there is negative, significant and substantial correlation between perceived organizational support and resistance to change ($r = -0.624$, $p < 0.01$), and there is positive, significant and substantial correlation between perceived organizational support and support of change ($r = 0.574$, $p < 0.01$)

The other correlation result showed that perceived procedural justice and resistance to change has negative, significant and substantial correlation ($r = -0.592$, $P < 0.01$), and perceived procedural justice and support of change are in a substantial way correlated positively and significantly ($r=0.538$, $p<0.01$), Fear of consequence of change was the other variable in the study the result of correlation for this variable indicated that Fear of consequence of change positively, significantly and in a substantial way correlated with resistance to change ($r=0.524$, $p<0.01$) and negatively, significantly and in a medium way correlated with support for change($r=-0.477$, $p<0.01$),

Self-confidence for learning and development also negatively, significantly and in a medium way correlated with resistance to change ($r=-0.430$, $p<0.01$) and has positive, significant and medium correlation with support of change($r=0.381$, $p<0.01$), employees will support if they have self-confidence for learning and development otherwise they will oppose the change.

Trust in management negatively, significantly and in a very strong association correlated with resistance to change($r=-0.837$, $p<0.01$) and very strong association, negative and significant correlation with support of change (0.707, $p<0.01$)

The other finding of the study shows that Perceived need for change negatively and significantly correlated in medium range with resistance to change ($r=-0.371$, $p<0.01$) and correlated positively, significantly and in a medium way with support of change ($r=0.402$, $p<0.01$).

In addition to this, as indicated in multiple regression analysis dimensions of perceived employees behavior towards organizational change which are perceived organizational support, perceived procedural justice, self-confidence to learning and development, trust in management and perceived need for change have negative and significant effect on resistance to change while it is positive and significant effect on support to change. Unlike this fear of consequence of change is positive and significant effect on resistance to change whereas it is insignificant to support to change.

To conclude Employees of MRCA show high level of support to change with the mean score but the result also showed there are employees who resist the change with the mean score. The results of all variables except fear from the correlation analysis revealed negatively, the multiple regressions indicate essentially corresponded with protection from change yet decidedly and altogether related with help to change. Then again, dread of obscure results of progress emphatically and fundamentally connected with protection from change and contrarily and essentially related with help to change. Resistance to change negatively affected by all variables but positively affected by fear of consequence of change. The other dependent variable support to change positively influenced by organizational support, procedural justice, self-assurance to learning and development, trust in the board and need for change but dread of consequence of change was insignificant.

6 Recommendations

Based on the findings and conclusions of the study, the researcher would like to give the following recommendations to the management of MRCA. The finding from the descriptive analysis indicates that employees are support the change initiatives implemented by MRCA. Managers should make this continuous. However, there are employees who resist the change initiatives hence, the organization should give attention and make these employees supporter. By performing the following points

If the organization needs its employees support during the change it must be show support for its employees by giving attention to their well-being and by showing care for their ideas and helping them to achieve their goals.

Justice in the procedure of decisions and policies has direct influence with support of change and distrust leads employees to resist the change therefore, decisions that made in the organization should be fair and participative

The organization should avoid fear of consequences of change by building trust and should help employees to avoid fear because it leads them to resistance to change

When change is planned to implement building employees self-confidence of learning and development and creating opportunity to learning is recommendable because employees who has self-confidence to developing new skills relevant to his or her job and who keep up with new techniques and knowledge is more likely support the change initiatives .

The organization makes its employees to feel the change is valuable it should be implements right now by identifying the right time to implement and giving the right explanation why the change is implemented at the moment

7 Direction for Future Research

This study undertaken by considering the direct effect between perceived employees 'behavior and their reaction towards organizational change. However, there will be variables that have a mediating role such as communication psychological contract etc. therefore; future researchers should consider these mediating variables. Furthermore, this study limited to MRCA Tigrai region. Hence, it will be good for future researchers to focus on industry wise and other Regions in Ethiopia.

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The Relationship of Organizational Justice and Job Performance: The Mediating Role of Organizational Identification

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Abstract: The present study was underpinned by an objectivist ontology, a positivist epistemology and a quantitative method. This study was aimed at exploring relationships among organizational justice, organizational identification and job performance. The research sample including 77 participants were selected from different companies in Chengdu, China. Correlation and regression analysis were used to test proposed hypothesis. Empirical findings indicated that: 1. Organizational identification played a mediating role in the effect of organizational justice on job performance, 2. Procedural justice, distributive justice, and interpersonal justice had a significant positive impact on organizational identification, but informational justice cannot predict organizational identification.
Keywords: Organizational justice; Organizational identification; Job performance; Mediating effect

1 Introduction

With the development of the marketization, the issue of fairness has become a widespread concern in China (Chu and Song, 2015). Justice has been an important issue of economics and management. If there are gaps in salaries, bonuses and various benefits for different employees in one company, it could seriously affect employees' perception and judgment to organization, and then affect their performance. In other words, in the unfair situation, the sense of belonging and identification to organization would be damaged, workers' enthusiasm and enthusiasm would be reduced, and they could perform badly. Therefore, organizational justice to employees has an important effect on employees' organizational identification and their job performance (Pattnaik, and Tripathy, 2018).

Organizational identification is considered as a significant mediator in the relation between organizational justice and contextual performance (Colquitt, 2001). However, contextual performance is just one of the dimensions of job performance. Does organizational identification would affect the relation of organizational justice and job performance? Moreover, although organizational justice is testified to have an impact on organizational identification, different people have different viewpoints about how these detailed dimensions of organizational justice affect organizational identification. Building on this, the research aim is to examine relation between different dimensions of organizational justice and organizational identification. Then to analyze the mediation effect of organizational identification on organizational justice and job performance.

1.1 The relation between organizational justice and organizational identification

Individuals always tend to find the sense of affiliated to a group, and often seek for the long-term relationship with the group and self-value information. This Group-Value would ultimately affect the organizational identity degree of individual. The justice standard of an organization is the important source of information which provides employees with the ability to judge whether they belong to or identify with the organization. Petriglieri (Petriglieri, 2015) pointed out that if individuals could gather positive information from organizational identification, such as being respected by the organization, they would be proud of themselves as members. Then the sense of self-esteem and pride could deepen the

degree of identification with the organization. Therefore, there is a positive relationship between organizational justice and organizational identification, and organizational identification could be predicted by organizational justice (Rıza Terzi, A. et al, 2017). Olkkonen and Lipponen(2006) considered that the higher the employee's perception of organizational justice, the higher the degree of identifying with their organizations. When the workers feel being treated fairer, they tend to dedicate more loyalty to their organizations.

Furthermore, Rıza Terzi (Rıza Terzi, A. et al, 2017) considered that procedural justice and organizational identification were significantly related. Further study confirmed this positive relationship between procedural justice and organizational identification(Olkkonen and Lipponen, 2006). But some scholars pointed out that explanatory power of organizational identification toward procedural justice was weak, that is, organizational identification could not be predicted by procedural justice precisely(Peng, Lin and Kuo, 2004). Distribution justice has a direct impact on organizational identification in some research findings, and this effect was proved to be positive and strongly explanatory(Olkkonen and Lipponen, 2006). However, some scholars have not agreed with this standpoint.

1.2 The effect of Organizational Identification on Organizational Justice and Job Performance

Although there is a fierce dispute among scholars about the relevance and degree of correlation between dimensions organizational justice and job performance, it is agreed that organizational justice has a strong predictive effect on job performance. Empirical research of Swalhi (Swalhi,2017) demonstrated that a state of fairness in organization contributed to the improvement of employees' job performance.–Organizational identification has an important impact on employees' attitudes and behaviors (Lee, 2015). Social Identity Theory indicates that when employees have identified with their organization, they would voluntarily accept the core values of the organization and internalize it as part of their own value system. Even without the supervision of others, they could consciously follow job instruments working hard. The centripetal force of employees could be stimulated by organizational identity, making them more willing to devote. In term of mediating effect of organizational identification, researchers generally consider that organizational justice has an impact on employees' extra-role behaviors(Olkkonen and Lipponen, 2006) and organizational citizenship behavior (OCB)(Demir, 2015)through organizational identification. Actually, organizational citizenship behavior and extra-role behavior are both contextual performances. Therefore, the previous researches just focused on one dimension of job performance to explore the role of organizational identification in the relation between organizational justice and job performance. In order to contributes to the theory, it is necessary to conduct in-depth research on the mediator role of organizational identification in organizational justice and job performance.

2 Research Design

2.1 Research hypotheses and theoretical model

From the literature review above, we could put forward the theoretical model (Figure 1) of this research. According to Colquitt(2001), organizational justice can be divided into four dimensions as procedural justice, distributive justice, informational justice, and interpersonal justice. The study assumes that the four dimensions of organizational justice all have a positive effect on organizational identification, and the organizational identification is a mediator in the relationship of organizational justice and organizational identification.

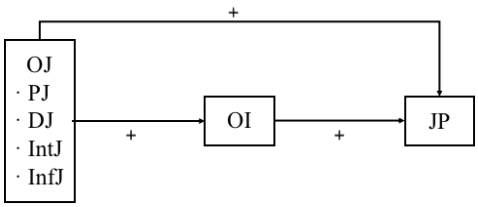

Figure 1 The Theoretical Model

The first hypothesis of this study is that the four dimensions of organizational justice have a positive effect on organizational identification.

H1a: Procedural Justice has a positive effect on Organizational Identification

H1b: Distributive Justice has a positive effect on Organizational Identification

H1c: Informational Justice has a positive effect on Organizational Identification

H1d: Interpersonal Justice has a positive effect on Organizational Identification

The second hypothesis of this study is that organizational justice can affect job performance through the mediation effect of organizational identification.

2.2 Measures

Considering the reliability, four scales used in this research were derived from well-known scholars and have been repeatedly cited by later researchers. Likert scales (ranging from 1 to 5) were used for all the survey items. All the measures demonstrated good reliability. Organizational justice measure scale is selected from Colquitt consisting of 4 subscales (Cronbach's α=0.903, 0.961, 0.965, 0.928) with 21 survey items (total Cronbach's α=0.961). Organizational identification scale used in this study is adopted from Ashforth and Mael with 6 survey items (Cronbach's α=0.879). Job performance scale is accepted from William and Borman, which include 20 survey items (Cronbach's α=0.963).

2.3 Sample selection

A simple random sampling was applied in this study to collect data of employees in Chengdu. After removing these unqualified cases, there were 77 cases to be used in this study, which accounted for 87.50% of all the participants. The respondents were 58.40% for men and 41.60% for women. Most of the respondents were young and distributed in the age group of 25-34 (account for 62.30%). More than two-third of the respondents have a high level of education, that 74% of the sample have received undergraduate and postgraduate education. The majority of the respondents were from private companies, accounting for 58.4% of the total sample. In addition, the respondents belonged to the high-income group, and more than half of the employees' salary were more than the average income of Chengdu.

3 Results

3.1 Testing for the impact of dimensions of organizational justice on organizational identification

Results showed that all the observed variables were positively and significantly associated with each other. In addition, all the correlations were moderately strong. In the Multiple Regression Model, DW-value was close to 2 (DW = 1.984), indicating that the variables were independent of each other. Multicollinearity could not be found out between independent variables, Tolerance > 0.1(Minimum value = 0.349), VIF <5 (Maximum value = 2.863), and the correlation coefficient between independent variables were all less than 0.8(Table 1).

Table 1 Correlations of Dimensions of OJ and OI (N=77)

	M	SD	OI	PJ	DJ	InfJ	IntJ

OI	4.0022	0.68264	1				
PJ	3.4935	0.85197	.601**	1			
DJ	3.6104	0.93746	.493**	.761**	1		
InfJ	3.626	0.92813	.497**	.727**	.698**	1	
IntJ	4.2175	0.55806	.577**	.528**	.368**	.497**	1

**. Correlation is significant at the 0.01 level (2-tailed). OI: organizational identification; PJ: procedural justice; DJ: distributive justice; InfJ: informational justice; IntJ: interpersonal justice

As presented in Table 2, if the informational justice was removed from regression model, the value of R^2 was remained (Model 2). While, if deleted distributive justice, the value of R^2 decreased from 0.461 to 0.456(Model 3). Therefore, informational justice was not a significant predictor of organizational identification in this multiple regression model. Regression analysis indicated that 46.1% of the variability in organizational identification could be explained by procedural justice, distributive justice, and interpersonal justice (R^2 = 0.461). The Model had statistical significance, F=20.783, P<0.001. Besides, procedural justice had a significant effect on organizational identification (b=0.257, P<0.05), distributive justice had a significant effect on organizational identification (b=0.083, P<0.05), interpersonal justice also had a significant effect on organizational identification (b=0.447, P<0.001). While, organizational identification could not be predicted by informational justice (P>0.05). Therefore, Hypothesis 1 was partially supported.

Table 2 Testing for Effect of PJ, DJ, InfJ and IntJ on OI (N=77)

	Model 1		Model 2		Mode 3	
Predictors	b	t	b	t	b	t
PJ	0.256	2.067	0.257	2.209	0.308	2.934
DJ	0.082	0.791	0.083	0.862		
InfJ	0.004	0.035			0.031	0.330
IntJ	0.446	3.477	0.447	3.603	0.432	3.410
R^2	0.461		0.461		0.456	
F	15.374		20.783		20.395	

Dependent Variable: OI. OI: organizational identification; PJ: procedural justice; DJ: distributive justice; InfJ: informational justice; IntJ: interpersonal justice

3.2 Testing for mediating effect

Means, standard deviations, and zero-order correlations for organizational justice, organizational identification and job performance variables are showed in Table 3. As expected, employees with higher level sense of organizational justice were more likely to better performance at work, which is also appropriate for employees with better of organizational identification. Furthermore, employees with better organizational justice sense were more likely to have higher levels of organizational identification.

Table 3 Descriptive Statistics And Correlations (N=77)

	M	SD	OJ	OI	JP
OJ	3.7369	0.69642	1		
OI	4.0022	0.68264	.631**	1	
JP	4.1732	0.52321	.580**	.661**	1

**. Correlation is significant at the 0.01 level (2-tailed). OJ: organizational justice; OI: organizational identification; JP: job performance

Multiple regression analysis presented that, firstly, organizational justice had a significantly positive effect on job performance, b = 0.56, p < 0.001 (Model 1 of Table 4). Secondly, organizational justice had a significantly positive effect on organizational identification, b = 0.65, p < 0.001 (Model 2 of Table 4). Thirdly, when organizational justice was controlled in this study, organizational identification had a significantly positive effect on job performance, b = 0.46, p < 0.001 (Model 3 of Table 4). Lastly, the bias–corrected percentile bootstrap method indicated that the indirect effect of organizational justice on job performance through organizational identification was significant (Table 5), a*b = 0.30, SE = 0.07, 95% CI = [0.16, 0.42], not including 0. The indirect effect represented 53.25% of the total effect. Generally, 4 criteria of mediation effect establishment were confirmed. Properties of the causal paths, including standardized path coefficients and t-values are presented in Figure 2. Therefore, Hypothesis 2 was supported.

Table 4 Testing on The Mediation Effect of OJ on JP (N=77)

Predictors	Model 1 (JP)		Model 2 (OI)		Mode 3 (JP)	
	b	t	b	t	b	t
OJ	0.56	6.17	0.65	7.05	0.26	2.51
OI					0.46	4.53
R^2	0.34		0.40		0.48	
F	38.09		49.67		34.29	

Each column is a regression model that predicts the criterion at the top of the column. OJ: organizational justice; OI: organizational identification; JP: job performance

Table 5 The Total, Direct, and Indirect Effect of Dominants on JP

			95% CI	
		SE	Lower Bound	Upper Bound
Total Effect	0.56	0.09	0.38	0.74
Direct Effect	0.26	0.10	0.05	0.47
Indirect Effect	0.30	0.07	0.16	0.42

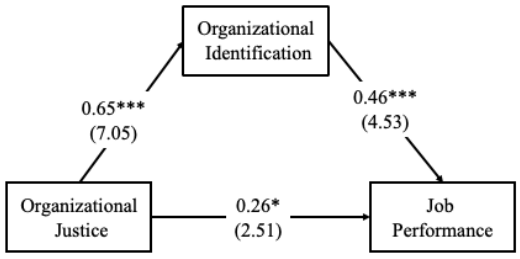

Figure 2 Hypotheses Testing Result

4 Discussion

4.1 Findings

The empirical study confirms that procedural justice, distributive justice and interpersonal justice have significant effect on organizational identification. However, this empirical study rejects the hypothesis that Information justice is a predictor of organizational identification. Most researchers believe that employees in the organization are also concerned about fairness of information (Guo and Zheng, 2016). When employees inquire leaders, they hope that managers can give them satisfactory answers. In this study, respondents belong to the high-income group, so their pay equals to their gain.

Therefore, individuals do not have a strong perception of the information related to procedures and distribution. As a result, these employees do not pay much attention to Information justice.

The empirical study supports the hypothesis that the employee's identification with the organization plays a mediating role between organizational justice and job performance. The result is similar to that of most of findings, that is, there is the mediating effect of organizational identification between organizational justice and contextual performance (Olkkonen and Lipponen, 2006). Overall, organizational justice not only can affect job performance directly, but also have an indirectly effect on job performance through organizational identification.

4.2 Suggestions

Managers should try to avoid discriminatory or mistreatment to employees, reducing the sense of injustice from the perspective of interpersonal justice, procedural justice and distributive justice. It is believed that as long as the decision-making procedures are controlled, including fully expressing themselves or having right to discourse, the process of decision-making is fair, so is the outcome (Shan, 2015). Therefore, most people focus on procedural control within the organization. However, with the basic need fulfillment, employees' other requirements will increase. Therefore, not only the right to speak and vote of employees is given, the respect and praise should also be noticed. Besides, managers should understand the real needs of employees for fair treatment. The sense of belonging and identity of employees can be improved through the satisfaction of justice, and then improving their performance.

5 Conclusion

The sample collected from employees of enterprises in Chengdu. As a whole, it covered employees of different enterprise types, but whether the classification of enterprise types is reasonable needed further consideration. Moreover, the sample size was small that only 77 valid questionnaires were collected for this research. Besides, the samples were concentrated on private enterprises. Whether the research findings can be generalized to other relevant groups needed to be further examined. In addition, due to the large number of items in a questionnaire, it is difficult to consider both comprehensiveness and simplicity.

The sample can be selected from a specific industry in Chengdu to test the relationship between organizational justice and job performance of in the future research. The sample also can be chosen from different types of company in another city to study, so as to enrich the practicability of the research findings. In addition, other relevant factors such as job satisfaction and organizational commitment can be identified and examined in the further research.

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Perceived Leader Regulatory-focused Modeling, Work Complexity, Work Regulatory Focus and Job Crafting: A Mediated Moderation Model

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Abstract: Differing from traditional top - down work design, job crafting is the change of job characteristics made by subordinates themselves, highlighting the subordinates' initiation. Drawing on regulatory focus theory by data collected from 336 subordinates and their supervisors, this study examined a mediated moderation model for job crafting. The results showed that: work regulatory focus mediates the relationship between perceived leader regulatory-focused modeling and job crafting; work complexity moderates the relationship between perceived leader regulatory-focused modeling and job crafting; work regulatory focus mediates the moderating relationship among perceived leader regulatory-focused modeling, work complexity and job crafting. The author discussed implications of these results for research and practice.

Keywords: Job crafting; Leadership; Work complexity; Regulatory focus; Role modeling

1 Introduction

Management practitioners are committed to improving subordinates' job performance, job satisfaction and well-being. Changing job characteristics through job design is an important way to achieve the above goals. Current job design is moving from a traditional top-down perspective to a bottom-up perspective, emphasizing the spontaneous adjustment of subordinates' work characteristics. At the same time, the importance of proactive behavior is increasingly highlighted in the uncertain and dynamic competitive professional environment, and job crafting - the process by which subordinates reconstruct their work, gain job recognition and job roles-has attracted more attention in many proactive behaviors(Solberg and Wong, 2016). In the existing research, scholars mainly focus on the identification and discussion of the factors influencing job crafting in the organization(Xu Changjiang and Chen Shi, 2018; Tian Xizhou, Peng Xiaoping and Guo Xinyu, 2017; Xie Baoguo, Xin Xun and Zhou Wenxia, 2016), mainly including individual factors such as traits and motivation (Niessen, Weseler and Kostova, 2016); environmental factors such as work features(Yin Kui and Liu Na, 2016; Dierdorff and Jensen, 2018; Niessen, Weseler and Kostova, 2016; Zhang and Parker, 2019), leadership style (Bavik, Bavik and Tang, 2017; Harju, Schaufeli and Hakanen, 2018). Although some scholars have mentioned that leadership is an important factor affecting followers' job crafting (Hetland *et al.*, 2018; Wang, Demerouti and Le Blanc, 2017), but this social cognitive process is not deeply analyzed to reveal the deep mechanism of typical action of the leader, such as leader role modeling, on followers' job crafting(Parker and Bindl, 2016).

Although the regulatory focus theory has been used in related research in the field of job crafting(Cao Yuankun and Xu Hongdan, 2017; Tian Xizhou, Guo Xiaodong and Xu Hao, 2020), there is still no research exploring and testing the mediating role of the regulatory focus in the relationship

between job crafting and perceived leader regulatory-focused modeling. Based on the regulatory focus theory, some scholars also pointed out that the demonstration of leadership behavior contains different regulatory focus orientations, which realizes the impact on subordinates' active behavior by evoking the regulatory focus of subordinates (Li Xiangfen et al., 2016). Work complexity is a typical job characteristic variable, which is widely used as a moderator variable to investigate as a situational factor. This study attempts to supplement and contribute to existing research by explaining the process of influence of perceived leader regulatory-focused modeling on followers' job crafting. Firstly, it analyzes the direct relationship between perceived leader regulatory-focused modeling and followers' job crafting. Secondly, it discusses the mediating role of work regulatory focus in the relationship between perceived leader regulatory-focused modeling and followers' job crafting. Thirdly, it examines the moderating role of work complexity in the relationship among perceived leader regulatory-focused modeling ,followers' job crafting and work regulatory focus.

2 Theory and hypotheses

2.1 Perceived leader regulatory-focused modeling and job crafting

Social cognition theory points out that individuals in an organization learn by demonstrating the leader role modeling and adjusting their cognitive resources to imitate the observed behavior. Based on this theoretical point of view, some scholars analyzed the impact of leader role modeling on subordinate sales behavior, regulatory focus, work-family balance and moral orientation behavior (Bavik, Bavik and Tang, 2017; Gan, 2018; Lin Yinghui and Cheng Ken, 2016; Chen Guoquan and Chen Zidong, 2017). Consistent with the theory of regulatory focus theory, Brockner and Higgins for the first time divided the leader role modeling into two types: promoting focus and defensive focus (Brockner and Higgins, 2001). Based on this, Li Xiangfen et al. (2016) clearly defined the two concepts of promotion-focused behavioral role modeling and prevention-focused behavior. If a leader continues to seek work improvement through improving methods, demonstrates multi-field development momentum, and pays little attention to compliance with organizational routines and avoidance of mistakes, then leader demonstrates a leader's promotion-focused behavior . On the contrary, if the leader emphasizes the adherence to organizational procedures and rules in behavior to avoid criticism from the upper level, even if the breaking of the rule is reasonable or the inevitable condition for success, the leader shows a prevention-focused behavior. Therefore, combining social cognition theory and the regulatory focus theory (Brockner and Higgins, 2001), we predict:

Hypothesis 1. Perceived leader regulatory-focused modeling is significantly related to followers' job crafting.

Hypothesis 1a. Leader's promotion-focused behavior is significantly positively related to followers' job crafting.

Hypothesis 1b. Leader's prevention-focused behavior is significantly negatively related to followers' job crafting.

2.2 Mediation of work regulatory focus

Regulatory focus theory provides an explanation of the social cognitive perspective for individual proactive behavior, which is also regarded as some situational factors, such as leadership, acting on the influence mechanism of individual proactivity (Kark, Van Dijk and Vashdi, 2018). Flexible thinking and willingness to take risks are the premise that individuals can and dare to break the established ways of doing things and presenting and practicing novel ideas(Hung *et al.*, 2020; Lichtenthaler and Fischbach,

2019). Promotion-focused individuals exhibit proactive thinking and ideas, broad and abstract interpretation skills, and risk appetite; on the contrary, prevention-focused individuals exhibit security tendencies, conventional thinking patterns, and risk aversion preferences(Hung *et al.*, 2020; Lichtenthaler and Fischbach, 2019). Therefore, from the perspective of flexible thinking and willingness to change, the work regulatory focus promotion will promote the improvement of job crafting level, while the work regulatory focus prevention will inhibit job crafting level. Some experimental studies have discussed and verified the relationship between regulatory focus and job crafting (Tian Xizhou, Guo Xiaodong and Xu Hao, 2020). According to the regulatory focus theory, some studies have explored the guidance and shaping of the leader role modeling in the context of work, and the more the leaders demonstrate the promoting or defensive behavioral role modeling, the more likely the subordinates will imitate accordingly (Brockner and Higgins, 2001; Zivnuska, Kacmar and Valle, 2017; Cao Yuankun and Xu Hongdan, 2017).Thus:

Hypothesis 2. Subordinate work regulatory focus mediates the influence of perceived leader regulatory-focused modeling on followers' job crafting.

Hypothesis 2a. Followers' work regulatory focus promotion mediates the positive influence of leader's promotion-focused behavior on followers' job crafting.

Hypothesis 2b. Followers' work regulatory focus prevention mediates the negative influence of leader's prevention-focused behavior on followers' job crafting.

2.3 Moderation of work complexity

Some scholars in the field of leadership research believe that it is necessary to introduce work characteristics factors (such as job characteristics model, work richness and work complexity) into leadership research(Hans and Gupta, 2018; Wang, 2018; Zhao Xinyu, Shang Yufan and Li Yujia, 2016) to deepen the understanding of leadership processes and mechanisms. Among the many job characteristics, work complexity plays an important role in explaining how subordinates respond to leadership influences. Complex work has the characteristics of high degree of freedom, skill diversity, high recognition, meaning, feedback, diversification of results and diversification of potential paths(Alameri *et al.*, 2019; Audenaert, Vanderstraeten and Buyens, 2017; Wang, Demerouti and Bakker, 2016).

As mentioned above, leader's promotion-focused behavior has a positive impact on followers' job crafting. When work complexity is high, subordinates will react more strongly to behavioral role modeling. Because leader's promotion-focused behavior conveys the leadership of proactive ways of working and the pursuit of success, when subordinates face more challenging and complex work, often accompanied by high-level skills and diverse methods, they are more sensitive to the behavioral role modeling of leadership promotion, their strong desires are also stimulated, pay more attention to the emergence of positive results in the work, and strive to achieve the desired goal through some positive actions, and perform a higher level of facilitating regulation and ultimately a higher level of job crafting at work. Conversely, when the work complexity is low, the subordinate response to leader's promotion-focused behavior will be diminished, because subordinates only need to use conventional methods to complete the work.

Consider a situation where leader's prevention-focused behavior has a negative impact on followers' job crafting. When the work complexity is high, the subordinates also show a stronger reaction to leader's prevention-focused behavior. Because prevention-focused behavior conveys the principle of doing things cautiously to avoid mistakes, and subordinates are often accompanied by higher potential risks of error

in the face of more challenging and complex work, in which case subordinates are also more sensitive to prevention-focused behavior, more likely to be motivate their safety needs, more focused on prevention of negative outcomes at work, more willing to avoid negative outcomes through some cautious behavior, more likely to perform a higher work regulatory focus prevention and ultimately a lower level of job crafting. Conversely, when the work complexity is low, the subordinate response to leader's prevention-focused behavior will be weakened, because the subordinates only need to use the conventional method to complete the work and will not be so sensitive to leader's prevention-focused behavior. Thus:

Hypothesis 3. Work complexity plays a regulatory role in the relationship between perceived leader regulatory-focused modeling and followers' job crafting.

Hypothesis 3a. Work complexity positively moderates the positive impact of the leader's promotion-focused behavior on followers' job crafting. The higher work complexity, the stronger the positive relationship between them, and vice versa.

Hypothesis 3b. Work complexity positively moderates the negative impact of the leader's prevention-focused behavior on followers' job crafting. The higher work complexity, the stronger the negative relationship between them, and vice versa.

In addition, it can be seen from the foregoing discussion that the regulatory effect of work complexity on the relationship between perceived leader regulatory-focused modeling and followers' job crafting is realized through the subordinate work regulatory focus. Thus:

Hypothesis 4. Subordinate work regulatory focus mediates the moderating effect of work complexity on the relationship between perceived leader regulatory-focused modeling and followers' job crafting.

Hypothesis 4a. Subordinates work regulatory focus promotion mediates the moderating effect of work complexity on the relationship between leader's promotion-focused behavior and followers' job crafting.

Hypothesis 4b. Subordinate work regulatory focus prevention mediates the moderating effect of work complexity on the relationship between leader's prevention-focused behavior and followers' job crafting.

3 Methodology

3.1 Research setting, sample and Procedures

The questionnaire was actually distributed to 342 subordinates (on evaluation of leader's behavior, job regulatory focus, work complexity, and demographic information) and their 91 direct supervisors(on evaluation of followers' job crafting), and finally 336 pairs of valid matching samples were selected, with an effective rate of 96%. One leader corresponded to an average of 4 (2 to 6) subordinates. The researchers also secretly marked the questionnaire to facilitate the identification of the leadership and subordinate questionnaires. The average age of subordinates is 31 years, and the average years of service and tenure are 5 and 4.5 years, respectively. The sample includes 114 women (33.9%), 222 (66.1%) men, of which 5 (1.5%) have a PhD, 42 (12.5%) have a master's degree, and 125 (37.2%) have a bachelor's degree. 164 (48.8%) have a college and high school education background. 85 leaders, 72.5% are male, the average age is 38 years, and the average length of service is 2.3 years.

3.2 Measures

3.2.1 Followers' job crafting.

We used the 15-item job crafting measure by Slemp and Vella-Brodrick (2013), including three

dimensions of cognitive crafting, relationship crafting and task crafting. Typical item is "change the type or scope of tasks to be completed in the work". Coefficient α was 0.91.

3.2.2 Perceived leader regulatory-focused modeling

We used the 7-item leadership behavior measure by Wu *et al.* (2008), including two dimensions of leader's promotion-focused behavior and leader’s prevention-focused behavior. Typical item is "my head boss sometimes gets stuck because of not being careful". Coefficient α were 0.82 and 0.86, respectively.

3.2.3 Work regulatory focus

We used the 18-item subordinate job regulation focus questionnaire compiled by Neubert *et al.* (2008), including the two dimensions of promotion regulatory focus and defensive regulatory focus. Typical item is "to maximize the realization of self-development goals, I do not hesitate to take risks in my work". Coefficient α were 0.78 and 0.81, respectively.

3.2.4 Work complexity

We used the 18-item work characteristics measure by Sims Jr, Szilagyi and Keller (1976) in which the work complexity includes 5 measurement items. Typical measurement items are "My work task is simple and not complicated." Coefficient α was 0.87.

Following Brislin’s translation-back-translation procedure, we created Chinese versions of the questionnaires for all measures, which were scored with Likert 7 points (1 means totally disagree, 7 means totally agree).

4 Results

4.1 Descriptive statistics

Table 1 shows the mean, standard deviation, and correlation coefficient of the study variables. It can be seen that job crafting is significantly positively related to the leader’s promotion-focused behavior, work promoting regulatory focus, and work complexity; it is significantly negatively related to the leader’s prevention-focused behavior, work defensive regulatory focus. The promoting and leader’s promotion-focused and prevention-focused behavior are significantly positively and negative related to the promoting and defensive work regulatory focus, respectively.

Table 1 Means, standard Deviations and Correlations among Study Variables

	Variables	Mean	S.D.	1	2	3	4
1	JC	4.85	0.97	(0.92)			
2	LRM+	5.14	1.12	0.36**	(0.89)		
3	LRM-	4.66	0.88	-0.18**	0.03	(0.92)	
4	WRF+	4.64	1.29	0.37**	0.36**	-0.29**	(0.80)
5	WRF-	3.81	0.71	-0.29**	-0.76**	0.25**	-0.50**
6	WC	4.76	1.02	0.24**	0.50**	-0.09	0.48**
7	Age	31.03	4.92	0.00	-0.07	-0.08	0.01
8	Gender	1.38	0.40	-0.10*	0.05	0.07	-0.06
9	Education	1.67	0.99	-0.19**	-0.07	-0.06	0.08
10	Length of work	5.02	5.01	0.14*	-0.08	-0.03	-0.02
11	Length of service	4.51	4.76	0.12*	-0.11	0.02	-0.03

	Variables	5	6	7	8	9	10
1	JC						
2	LRM+						
3	LRM-						
4	WRF+						
5	WRF-	(0.84)					
6	WC	-0.40**	(0.85)				
7	Age	-0.04	0.03				
8	Gender	-0.06	-0.06	-0.01			
9	Education	-0.06	0.03	0.02	0.06		

10	Length of work	0.01	-0.06	0.70**	-0.03	-0.21**	
11	Length of service	0.05	0.02	0.61**	-0.04	-0.21**	0.92**

Note: LRM, leader role modeling; WRF, work regulatory focus; WC, work complexity; JC, job crafting; +, promotion ;-, prevention ;M, model; *p< .05, **p< .01

4.2 Hypothesis testing

In order to test the foregoing hypothesis, the data was analyzed using a multi-level regression analysis method, and the scores of all variables were centralized (Iacobucci *et al.*, 2017).

One is to test the direct impact of leader role model on job crafting. We built model1 with gender, age, education, length of work and length of service as control variables. Introducing independent variables on the basis of model1, we built model2. Leader's promotion-focused behavior is significantly positively related to followers' job crafting. Hypothesis 1a is verified. Leader's prevention-focused behavior is significantly negatively related to followers' job crafting. Hypothesis 1b is verified.

The second is to test the mediating role of work regulatory focus. The three-step regression method of Baron and Kenny was used. First, the control variables and independent variables were regressed on the mediator variable to construct model3. Leader's promotion-focused behavior is significantly positively related to followers' work regulatory focus promotion(model3a), and leader's prevention-focused behavior is significantly positively related to followers' work regulatory focus prevention(model3b), both of which meet the first condition of mediating role verification. Second, the control variables and independent variables were regressed on job crafting to build model4. Leader's promotion-focused behavior is significantly positively related to followers' job crafting(model4a), and leader's prevention-focused behavior is significantly negatively related to followers' job crafting(model4b), which meets the second condition of mediating role verification. Finally, the control variables, independent variables, and mediator variable were regressed on job crafting, to build model5.When followers' work regulatory focus promotion enters the model, the β coefficient of leader's promotion-focused behavior to followers' job crafting is still significant, but the value drops from 0.34 in model 4a to 0.25 in model 5a, so the followers' work regulatory focus promotion partially mediates leader's promotion-focused behavior's positive impact on followers' job crafting, hypothesis 2a is verified; when followers' work regulatory focus prevention enters the model, the β coefficient of leader's prevention-focused behavior on followers' job crafting is still significant, but the value drops from 0.18 in model 4b to 0.13 in model 5b, so the followers' work regulatory focus prevention partially mediates the negative impact of leader's prevention-focused behavior on followers' job crafting, hypothesis 2b is also verified.

The third is to test the mediated moderating role of work regulatory focus using Muller, Judd and Yzerbyt's method. The influence coefficient of "leader role modeling promotion × work complexity" on job crafting is significant ($\beta = 0.23$, $p < 0.01$) (model6a). Hypothesis 3a is verified. Figure 1 illustrates the adjustment effect in detail. After controlling the influence of other variables, the influence coefficient of "leader role modeling promotion × work complexity" on followers' work regulatory focus promotion is significant ($\beta = 0.16$, $p < 0.05$) (model7a). After controlling the influence of "followers' work regulatory focus promotion × work complexity" and other variables, the influence coefficient of followers' work regulatory focus promotion on the followers' job crafting is significant ($\beta = 0.22$, $p < 0.01$) (model8a). After controlling the influence of followers' work regulatory focus promotion, the value of the influence coefficient of "leader role modeling promotion × work complexity" on followers' job crafting decreased from 0.23 (model6a) to 0.15 (model8a). In summary, followers' work regulatory

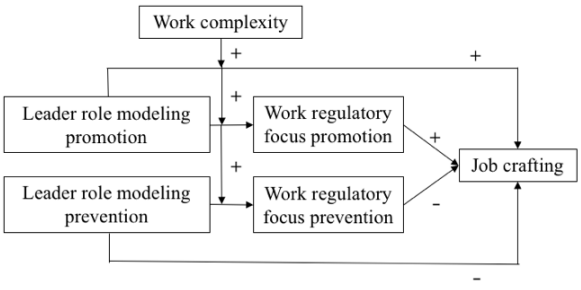
focus promotion partially mediates the role of work complexity in moderating the relationship between leader’ s promotion-focused behavior and followers’ job crafting. Hypothesis 4a is verified.

The impact coefficient of “leader role modeling prevention × work complexity" on job crafting is significant (β = 0.13, p <0.01) (model6b). Hypothesis 3b has been verified. Figure 2 illustrates the adjustment effect in detail. After controlling the influence of other variables, the impact coefficient of “leader role modeling prevention × work complexity" on followers’ work regulatory focus prevention is significant (β = 0.09, p <0.05) (model7b). After controlling the influence of "followers’ work regulatory focus prevention × work complexity" and other variables, the influence coefficient of followers’ work regulatory focus prevention on followers’ job crafting is significant (β = -0.22, p <0.01) (model8b). After controlling the influence of followers’ work regulatory focus prevention, the influence coefficient of “leader role modeling prevention × work complexity" on followers’ job crafting becomes insignificant (β = 0.06, p> 0.05) (model8b). In summary, followers’ work regulatory focus prevention completely mediates the role of work complexity in moderating the relationship between leader’ s prevention-focused behavior and followers’ job crafting. Hypothesis 4b is also verified.

Table 2 Hypothesis Testing

	Direct impact of leader role model on job crafting		Mediating role of work regulatory focus					
Variables	M1:JC	M2:JC	M3a:WRF+	M4a:JC	M5a:JC	M3b:WRF-	M4b:JC	M5b:JC
Controls								
Age	-0.22*	-0.22	0.01	-0.16*	-0.20*	0.04	-0.18*	-0.18*
Gender	-0.11	-0.11**	-0.09	-0.11	-0.12	-0.10**	-0.09	-0.08*
Education	-0.11	-0.12*	0.07	-0.07*	-0.12*	-0.08	-0.09	-0.11
Length of work	0.32	0.25	0.05	0.25	0.26	-0.20	0.26*	0.16
Length of service	-0.05	0.05	-0.02	0.03	0.03	0.21	0.00	0.04
Predictor								
LRM+		0.35**	0.22**	0.34**	0.25**			
LRM-		-0.22**				0.24**	-0.18**	-0.13**
Moderator								
WC								
Interaction term								
LRM+ ×WC								
LRM- ×WC								
Mediator								
WRF+					0.23**			
WRF-								-0.25**
Interaction term								
WRF+ ×WC								
WRF- ×WC								
R^2	0.13	0.29	0.29	0.21	0.25	0.13	0.14	0.18
ΔR^2		0.13		0.13	0.06**		0.13	0.05**

	Mediated moderating role of work regulatory focus					
Variables	M6a:JC	M7a:WRF+	M8a:JC	M6b:JC	M7b:WRF-	M8b:JC
Controls						
Age	-0.19*	-0.02	-0.19	-0.24	0.04*	-0.19
Gender	-0.11	-0.04*	-0.11	-0.05*	-0.15	-0.09
Education	-0.07	0.08*	-0.11*	-0.12	-0.06	-0.09*
Length of work	0.28	0.10	0.26*	0.27*	-0.34*	0.20
Length of service	-0.01	-0.06	0.03	-0.04	0.28*	0.02
Predictor						
LRM+	0.27**	0.13*	0.287**			
LRM-				-0.19*	0.24**	-0.15**
Moderator						
WC	0.09	0.28**	0.04	0.13*	-0.38**	0.12*
Interaction term						
LRM+ ×WC	0.23**	0.16*	0.15**			
LRM- ×WC				0.13**	0.09*	0.06
Mediator						
WRF+			0.22**			
WRF-						-0.22**
Interaction term						
WRF+ ×WC			0.08			
WRF- ×WC						0.15**



R^2	0.26	0.33	0.32	0.19	0.23	0.27
ΔR^2			0.06**			0.05**

Note: LRM, leader role modeling; WRF, work regulatory focus; WC, work complexity; JC, job crafting; +, promotion ;-, prevention ;M, model; *p< .05, **p< .01

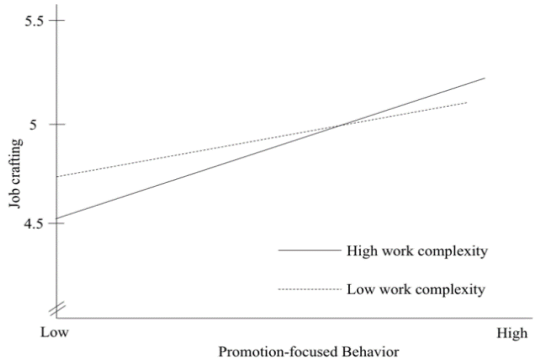


Figure 2 Leader's promotion-focused behavior – work complexity interaction for job crafting

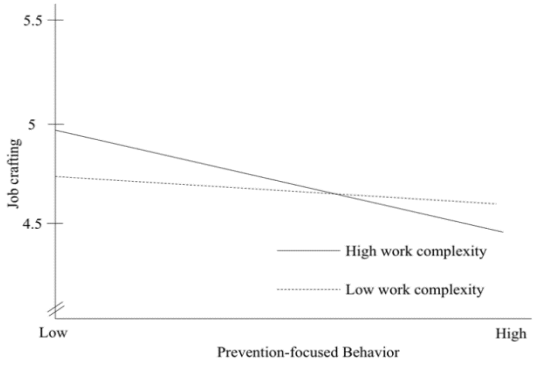


Figure 2 Leader's prevention-focused behavior – work complexity interaction for job crafting

5 Conclusion

Modern managers not only expect subordinates to adapt to passive environments, but also emphasize that subordinates actively seek change. Job crafting is one of the subordinate active behaviors. It does not redesign the work as a whole, but changes specific aspects within specific work tasks. Through theoretical analysis and empirical testing, this study draws the following research conclusions: Firstly, the perceived leader regulatory-focused modeling has a significant impact on followers' job crafting. Secondly, the work regulatory focus mediates the impact of perceived leader regulatory-focused modeling on followers' job crafting. Thirdly, the work complexity moderates the impact of perceived leader regulatory-focused modeling on followers' job crafting. Finally, the work regulatory focus mediates the moderating role of work complexity. The final verified theoretical model is shown in Figure 3.

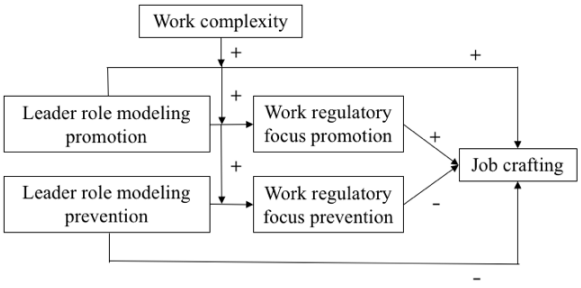


Figure 3 Proven Theoretical Model

The theoretical contributions are embodied in the following three aspects. One is to identify a social cognitive process in which leader influences followers' job crafting. The second is to make an accurate understanding of the relationship between perceived leader regulatory-focused modeling and followers' job crafting possible by revealing the moderating role of work complexity. The third is to clarify the mediating role of the work regulatory focus on the moderating role of work complexity in the relationship between perceived leader regulatory-focused modeling and job crafting.

In terms of practice, the results of this research have implications for managers. First, from the perspective of social cognition, it answers the reasons for the improvement and restraint of subordinates' job crafting, and provided a beneficial perspective for the management practice of leaders: the leaders themselves should show promotion-focused behavior as much as possible when dealing with work problems, which can effectively promote followers' job crafting. At the same time, prevention-focused behavior should be reduced or avoided to achieve effective evasion of followers' job crafting suppression. Second, the disclosure of the moderating role of work complexity can allow managers to recognize the organizational context in which their behavioral role modeling is more effective, and then help them continue to evaluate their own behaviors in the future based on changes in the organizational context. Finally, the elaboration of the mediating role of the work regulatory focus will help managers to better understand the path and mechanism of their behavioral role modeling affecting followers' job crafting, so that leaders can better replace unconscious behaviors with conscious rational behaviors to ensure that the impact of behavioral role modeling is more in line with the process of social cognition, which effectively promotes followers' job crafting.

There are limitations and implications for future research. The first is the limitation of cross-sectional design. Although the empirical results of this study are consistent with theoretical assumptions, the design of cross-sectional data does not clearly confirm the causal relationship between variables. For example, the relationship between leader role modeling and subordinate job crafting can be explained as follows: Leaders who show promotion-focused behavior may choose subordinates who are more willing to job crafting, or are more sensitive to their subordinates' job crafting evaluation. Similarly, the relationship between work regulatory focus and job crafting can also be explained as follows: Subordinates' work regulatory focus may be affected by their job crafting success or failure experience. Therefore, in future research, it is necessary to strengthen the test of causality between variables by longitudinal research design. The second is the ignorance of the discussion of other leaders' daily behavior. Although social cognitive theory emphasizes the important role of perceived leader regulatory-focused modeling in influencing the focus of subordinates 'work regulatory, other aspects of daily leadership performance (such as the use of language and symbols, feedback, etc.) can also influence the followers' work regulatory focus(Brockner and Higgins, 2001). The neglect of these leadership behaviors is one of the limitations of this study. Future research should control the influence of the above leader behaviors when discussing the leader role modeling on followers' job crafting. The third is the insufficient consideration of model dynamics. Issues such as the dynamic transformation of the regulatory focus in subordinates' work and the role of leadership in this process still need to be discussed in future research. Can leader guide the subordinates' work regulatory focus promotion and prevention at the same time? Does leader promote the transformation of subordinates from one type of work regulatory focus to another? What is the mechanism? These scientific issues need to be addressed in future research. At the same time, future research should also explore the moderating role of other organizational context factors.

Acknowledgement

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Evidence on Mediated Moderated Model on the Relation of Green Human Resource Management and Organizational Citizenship Behavior

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Abstract: Research on human resource management to improve the quality output of the organization are going on extensively. This paper aims to present an empirical study on the moderating relation of perceived organizational support to green human resource management (GHRM) and affective commitment (AC). The data were gathered from secondary level school employees using a structured questionnaire. The result of the study suggests that employee development (e.g. ability acknowledgment, training), active participation of employees, and their commitment towards the organization is very essential to improve the green quality of the organization. The importance of the study focus lies on the employee's level of commitment and their perception towards organizational support. Parallel organizational support and affective commitment assuring performance management, employee involvement, ability acknowledgment directly predict positive citizenship behavior of the organization.
Keywords: Green HRM; Perceived organizational support; Affective commitment; Organizational citizenship behavior

1 Introduction

Changing trend of the modern world with innovative ideas on better organizational performance, numerous techniques and ideas including "Green "practices are casual. Studies have shown that making strides towards environmental friendliness is monetarily beneficial, directly affects business-related benefits and increases investment returns. Human capital is one of the very important assets of any organization. Time and again turnover, job dissatisfaction, worker's depressions are some of the lags that may hamper in the organization in a negative way. Considering the advancement of human resource practice in organizations, this study has extensively reviewed the literature on Green HRM practice, pros and cons, its influence, behavioral changes and effects on the conduct of organizational citizenship considering some other major variables and their relationship.

The dominant approach over the last decades has been to conceptualize the relationship between perceived organizational support and affective commitment in terms of social exchange perspective. Despite the theoretical propositions, empirical research has not examined the moderating relation of perceived organizational relationships between the Green HRM and affective organizational commitment. Filling this gap, the objective of the current research is to investigate how organizational support may provide a new sight into the relationship. More precisely, this study will contribute to understand the relation of perceived organizational support and affective commitment relation. Moreover, the study examines how this relationship extends the prediction of organizational citizenship behavior.

2 Literature Review

Green HRM can be defined as " the environmental orientation of all human resource management (HRM) functions or practices of an organization at all levels (Arulrajah et al., 2015). The greening of HRM and resulting outcomes cab be better comprehend in light of Ability-Motivation-Opportunity (AMO) theory which is most dominant theory in understanding the impact of green human resource practices(Anwar et al., 2020). AMO theory explains that high performance work practices (HPWS) are set of distinct and the interrelated practices are grouped based on ability, motivation and opportunity (Appelbaum et al., 2000). Abilities includes the HR practices including recruitment and training programs, which ensures knowledge and skill of the employee to conduct specific task. Moreover, motivation is based on the appraisal of the employees to boost their performance. Similarly, opportunity is a bundle of practices comprised of involvement, knowledge sharing activities to improve active participation of employee. The Ability motivation opportunity theory presents a specific way of defining HRM and focus on the human resource (HR) practices. This has effect of making workers feel highly engaged with their organization with their team, colleagues, their work and going extra mile. This is also known as organizational citizenship behavior (OCB) (Boselie, 2010).

The Social Exchange Perspective Previous studies have shown a strong link between perceived organizational support and affective commitment. Based on the norm of reciprocity and the social exchange theory, organizational support theory holds that POS would foster AC by creating a feeling of obligation among employees (McWilliams and Siegel, 2001). Employees would reciprocate the positive treatment they received from the organization by developing an emotional attachment to this employer because they feel the obligation to care about the organizational welfare and to help the organization to reach its goals. Empirical support (Eisenberger et al., 2014) has been found for this perspective, which clearly dominates the literature since the POS concept emerged. Research has indeed shown that felt obligation partially mediates the POS-AC link (Eisenberger et al., 2014).

2.1 The relation of Green HRM with OCB

Researchers have studied OCB of employees in different sectors. For instance, a significant relation to the manager's engagement in OCB and environmental practice in manufacturing companies(Fayyazi et al., 2015). A positive influence of OCB among frontline workers of manufacturing companies (Paillé et al., 2014). Similarly, a significant positive influence of motivation on OCB(Shaaban, 2018). Though studies mentioned above have examined OCB in manufacturing companies, this link has not been tested in the education sector's academic staff.

Similarly, green employee involvement practices refer to providing an opportunity to foster an employee's voice in managing the environmental issue and provides a solution to the uplift environmental status of an organization (DuBois and Dubois, 2012). Focusing on the clear environment vision and articulation of the information through formal and informal information channels guides the employees to engage in the initial task of organizational environmental goals. Besides, the use of green teams fosters the improvement of the environmental management practice of the organization. Teamwork majorly influences the opportunity seekers of the organization to hookup together in better performance of the organization.So, based on the statements above the following hypothesis is posited;

H1: Green competence building, green employee involvement, green performance management are positively related to organizational citizenship behavior (OCB)

2.2 Mediating role of affective commitment

The role of affective commitment to human resource management is proving the cornerstone to improvise the human capital of the organization. The foundation of the concept of affective commitment lies in the social exchange theory (SET). It is the potency behind the workplace behavior and their relationship shared by the employees and their firms(Sharma and Dhar, 2016).

Previous studies indicated that affective commitment is correlated more significantly with the firm outputs such as turnover, OCB, performance compared to the continuance and normative commitment. An array of studies has explored that affectively committed employees are intrinsically motivated and achieve organizational aims with passion. Employees with an affective commitment to the organization show loyalty and they will resist in the organization for a long period.

The positive significant influence of affective commitment and factor classification was carried out in the organizational category(Meyer et al., 2002). Similarly, mediating the relation of affecting commitment to the burnout of nursing candidates was studied with positive significance(Sharma and Dhar, 2016). In contrast to the past studies, this study aims to present the mediated moderation relation considering the social perspective aspect. Further, the mediating role of affective commitment also is studied as well as it tried to discover the moderation relation of perceived organizational support. Based on the above statement the hypothesis is posited:

H2: Affective commitment mediates the relation of Green competence building, green employee involvement, green performance management and organizational citizenship behavior.

2.3 Moderating role of perceived organizational support (POS)

"Perceived organizational support has been defined as employees' global beliefs concerning the extent to which the organization values their contributions and cares about their well-being" The relationship between POS and affective commitment is also well documented (Gupta et al., 2016). Numerous studies have shown that perceived organizational support has positive consequences on both employees and organizations(Siyambalapitiya et al., 2018 , Stinglhamber et al., 2015). The concept used for explaining those subjective perceptions (which in turn explains employee commitment to an organization), is the perceived organizational support (POS) (Caesens et al., 2014 , Knies and Leisink, 2014). There were several research conducted explaining the moderating role of POS concerning affective commitment to organizational identification (Caesens et al., 2016). Moreover, the relation of perceived organizational support and also perceived supervisor support positive effect on organizational behavior is also considered (Eisenberger et al., 2014 , Gupta et al., 2016).

Based on the literature, there was a literature gap in the study of the moderating role of perceived organizational support concerning GHRM and Affective commitment. To shed the light on the gap, this research tried to study the above relation based on the hypothesis:

H3: The relationship between 'Green' Competence Building practices, 'Green' Employee Involvement, Green' Performance Management will be moderated by perceived organizational support, in that the relationship between 'Green' Competence Building practices and affective commitment will be stronger when there is high perceived organizational support than when there is low perceived organizational support.

3 Methodology

3.1 Sample and data

The size scales inside the questionnaire used consisted of items representing respondents' attitudes and opinions approximately the green innovation practices, the related factors in addition to the

aggressive gain, the organizational and environmental overall performance. The target population of the study consists of employees and managers, both middle and senior level, working in organizations that had adopted green innovation practices. A convenience sampling approach was applied for sampling. To evaluate the model and examine the hypotheses, the latent reflective measures were extracted from several research discoveries and some mandatory modifications were made to the items to make them suitable for the study framework.

This study tried to understand the relationship between green human resource practices and their impact on organizational citizenship behavior. In addition, it tried to explore the relation of perceived organizational support towards affective commitment among the employees. To examine the conceptual model and test the hypothesis proposed in the study, a quantitative structured questionnaire and measurement scale was developed. The items for Affective commitment (3 items), Organizational citizenship behavior (4 items), perceived organizational support (4 items) were adopted form the research work (!!! INVALID CITATION !!!). The questionnaire was pretested to confirm the validity and reliability of the survey tool with the support of experts from three different universities. The research used the questionnaire using universal English language. A Likert scale ranging from "Strongly Agree to Strongly Disagree (5) measured each item of GHRM, POS, AC, OCB. A five-point Likert made the data more reliable and applicable discriminant validity of the data. The finalization of a revised version of the survey tool facilitates well to conduct the hypothesis test among the target population for the study.

4 Result

The brief demographic aspects and profiles are; in terms of gender, 72.2% participation were male employees and around 28% female. More than half of the respondents (55.6%) were postgraduates and were above 30 years of age. 56.7% of the sample population were involved in government schools whereas a maximum of 31% of the sample population had been enrolled in the job for more than 10 years.

Table 1 Measurement model

	CR	AVE	MSV	Max R(H)	POS	GEI	OCB	GPM	GCB	AC
Perceived Organizational Support	0.887	0.723	0.332	0.889	**0.851**					
Green Employee Involvement	0.898	0.691	0.261	0.928	0.511	**0.831**				
Organizational Citizenship Behavior	0.909	0.716	0.196	0.920	0.443	0.079	**0.846**			
Green Performance Management	0.884	0.657	0.266	0.886	0.516	0.202	0.019	**0.810**		
Green Competence Building	0.835	0.561	0.293	0.864	0.541	0.191	0.124	0.130	**0.749**	
Affective Commitment	0.886	0.722	0.332	0.891	0.576	0.234	0.196	0.229	0.170	**0.850**
Cronbach'α					0.899	0.907	0.908	0.884	0.849	0.885

Note: Bold values in the diagonal of the correlation matrix are the square root of AVE (discriminant validity), CR: Construct Reliability, AVE: Average variance extracted, H: Maximum reliability.

Similarly, the substantiation of the measurement calculated by the measure's internal consistency, Cronbach's alpha. Cronbach's alpha of any construct is thought to have good and very good reliability with the value 0.78-0.80 and greater than 0.80 respectively (Henseler et al., 2016). All the six constructs of the study yield a high level of consistency than suggested by the pioneers. Each item had a good score with the highest 0.908, although the cutoff limit is 0.70 (Hair et al., 2011).

4.1 Confirmatory factor analysis

The evaluation of distinctiveness of the key variables including green HRM, affective commitment, perceived organizational commitment and organizational change behavior, this study also conducted

confirmatory factor analysis (CFA) using AMOS 21.0 software. According to Fornell and Larcker, all measurement factor loadings with value o.70 or above is significant. Using the HTMT as a criterion involves comparing it to a predefined threshold (Fornell and Larcker, 1981). If the value of the HTMT is higher than this threshold, one can conclude that there is a lack of discriminant validity (Henseler et al., 2015). While constructs reliabilities must exceed above .80 and AVE value should exceed 0.50. However, out of 23 indicators 1 indicator from perceived organizational support yields unexpected loadings i.e. lower than 0.70. Further analysis yield better loading with Kaiser-Meyer_Olkin value of 0.826, with significance. Bartlett's test and all the constructs loaded the satisfactory level of reliability.
A model is regarded as acceptable when GFI index exceeds 0.90, NFI > .90, CFI > .93, RMSEA < .05 with the relative chi-square value should be less than 3. In regards, the examination of measurement model demonstrates the indexes showed an acceptable fit with $\chi 2 = 537.094, p<.001$, RMSEA = .071, NFI = .904, CFI = .936, TLI= .923. The overall model's fit is specified by the fit indices (Byrne, 2012).

4.2 Hypothesis test

Hypothesis 1 explores the direct influence of green human resource attributes to organizational citizenship behavior. The direct effect of GHRM attributes fit to model well with the data $\chi 2 = 173.345$, CMIN/df= 2.476, GFI= 0.941, RMSEA = .064, PCLOSE=0.27, NFI = .946, CFI = .967, TLI= .957. Further, all the items weighted reliably on their predicted factors with standard loadings from 0.50 to 0.92 for GHRM attributes and from 0.81 to 0.92 for Organizational change behavior. Hence, the loadings prove that green HRM attributes GCB, GPM, GEI is positively significant to organizational citizenship behavior. This clearly supports the first hypothesis.

Further, the second hypothesis discusses the mediating role of affective commitment. The researcher tried to analyze both the partial and full mediating effect of the variable direct and indirect influence of green HRM attributes based on AMO theory namely green competence building, green performance management and green employee involvement to outcome variable organizational citizenship behavior. The model fit with mediation effect is with values, CMIN=6.559, CFI= .964, SRMR=0.040, RMSEA= .057, PCLOSE= 0.057. The model fit was excellent. This shows they have partial mediation and support the hypothesis. The indirect effect of green competence building on OCB through the medication of AC was 0.103 at a 1% level of significance. The researcher conducted 2000 bootstrap sampling revealing the distribution of the product coefficients 95% confidence interval being 0.064-0.159 containing Zero. While the indirect effect for green performance management was 0.062. With a bootstrap sampling of 2000 revealing the CIs 95% for the distribution of product coefficient ranged between 0.032 to 0.107. Similarly, the indirect effect of green employee involvement was .056. With the bootstrap of 2000 sampling, Cis 95% level ranged between .026 to .095. Thus, green human resource management, directly and indirectly, affects the organizational citizenship behavior through partial mediation of affective commitment. Hypothesis 2 consequently supported.

Table 23 Indirect Effects Hypothesis Test

Parameter	Estimate	Lower	Upper	P
GCB>AC>OCB	0.103	0.064	0.159	0.001***
GPM>AC>OCB	0.062	0.032	0.107	0.001***
GEI>AC>OCB	0.056	0.026	0.095	0.001***

Note: GCB: Green Competence Building; AC: Affective Commitment; OCB: Organization Citizen Behavior; GPM: Green Performance Management; GEI: Green Employment Involvement. **p < .01 and ***p < .001.

4.3 Moderating Effect of POS

The interactive effect of POS and GEI in the third hypothesis was significant. To probe this interaction, this research drew an interaction plot and carried out a simple slope test. (One standard deviation above the mean) to determine the nature of Perceived organizational support ×Green Employee Involvement. In line with the hypothesis… GEI was positively related to Affective Commitment for respondents with less perceived organizational support. In contrast, the moderation role of POS to GCB and GPM was not significantly significant. The employees of the secondary school's perception towards their performance management might not be satisfied with that of their expectations. The proper capability marking might be lacking in the case of the educational institutes of Kathmandu, Nepal. The insignificant result might be because of the above reason. This research will be supportive for future researchers to find out the breakthrough in the insignificant relation in the same field or either in other research areas.

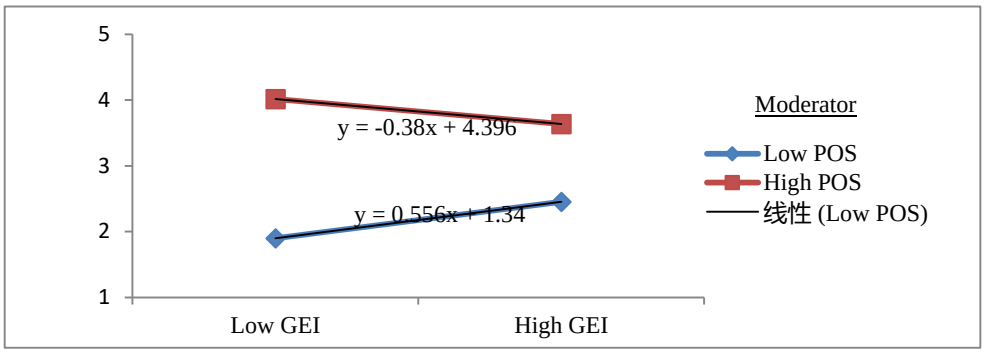

Figure 1 Moderation Graph "POS dampens the positive relationship between GEI and AFFEC"

5 Conclusion

The present study sought to expand previous research to evaluate whether perceived organizational support would moderate the relationship between GHRM and affective commitment. Based on the result of the present study, it concludes that the third hypothesis gives the concept that the relationship between green HRM and employee affective commitment is moderated by perceived organizational support. The study found the positive relation of green employee involvement to the perceived organizational support. In contrast, the moderating relationship of perceived organizational support with green competence building and green performance management was found to be not significant. The calculation of the product of the independent variable to the dependent variable is essential, where we have an affective commitment as a dependent variable for the case of a moderated mediated effect. The product terms calculations using the mean-centered approach. From the analysis, model fit obtained adding the path involving product term and affective commitment while controlling for POS. The model fitted well.

However, the outcomes of the study are much applicable for the researchers and policy makers. POS with the perception of employees links more in job experience of them, which contributes for the wellbeing of the organizational values. Overall, the study outcome signifies an initial step towards valuable understanding of moderation relation of POS. This study might be fruitful for exploring moderation relation to the future researchers. Further, detail empirical study in future will contribute in the "green" concept in HR.

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Research on the Competence Characteristics of Human-Machine Cooperation and Its Influence on Organizational Behavior

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Abstract: With the development of information technology and related fields, machines are playing an increasingly important role in different types of organizations. This paper analyzed the basis of man-machine cooperation mode, that is, the advantages of their different capabilities and characteristics, put forward the different types of jobs suitable for man-machine, and prove man-machine cooperation can bring higher benefits based on game theory. And then this paper put forward three stages of man-machine cooperation mode, and summarized the influence of human-machine mode in different stages on organizational behavior.

Keywords: Human-machine; Capabilities advantages; Three stages; Organization behavior

1 Introduction

With the developent of information technology and related fields, machines are playing an increasingly important role in different types of organizations. Human-machine cooperation has been widely used in practice, but the research on theory still needs further study. As of June 2020, the CNKI keyword "human-computer cooperation" can only search 49 pieces of information, enter the keywords "human-machine cooperation" and "artificial intelligence" can only search 22 pieces of information. Compared with the application of human-machine cooperation in reality, domestic scholars in this area of theoretical research is far from enough, this paper is put forward in this context.

Human-machine cooperation in industrial production is an intelligent system in which people have good sense systems and good judgment of the working environment, the machine can also provide the required driving force to reduce the operator's fatigue. It pointed out the key technologies of human-machine cooperation such as teleoperation robot, cobot robot and man-machine cooperative manipulator (Wang Liang, 2008).

In the realm of unmanned aerial vehicle (UAV) real-time path planning, a human-machine cooperation strategy is proposed. The role of human is to make decision and analyse threat information, and then send the direction of evasion and emergency degree of task to UAV. According to the message that human provides, UAV adopts fuzzy logic method to calculate the position of guide point which attracts UAV to change course(Zhang Shuai etc, 2017).

Modern intelligent machines are basically capable of rational thinking and logical judgment and reasoning. And it means that cooperation between human beings and intelligent machines is possible. But they are not yet capable of emotion and ethics. And these characteristics are unique to human beings. Therefore, the key to achieve a harmonious human-machine interaction environment is to give machines the ability to adapt to human emotions(Zhang Tao etc, 2019).

Artificial intelligence has done a lot of work in data analysis, processing and diagnosis, through expert systems, planning systems, scheduling systems to help human in the management of information, personnel matching and other aspects play an important role. With advances in knowledge representation, machine learning, and so on, artificial intelligence has become even more useful. The most powerful

applications of intelligent machines are those where human intelligence is difficult, those where sense is out of reach, and those where drudgery is the norm, where emotions are rarely involved(Jeff, 2016). The core elements of a cognitive subject are self-consciousness and the ability to receive and process information from the outside world. Up to now, intelligent machine can receive and process information from the outside world, but have no self-consciousness, if it does not constitute the subject of cognition, it is impossible to produce knowledge in the true sense. At present, the knowledge generated by AI from big data, by finding correlations between things, is the knowledge that an intelligent machine makes according to human instructions, according to Algorithms designed by human engineers, or making decisions, trained by human engineers(Wang Zhuli, 2019).

The human-machine cooperation in the policy process, emphasized the power of artificial intelligence in technical rationality on the one hand, and the role of human beings on the other, emphasizing the experiential knowledge and emotional experience that human beings have, it mainly included the cooperation of procedural operation and situational innovation, the combination of technical knowledge and experience knowledge, the division of labor and cooperation in overall planning and technical operation, and the cooperation for the realization of high-speed computing. Human beings and artificial intelligence can highlight their respective advantages, and at the same time, human beings can make overall planning and positioning of policies, and infuse value and significance into public policies(Xiang Yuqiong, 2020).

In this paper, the concept of human-machine cooperation is that in order to human-oriented development and human tasks as the goal, it use the advantages of both human and machine to optimize the allocation of complementary. Finally, the efficiency of man-machine system is maximized. On the basis of human-machine different capabilities and characteristics, according to the different degree of man-machine cooperation, this paper combs the three stages of human-machine cooperation, analyzes the characteristics of the mode of man-machine cooperation in the different stages, and on this basis, analyzes their actual influence on organizational behavior.

2 Human-Machine Cooperation Foundation--- Complementarity of Competence

Human-Machine cooperation is based on their respective advantageous capabilities. The two sides play their own advantages in order to better achieve organizational goals and performance. Therefore, in order to better understand the impact of human-machine cooperation on organizational behavior, this paper analyzed different human-machine capability characteristics, as shown in Table 1.

Table 1 Human-Machine Capability Characteristics

Capability Characteristics	Human	Machine
Experiential	mainly from existing knowledge, self-exploration, learning experience and life experience	mainly from a part of human experience that can be represented by machine symbols
Learning ability	self-learning ability, self-identification of learning needs, active completion of learning tasks	passive learning ability, the need for human input of auxiliary information in order to complete the learning process
Computing and data processing power	complete simple calculation, carry on a small amount of data process slowly	complete complex computation, can carry on the big data computation processing quickly
Environmental adaptability	able to work long hours in comfortable environment; short hours in harsh environments such as hot and cold; unable to work in hazardous environments	able to work long hours in a variety of environments
Task type	Self-determination, initiative, flexibility and	boring, monotonous and repetitive

	creative work	work
Continuous working ability	The continuous working time is different in different working environment, but they all need regular rest, and the continuous working time is much shorter than that of the machine	able to work continuously for a long time and need to be tested regularly
information replication capability	the ability of information reproduction between people is weak	between the human and the machine, between the machine and the machine information reproduction ability is very strong
Creativity	on the basis of experience and knowledge, people can take advantage of their own initiative and engage in a lot of creative work	the machine can only complete the study activity and carry on the output in the human input symbol foundation, own creativity is limited
Uncertainty problem solving ability	according to the actual situation, combined with the existing knowledge to make emergency judgment, deal with the uncertainty	the ability to deal with this kind of problem is weak
Making decision ability	able to more effectively address the sudden, creative and flexible decision-making issues	able to solve conventional and empirical decision-making problems more efficiently

From the above table, we can clearly see that human-machine has different characteristics of capability advantage. In the organization management, we should bring into play the human-machine different superiority specialty, in order to better realize the organization goal. For a large number of simple, boring and monotonous ordinary operations, hazardous operations that need to work in toxic and hazardous environments, highly procedural work and the need to carry out a large number of double-counting and data processing problems can be dominated by machine-oriented work. For the abstract, flexible, uncertain and autonomous decision-making work can be people-oriented work. Human and machine give full play to their strengths, and then can better achieve organizational goals and performance.

According to game theory, the two parties in the game must meet certain conditions to form a cooperative relationship, that is, the interests of both parties in the game increase, or at least the interests of one party increase while the interests of the other party are not harmed. What needs to be pointed out here is that the machine has been trained through human-machine cooperation and its performance has been improved to a certain extent, which is equivalent to gaining benefits.

The game between human and machine has the nature of repeated game, and it is precisely because of its existence that a long-term cooperative relationship between them can be formed. Assuming that there is a single game between them, since human is in the active position, the entire game process should be ended by human. This setting is in line with the actual situation. The game tree between them is shown in Figure 1.

For the two-stage dynamic game, we can use the reverse solution method to get the equilibrium solution of the game. For human, choosing not to cooperate with machine can get 4 units of income, and choosing to cooperate to get 6 units of income, so human will choose to cooperate. For machine, as long as it cooperates with human, even if human is not willing to cooperate, machine will also get 1 unit of income; if human is willing to cooperate, it will get 2 units of income. Therefore, human-machine cooperation can bring higher benefits to both parties.

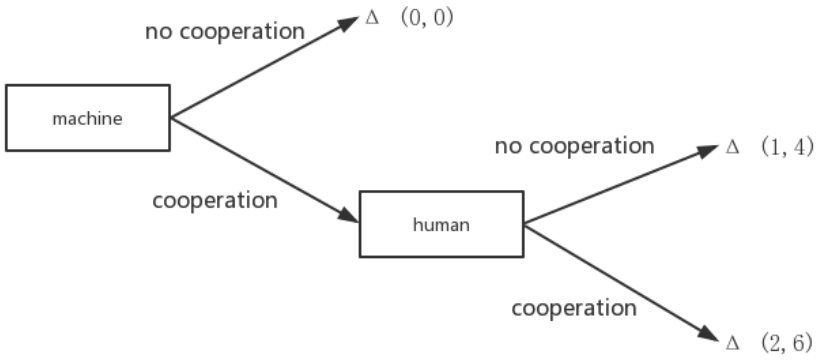

Figure 1 Game Tree

3 The Mode of Human-Machine Cooperation in Different Stages

With the development of technology, the participation of machines in human organization works has been gradually enhanced. According to the different degree of human-machine cooperation and the different degree of influence on organizational behavior, this paper divides the human-machine cooperation mode into three stages.

Stage I: Initial human-machine cooperation. In the early stages of human-machine cooperation, the use of machines increased the productivity and efficiency of human work, but the technical level of machine equipment was limited. The main feature of this stage is to emphasize the auxiliary function of machine to human work. The Wester's "Bulletin Board" phase and the remote robots of industrial enterprise are the classic examples of this stage. At this point, the application of mechanical equipment to improve the industrial production efficiency, improve the working environment and scene of the staff. The application of electronic equipment, especially the use of computer, improves the work efficiency of all kinds of organizations. In this stage, all kinds of machines and equipment participate in human's work function mainly as auxiliary means, which can help human to complete work more efficiently.

Stage II: human-machine interaction. With the development of technology, machine and equipment can participate in human organization more and more. The main features of this stage are: Machines have been widely involved in human organization work. Human activities have been basically unable to leave the help of machines. They participate in the work of the organization task activities more extensively. The Wester's portal phase and COBOT in industrial enterprises are the classic examples of this stage. At this point, the organization's human and machine equipment to participate in and work together to achieve the organizations' mission objectives. Machine equipment has not only been an auxiliary part of human work, it has become an essential partner of human work. For organizations, the use of machines has greatly improved the performance level of human work organization, and managers and researchers in the academic community have also begun to pay attention to the important role of machine equipment in organizational behavior.

Stage III: human-machine deep integration. With the development of technology, especially the deep research of artificial intelligence, the participation of machine and equipment in human organization is more and more extensive. The Wester's e government features an interactive democratic phase characterized by popular adoption and enhanced accountability, as well as the use of intelligent robots in business and life are the classic examples of this stage. At this time, human and machine equipment in the organization work and daily life has been extensive and in-depth cooperation. Machines can not only help humans do things that humans can't do alone, but can also participate more efficiently in the human

process. The cooperation between human and machine has realized the maximum efficiency of man-machine system by giving full play to their respective ability advantages. It can realize mutual understanding, perception, decision-making and execution of organizational goals.

4 Influence of Different Stage Human-Machine Mode on Organizational Behavior

According to the three-stage division of the above-mentioned human-machine cooperation mode, we can see that its impact on organizational behavior is different in different stages. Based on the basic content of organization behavior, this paper analyzed the specific effects of different stages on organization behavior, as shown in table2.

Table 2 The Specific Effects of Different Stages on Organization Behavior

stage	Reflections on organizational behavior	The study of organizational behavior
Stage I	For organizations, the use of machines can improve the performance level of human work organization, but the focus of managers on organizational behavior is still mainly on human beings.	The study of organizational behavior by managers and scholars mainly focuses on human behavior in organizations.
Stage II	What about the reliability and stability of the equipment? How do you assess the allocation of responsibility for the reduction in the level of organizational performance due to machine failure?	In addition to the traditional study of organizational behavior on people, managers and scholars begin to pay attention to the influence of machines on organizational behavior.
Stage III	Will they consider how to give full play to their respective strengths? What are the effects of deep human and machine involvement on organizational behavior, such as organizational structure and culture?	Managers and researchers in academic circles pay more attention to the extensive influence of man-machine model on organizational behavior.

5 Conclusion

On the basis of literature review, this paper analyzed the basis of man-machine cooperation mode, that is, the advantages of their different capabilities and characteristics, put forward the different types of jobs suitable for man-machine, and prove man-machine cooperation can bring higher benefits based on game theory. And then this paper put forward three stages of man-machine cooperation mode, and summarized the influence of human-machine mode in different stages on organizational behavior. In the following research, the author will specifically analyze the influence of human-machine on different organizational behavior, such as human resource management, production management and information management.

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Research on the Influence of Climate Comfort on Innovation Behavior and Work Performance

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Abstract: This paper aims to study the influence of climate comfort on employees' working attitude and behavior. Based on the perception to climate comfort, the study analyzes the relationship between the climate comfort, innovative behavior and work performance of employees from different visions, especially in terms of the levels of enterprises (state-owned, joint-stock, private, etc.) And the methodology that we adopted is the questionnaire survey. Proportions regarded to climate comfortable are involved with different groups, innovation behavior and work performance. Meanwhile, hypothesis are brought by the above interrelationships. Statistics comes from 266 valid questionnaire analysis. Positive test results can be drawn from several aspects, including the comfort temperature and humidity, wind speed, sunshine comfort and so on. Similarly, the positive effect works on a climate comfort perception on employee innovative behavior and work performance. Therefore, organizers or managers should pay attention to the optimization of work environment facilities.Attentive considerations should be made out of various climate comforts by different groups. Improvements also need to make in different working environment and enhance occupational safety. A ratio of working effectiveness and innovative behaviors can be upgraded by using the perceived climate comfort differences. All the means contribute to the organization development.

Keywords: Climate comfort; Innovation behavior; Work performance; Work environment design

1 Introduction

Humanistic management is people-oriented management system and the way of enterprise, which takes employees as the most important resources. This theory uses various management means to fully tap the potential of people, mobilize the enthusiasm of people, create a harmonious and fair cultural atmosphere. This theory can motivate most people from the psychological level and help achieve the ultimate goal of joint development of the enterprise and employees (Sigmund Wagner‐Tsukamot, 2018). Innovation has become one of the important means for enterprises to maintain their core competitiveness. And how to promote innovation behavior more effectively is also a problem many enterprises want to solve. Employee innovation has received increasing attention since the 1990s. Innovation behavior refers to a series of behaviors in which employees in an enterprise produce new and beneficial ideas, processes and solutions and consciously apply them. This behavior enables companies to innovate and grow, thus helping to maintain their continued competitiveness (Magali A. Delmas and Sanja Pekovic, 2018). Employee innovation refers to the behavior of employees in their work to consciously discover problems, introduce or propose new ideas, integrate resources and apply new ideas in order to acquire new products, new technologies and new processes (Se Yeon Choi, Goo Hyeok Chung and Jin Nam Choi, 2019). The influencing factors of employee innovation mainly include enterprise innovation, cultural environment, enterprise structure and personnel characteristics (Zhou Ye, Wang Qingqing, 2019). Based on the predecessors, this paper believes that innovation behavior is not only to produce a new product, but also

to propose many new working methods, working processes and sales methods that are beneficial to enterprise performance. Employees in any department of the enterprise are likely to produce innovative behaviors.

The definition of work performance has gradually evolved under a large number of studies by different scholars, which can be explained from whether researchers regard work performance as a result or a behavior, or a combination of both (Elizabeth R. Tenney, Jared M. Poole 2016). Work performance is related to the quality and efficiency of employees' work, and is closely related to the ultimate realization of corporate goals. It is also an important standard to measure the strengths and weaknesses of an enterprise. This paper studies result-oriented work performance and tends to regard work performance as a result (Tracy L Tuten, Presha E Neidermeyer, 2004). The result view of work performance has certain practical significance. Specifically, it enables employees to make clear the requirements and expectations of the enterprise. The clear assessment standards formulated by the enterprise will improve the work autonomy and self-efficacy of employees, thus improving their work performance.

Human-oriented management activities are carried out in the material and humanistic environment of an enterprise. People's emotional evolution towards a specific work environment will also construct new behavioral awareness and stimulate corresponding behaviors. In recent years, employees have put forward higher and higher requirements for the working environment quality of their enterprises, and climate comfort has gradually become an important reference index for employees to choose their enterprises for work.

Experts and scholars at home and abroad have done a lot of research on climate comfort. Most scholars divide climate comfort into temperature, wind speed, sunshine, humidity and other parameters for research. Sanjay Kumar's team spent four years in India conducting field experiments on climate comfort in different seasons, arguing that the boundaries of human comfort are defined in terms of the role of specific climate adaptation, air speed and thermal preference, and determining the range of acceptable temperatures for comfort as air speed rises (Sanjay Kumar, et al, 2016). By conducting a control experiment, Henna Maula's team concluded that the rise and fall of climate comfort had a certain impact on the cognitive performance of individuals in the work environment, as well as the perception of the subjective workload, and suggested that the subjective working conditions should be improved by adjusting climate comfort (Henna Maula, et al,2016). A high degree of climate comfort is associated with a high degree of happiness experienced by professional people in the working environment. In other words, the climate discomfort that professional people perceive in the working environment will reduce their sense of identity for the design of enterprise working environment (Yan Tianhe, et al, 2018).
Occupational groups are more vulnerable to climate change due to their own particularity. These negative effects may lead to occupational diseases, industrial injuries and even death of employees, reduce working hours and labor productivity, and have a negative impact on the development of enterprises. Therefore, it is of great value and reference significance to study the influence of climate comfort on innovation behavior and work performance to improve the humanized management level of enterprises.

2 Research Hypothesis

On the basis of summarizing the research of experts and scholars at home and abroad, according to research contents in this paper, the climate comfort degree is defined as: Employees do not need to use their own cold and cooling equipment to ensure that their physiology and perception of appropriate climate conditions. Climate comfort is a biological meteorological index designated from the point of

view of meteorology to evaluate the human body's comfortable state under different weather or climate conditions (Li Zongxing, 2018). In this paper, the perception types of climate comfort are divided into temperature comfort, humidity comfort, wind speed comfort and sunshine comfort. The main purpose of the study is to clarify the relationship between climate comfort and employees' innovation behavior and work performance.

2.1 The influence of climate comfort on employees of different genders

Expressions of climate perceived comfort and discomfort have increased over the past few decades. On the one hand, it may be due to the unstable climate; on the other hand, it may be influenced by the various physical and mental burdens of modern lifestyle, sleeping and eating habits, and the rapid pace of work (Yang Zi, et al, 2020). These factors increase the environmental pressure and reduce the ability of professional people to adapt to natural influences, which is the main reason for affecting the professional people's perception of climate comfort. Therefore, suppose:

H1: Climate comfort (temperature, humidity, wind speed, sunshine) has no influence on employees of different genders.

2.2 Relationship between climate comfort and innovation behavior of employees

In the daily work of an enterprise, professional people will be affected by many external environments. However, in the cognition of employees and business managers, they tend to pay more attention to the influence of external environment, such as the office area where the enterprise is located and social relations, rather than climate factors. In the existing literature, few scholars study the relationship between climate comfort and employees' innovation behavior. Therefore, enterprise managers can optimize the design of working environment from the perspective of climate comfort to encourage employees to innovate. Enterprises provide employees with a good working environment to ensure a comfortable working environment, which is conducive to meeting the psychological needs of employees, so that they can maintain a high sense of happiness at work, so that employees can maintain a high degree of work engagement.

Different age groups of employees have different mental health, work motivation, perception and adaptability to the working environment, which inevitably leads to the gap in innovation motivation and innovation behavior. Therefore, suppose:

H2: Climate comfort (temperature, humidity, wind speed and sunshine) has a significant influence on innovation behavior, and different age groups have certain differences.

2.3 Relationship between climate comfort and work performance

Professional people believe that their perceived climate and office environment will have a significant influence on their behavior at work. Before they adopt any work attitude and behavior, they have established a certain relationship between their current behavior and the rewards and benefits they enjoy. If employees want to ensure that they are comfortable in their work environment and reduce the negative emotions caused by the office environment, such as depression and even illness, employees need to be motivated to work hard and achieve their expected goals in exchange for the opportunity to change(Du Zhenjiang, Luo Zhiping,2016). Therefore, when an enterprise encourages its employees to improve their work performance, it is necessary to make clear what kind of climate comfort perception requirements the employees put forward for the enterprise.Therefore, it is of great practical significance to study the influence of climate comfort on different age and gender working groups to help managers to optimize the working environment of employees in different levels and groups. Therefore, suppose:

H3: Climate comfort (temperature, humidity, wind speed, sunshine) has a significant impact on work

performance, and there are certain differences among different age groups.

3 An Investigation on Climate Comfort on Innovation Behavior and Work Performance

This paper conducts a questionnaire survey on employees of various enterprises of different scales (state-owned, joint-stock, private, etc.). In 2019, we spent two months to issue 300 questionnaires through the combination of online and offline methods. After eliminating incomplete information and invalid questionnaires, 266 valid questionnaires were obtained, and the effective questionnaire recovery rate was 88.67%.

3.1 Research design

Based on the literature review, this study gives priority to the mature scale that has been verified many times by foreign authoritative journals, and controls the process of questionnaire design and data collection to ensure the data quality. These scales have been proved to have good reliability and validity in many previous studies.In this study, we made appropriate modifications according to the actual research situation.

As for the measurement of climate comfort, employees' psychological and physiological perception of comfort level is subjective and will vary with different clothing and physical qualities, so design analysis cannot be carried out from a single factor. Therefore, in this paper, the empirical model of Terjung.W.H (1966) is adopted for the design of relevant studies on climate comfort. Indicators of temperature comfort, humidity comfort, wind speed comfort and sunshine comfort are selected and graded according to GB/T 35562-2017 Air Temperature Evaluation Grade. Humidity comfort is graded according to MSL humidity sensitivity level; Comfort level of wind speed is selected according to Wind Speed and Wind Power Classification Standard, GB/T 28591-2012 wind power classification standard. There is no accurate classification of sunshine intensity, and sunshine comfort is divided from strong to weak (Tab.1). The problems with model basis are designed and measured by Likert 5-point Scoring.

Table 1 Measurement of Climate Comfort

Climate Comfort	1	2	3	4	5
Air Temperature Comfort	Very Low	Low	Normal	High	Very High
Humidity Comfort	Very Wet	Wet	Normal	Dry	Very Dry
Wind Speed Comfort	Moderate Gale	Strong Breeze	Breeze	Soft Breeze	Calm
Sunshine Comfort	Unbearable	Strong	Normal	Weak	No Light

For the measurement of innovation behavior, this paper adopts the scale developed by Scott & Bruce (1994). Starting from the three stages of individual innovation (generation of innovation idea, seeking innovation support and implementing innovation idea), six items are proposed to measure individual innovation behavior, which are mainly used for employees' self-evaluation. Likert 5 - point Scoring was used to measure.

For the measurement of Work Performance, this paper adopts the outcomes-based view of Work Performance (Tuten, 2004). The results reported by employees are directly related to their work behavior (Xia Huijun, et al, 2020). This part is a one-dimensional scale with 6 questions, and Likert 5-point Scoring is used for the measurement.

3.2 Data analysis and empirical results

The results of demographic variables in this survey are described and analyzed as follows:In terms of gender, male employees account for 44.0% and female employees for 56.0%. In terms of age groups,

56.4% of employees are aged 30 or below, 33.1% are aged 31 to 50, and 10.5% are aged 51 or above. In terms of employee education, 12.8% of employees have high school education or below, 15.0% have high school education or technical secondary school education, 44.7% have undergraduate education, and 11.7% have postgraduate education or above education.

3.2.1 Detection of reliability and validity

In this paper, SPSS and other software were used to analyze the reliability of each scale, and the measurement results were as follows (Tab.2) : :

Table 2 Detection of Reliability and Validity

Test Variable		Climate Comfort	Work Performance	Innovation Behavior
Cronbach's α Coefficient		0.522	0.840	0.838
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.531	0.859	0.833
Bartlett Sphericity Test	The Approximate Chi-square	362.978	589.223	589.827
	Degree of Freedom	15	15	15
	Statistical Significance	0.000	0.000	0.000

First of all, the suitability of each scale was judged by factor analysis of the fitness quantity and Bartlett sphericity test results of KMO sampling. The values of KMO in the table are >0.5, and the P<0.001 of bartley test indicates that the validity is good and each item has a good recognition ability. Secondly, the Cronbach's α coefficient of work performance and innovation behavior were all >0.7, and the reliability of the scale had high homogeneity and stability. In particular, the survey employees come from all over the country. In the measurement of climate comfort, their perception of local climate is greatly influenced by geographical regions. Therefore, the project has certain bias, which needs to be improved in future studies.

3.2.2 The impact of employee gender on climate comfort

In this study, independent sample T-test was used to test whether there were differences in the impact of climate comfort on employees of different genders. First of all, the test results of whether there is a difference between different genders in the influence of climate comfort are as follows (Tab.3) :

Table 3 Analysis of the Difference Influence of Different Genders on Climate Comfort (N=266)

Test variable	Gender	Sample N	Mean Value	Mean T test	
				Value of T	Significance (double-tailed)P
Air Temperature Comfort	Male	117	3.0855	-0.089	0.929
	Female	149	3.0940		
Humidity Comfort	Male	117	3.1197	1.786	0.075
	Female	149	2.9195		
Wind Speed Comfort	Male	117	3.3248	-0.694	0.488
	Female	149	3.4161		
Sunshine Comfort	Male	117	3.2650	-0.376	0.707
	Female	149	3.3020		

As can be seen from Figure 3 , the significance level P of employees of different genders in the perception of climate comfort in terms of temperature comfort, humidity comfort, wind speed comfort and sunshine comfort is all greater than 0.05, with no significant difference. This indicates that the perception of climate comfort has a relatively stable performance between the two sexes, which proves that climate comfort (temperature, humidity, wind speed, sunshine) has no significant influence on employees of different genders. Hypothesis 1 is verified.

Specifically, female employees are more sensitive to temperature (3.0940), wind speed (3.4161) and sunshine (3.3020) than male employees, while male employees(3.1197) are more sensitive to humidity. It can be seen that female employees are more sensitive to the perception of climate comfort, so female employees are more likely to find and express their feelings caused by climate discomfort than male employees, while male employees' expressions of climate discomfort mainly focus on the problem of humidity in the working environment.

3.2.3 Relationships between climate comfort and age group, innovation behavior and work performance

In order to test whether there is a difference in the perception of climate comfort among employees in terms of age and whether there is a significant difference in the innovation behavior and work performance of different employees, this paper adopts the one-way test of variance to identify the difference in climate comfort. The specific results are as follows(Tab.4 and Tab.5):

Table 4 Data Analysis of Temperature Comfort, Humidity Comfort and Age, Innovation Behavior and Work Performance

Test Variable		Air Temperature Comfort				Humidity Comfort		
		Sample N	Mean Value	F-Measure	Significance	Mean Value	F-Measure	Significance
A	Age 30 and Under	150	3.1000			3.0200		
g	31 to 50 Years Old	88	3.1023	0.216	0.806	3.0341	0.431	0.650
e	Age 51 and Above	28	3.0000			2.8571		
Innovation Behavior		266	3.2644	1.421	0.227	3.2644	3.078	0.017
Work Performance		266	3.5470	2.886	0.023	3.5470	4.266	0.002

Table 5 Data Analysis of Wind Speed Comfort, Sunshine Comfort, Age, Innovation Behavior and Work performance

Test Variable		Wind speed comfort				Sunshine comfort		
		Sample N	Mean value	F-Measure	Significance	Mean Value	F-Measure	Significance
A	Age 30 and Under	150	3.3733			3.2067		
g	31 to 50 Years Old	88	3.5000	2.367	0.096	3.4659	3.503	0.032
e	Age 51 and Above	28	3.0000			3.1429		
Innovation Behavior		266	3.2644	5.979	0.000	3.2644	0.819	0.514
Work Performance		266	3.5470	4.706	0.001	3.5470	0.734	0.569

In different age groups, P values of temperature comfort, humidity comfort and wind speed comfort are all less than 0.05, indicating that employees in different age groups have relatively stable perception of these three categories. There were significant differences in the perception of sunshine comfort in different age groups (P=0.032), and the people aged 31-50 (3.4659) had the strongest perception of sunshine comfort.

Employees aged 51 and above were most sensitive to four comfort indicators: temperature (3.0000), humidity (2.8571), wind speed (3.0000) and sunshine (3.1429). The comfort level of employees in this age group is very low, which indicates that older employees are able to perceive the climate with a small range of climate change. Sunshine, temperature and humidity, which rise and fall significantly, are not conducive to the long-term career development of employees.

Employees aged between 31 and 50 have the most stable perception of climate comfort in their occupational environment, and perform better in the perception level of temperature comfort (3.1000), humidity comfort (3.0200), wind speed comfort (3.3733) and sunshine comfort (3.2067).

In addition, we can see from Figure 4 and Figure 5 that, in the analysis of the difference between climate

comfort and innovation behavior, humidity comfort (P=0.017<0.05) and wind speed comfort (P=0.000<0.05) have a significant impact on innovation behavior. This shows that in the working environment with obvious changes in humidity and wind speed, employees will be directly or indirectly affected by some physiological and psychological factors, which in turn will affect their innovation behavior. Hypothesis 2 is verified.

In the analysis of the difference between climate comfort and work performance, temperature comfort (P=0.023<0.05), degree (P=0.002<0.05) and wind speed comfort (P=0.000<0.05) have significant influence on work performance. Hypothesis 3 is verified.

To sum up, the test and analysis results of the hypothesis in this paper are as follows (Tab.6):

Table 6 Summary of Assumed Results (N=266)

Serial Number	Description of Research Hypothesis	The Inspection Results
H1	Climate comfort had no effect on gender differences.	Support
H2	The climatic comfort factors with significant differences in innovation behavior at different ages include humidity and wind speed.	Partially Supported
H3	The climatic comfort factors with significant differences in Work Performance at different age stages include air temperature, humidity and wind speed.	Partially Supported

4 Conclusions

A key issue facing enterprises and leaders is how to effectively conduct management activities to improve employees' work efficiency and achieve the goal of generating more innovative behaviors and improving work performance. How to create a more suitable working environment by adjusting employees' perception of climate comfort is very important for continuous improvement and optimization of people-oriented management activities. Through a series of theoretical analysis and enterprise research, this paper draws the following research conclusions:

First of all, employees of different ages and genders have different perceptions of climate comfort. According to their different responses and degree of significance, they can be divided into three groups, giving different work environment design and occupational protection. Most of the male and female employees aged 30 or below who are in good health are those who have no obvious perception of changes in climate change. Therefore, the company can make continuous observation and let them continue to work in a stable environment. Workers aged between 31 and 50 have a higher demand for lighting in their work environment. The sensitivity of male employees to humidity increases year by year from this age. In humid climates, employees who suffer from rheumatism may feel uncomfortable, and the low-pressure atmosphere of the rainy day may lead to negative emotions in older employees. Enterprises should have better work environment design and occupational protection, and the knowledge of employees' physiological rhythm and the application of cold and hot can be incorporated into their work environment design. For senior employees aged 51 and above, the significant fluctuation of sunshine, temperature, humidity and wind speed will make elderly or traumatic employees feel uncomfortable, or induce rheumatism, bone pain and other conditions, which will affect the work efficiency of senior employees. Enterprises can add their working environment can be warm bath and wet hot compress special room design to show supporting care. It is worth mentioning that in the work environment, women are more likely to express their dissatisfaction with the climate perception of the work environment, which can quickly improve their perceived comfort. Male employees, on the other hand, do not immediately express their dissatisfaction with the climate perception in the organization environment, and may be more likely to accumulate their dissatisfaction with the working environment. Secondly, employees in different fields and work scenes have different requirements on the comfort

conditions of the working environment and climate. If employees think that the perception of climate and comfort in the working environment of the enterprise is not ideal, they will have two emotions. One is that they are unwilling to stay in the office for a long time, which leads to their resistance to going to work, which is not conducive to the improvement of work performance. The other is to respond with an improved attitude, actively carry out innovative behaviors and improve the working environment by themselves. In order to prevent and protect on-the-job employees from the health impact and danger caused by climate, enterprises should pay attention to it. After understanding the impact of temperature, humidity, wind speed and sunshine on employees' innovation and performance, enterprises should optimize the working environment and facilities to promote and protect employees' physical and mental health and welfare at work. For example, as the temperature rises, employees' bodies release too much heat through sweat glands. If the temperature continues to rise faster than the rate of heat release, uncomfortable feelings will be generated, which will lead to negative emotions. However, when the cooling conditions of the working environment are improved, such as the improvement of wind efficiency under external conditions, employees will change from uncomfortable state to comfortable state, and their emotions will also change to positive state. Therefore, when employees feel overheated, the working environment of the enterprise should be equipped with corresponding cooling facilities.

In addition, the enterprise's planning for the working environment should ensure reasonable lighting, appropriate temperature, appropriate use of building wall materials and the setting of characteristic use Spaces such as changing rooms. The higher the ventilation rate is, the lower the influence on indoor relative humidity is and the higher the respiratory comfort is.

Finally, the limitations of this study are that the respondents are small, and there are individual differences in personality perception of climate. It is hoped that in the future research, the number base of investigators will become larger and more regular conclusions will be found.

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Intangible Assets Impact on Economic and Human Resource Efficiency in a Cuban Financial Institution

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Abstract: An empirical study was conducted at a Cuban financial institution. We study the national and international theoretical models of intangible assets in the modern enterprise and its importance to generate value in the organization based on the premise that if you can't measure intellectual capital you can't manage it which is determine whether intangible assets are adding or destroying value in the organization. The results of the metrics applied were triangulated, and revealed that there is no significant relationship between the economic performance of the bank branch and the perception of the management of intangible assets by the leaders, the average scores denote low management of intangibles so in the short term they deserve to generate alerts to avoid in the long term contractions in efficiency.
Keyword: Economic performance; Intangible assets; Tangibles assets; human capital indices

1 Introduction

Since 2011, the Cuban business system has been going through a new stage of transformations that, among other purposes, seek to unleash old ties, grant greater powers and achieve more efficiency and organization. Like any change process, it has not been without complexities, successes and misadventures. The government's top direction led to a diagnostic in the main organisms of the state, in order to know the deficiencies, their causes and measures to solve them. Also, make changes that consider organizational transformations to be complex processes and that need to be studied and implemented gradually. (Izquierdo L. 2018).

The institution under study as the governing body of the National Banking System (SBN), has the mission to promote, to the extent of its powers, the stability of the purchasing power of the national currency and contribute to the harmonious development of the economy, as well as to exercise the regulation and supervision of financial institutions, branches and offices of representation of foreign financial institutions authorized to be established in the country, and any other that the laws entrust to it. (Decree Law 361/2018).

In addition, regulates and supervises the activities of financial intermediation, financial support services, collection services, payment or transport of monetary and securities species, as well as other activities that are related with the financial and exchange rate activity carried out in the national territory. The institution is implementing a process of reform or improvement of its internal functioning and structure. As a result, the process map, the institution's value chain, was developed and a strategic computerization program was designed for the development and adoption of new information and communications technologies. To develop this reform process, scientific research related to human resources is needed to assess its impact on technology and economic efficiency.

The changes that occur in the Cuban socioeconomic model at present have a significant impact on their labor organizations. This new scenario calls for a greater role of executives and workers in the sense of adopting different ways of acting and managing the processes of working life (Casaña 2015).
Intellectual capital is a system of relationships within the organization supported by tools of information technology, knowledge, communications that are essential for the organization to work and that by themselves constitute an asset. (Brookings A. 1996), (Lennard, 2019).

The management of intellectual capital emerges as part of the advances in science and technology in the field of information technology and communications, giving rise to a new era, the era of knowledge. Intangible assets recreate a broader perspective, since it contemplates the human capital aspect and that of relational capital and structural capital. (Brookings A. 1996)

Within the framework of knowledge societies, the intellectual capital management is a key process in the generation of value and competitiveness for the different organizations. The measurement of intangible assets is undoubtedly an opportunity for the institution, because it allows us to calculate exactly what its true wealth is and what makes the organization to stay and endure. It is a source of attention for making decisions when faced with limitations or restrictions that occur in the dynamics of the organization. Within the different intangibles that make up the intellectual capital of an organization, we must first point out the human capital. This can be defined as the set of knowledge, skills, experiences and abilities of the subjects that make up the organization, which are articulated through human and social communication and make up a complex and dynamic interweaving that is the organization. (Armas-Heredia I. et al, 2017).

The concepts discussed above have been studied by Cuban labor organizations, and there is a certain familiarity with their impact on the organization. However, the studies carried out do not reach the magnitude necessary to determine the costs they generate, either the expenses incurred when a worker decides to leave or takes with him the investments made in their preparation.

The current perspective puts physical and financial assets at the center of attention, without taking into account that the know-how is owned by the individual and is an intangible asset, others such as: knowledge, skills the motivations, values, job skills; and the organizational structures, software, information systems and documents, also make up these intangible assets (Cuesta 2014).

In order to comply with the changes required by the current situation, it is necessary to have a competent staff capable of taking on the changes required by the environment. In addition, it is necessary to develop new channels of communication that allow to identify and conceptualize. Also invite organizations, to recognize the intellectual capital that is creating value. It's not just re- analyst of corporate reporting. It is necessary to innovate in the search for languages that facilitate the measurement and identification of intangibles assets. (Cuozzo B. et al, 2017).

That is why attention to people at work, is an essential aspect to develop labor organizations. In this sense, it is necessary to model change management so that the institution transitions to a scenario that responds to the new demands of the environment (Kaplan and Norton 2004, Cuesta 2014).
The change of economic paradigm requires adopting a new strategic perspective, where it must identify and manage those resources and capacities that make it sustainable over time. In the knowledge economy, these resources and capacities will be - basically - of an intangible nature, delimiting the potential of the organization. Other authors have stressed the importance of identifying cultural and language aspects for analysis of intangible assets. Differences between countries in approved regulations are often different

and create difficulty in equally understanding the effect these intangibles have on productivity. (Catalfo P. 2016).

The question that arises is: how to collaborate so that such changes do not impede welfare and human development? The pretense is added that those processes or changes that arise from the implementation of this methodology are in themselves generators of value for the organization.

According to Borrás (2015): " This requires promoting an academic model characterized by the investigation of problems in their contexts, the production and transfer of the social value of knowledge (...)", "(...)" a scientific investigation, technological, humanistic and artistic problems to have a fundamental solution for the development of the country and the region ... "(...)" (p. 354).

In the literature consulted we appreciate the need or lack of research in this field that contributes to the development of this topic. The relevant data, scientific articles, journal and revised books, clearly explain this research variable and are consistent in their presumptions. Recent research finds that the magnitude of the intangible assets recognized in the accounting book is significantly related to the quantity and quality of the disclosure and communication of intangible assets. For example, there is a need to improve the intellectual capital reports that are made in the organizations. It is necessary that they be more integrated and cover all areas in which intangible assets take place. In turn, intellectual captain assets should be included in the annual reports of the institution. However, we appreciate theory inadequacies that need to be studied and that could facilitate the work of the modern enterprise (Shaper S., Nielsen Ch., & Roslender R., 2017), (Schiemann F., Günther T., 2015)

The reliability of Models to measure Intellectual Capital is still insufficient. Especially Methods based on the VAIC model as they respond to financial reports reporting strategies already implemented, but which does not take into account synergies between different components of the model and that does not analyze the innovation capacity and the relational capital of the company as value generators. These models do not detail the management of intangible assets and this point becomes a limitation that requires study. (Moreno G. Londoño E., 2016),

Other methodologies study the effect of the labor cost of innovation, using data that is derived from intangibles. They also link the labor share of intangible assets and knowledge savings of the direct effect of innovative work on technology. The intangible assets within the organization presupposes a higher level of creativity and innovation to cope with the constant changes in the environment. (Piekola H.,2020). Cuesta A.,2014 proposes us the possibility of correlated intangible indicators with tangible, especially with the important to show the impact of the former. This gives you positive correlations between the two types of indicators. It is important to recognize that the value of intangible assets is indirect and potential and also depends on the context; they have as fundamental characteristics that are expressed grouped, so their study is more complex. (Kaplan &Norton, 2004).

Roth F., 2020 found significant relationship between the growth of labour productivity and the effect of intangible assets collected in the ledgers. The company's added value is increased and becomes a source of productivity growth. However, another study purported to understand how financial results are influenced by intangible assets, analyzed the relationship between intangible assets and the company's total assets to measure the relationship and intangible assets were found to have no significant effect on the financial performance of the companies studied, although the intangible/total asset ratio has been found to have a significant impact on financial performance, in these cases it was not always similarly behaved in all companies. (Vanderpal G., 2019).

The measurement of intangible assets is not necessarily linked to the traditional measurement of classical physics or positivist research (Cuesta A. 2014). In this case the measurement of intangibles is considered relevant states of non-parametric, especially those referring to the ordianl or Likert type scales and are able to provide the necessary research inferences associated with correlation. Intangible values are often manifested in deterministic processes expressed through mathematical correlations that show the trend of this intangible values.

The accounting dimensions of tangible assets are generally consistent. However, there is a significant variation when the dimensions of intangible assets are represented in financial assets. Accountants recognize a broader perception of intangible assets Accounting reports reflect greater openness and development in this topic. Other studies reveal that intangible assets on corporate performance can lead to a significant increase in their financial results However, sometimes companies cannot maximize wealth due to the effect of stock markets. (Syed A. et al, 2017), (Jannatul F., Mohammad M., 2019).

Intangible assets have a contrasting positive impact on firm performance. The measurement of intangible assets corresponds to the field of behavioral science so the most taken measurements are nominal and ordinal. The tendency is usually to establish correlations and inferences about their value compared to economic and efficiency indicators. Ordinal scales can be used for the measurement of intangible assets, due to their isomorphic characteristics with respect to the system of arithmetic numbers. In this sense it is not advisable to use parametric tests such as mean and standard deviation. (Cuesta A. 2014: p.17, 19), (Abdifatah A., Nazli A., 2018).

All the above is summarized in the following problematic situation: Lack of technical tools and their limited use to measure results that allow to know the value of psychosocial assets that generate value in the organization. The application of the Integrated Human Capital Management Systems that is developed has not been able to calculate the labor costs. Failure to recognize the existence of intangible assets prevents analysis of efficiencies that contain variables such as: motivation index, leadership index, training time, % worker retention and % turnover, labor climate index, % of dedicated people to R & D, satisfaction indexes, degree of alignment to the culture of the organization (%), and communication, among others. This analysis suggests that such tools are not being used to predict the future development of the organization. (Quinapanta M., 2019).

This problem has a complex nature and although there are objective conditions that favor the implementation of the management of intangible assets in the financial institution, learning of human talent and knowledge management practices is still insufficient. (Kaplan and Norton, 2004). There is a lack of methodologies, models, own programs that facilitate the management of intangible assets, their characterization and current status.

Thus, an inadequate measurement of intangibles (due to the use of classical valuation methods) can lead to an inefficient allocation of material, financial and human resources. It is then necessary to develop intangible asset management methodologies that allow the use of information and knowledge of people, experiences, research results and other sources of information and knowledge, in order to achieve superior results. (Lennard A., 2019)

The considerations referred to above demand an investigation that solves the following scientific problem: Lack of management of psychosocial intangible assets that prevents having information about those that add value to the organization and that are important to manage them in the organization work. That has proven to be valid and effective in the field of labor organizations. From which the research

question emerges: How to management intangible assets of the human capital dimension that allows obtaining superior results.

Taking into account international experiences, empirical research focuses on the diagnosis of the management of the intangible human capital in a Cuban financial institution.

H.1 The management of human capital in the financial value under study is insufficient

H.1.1 The measurement and management of human capital variables in the financial value under study is not insufficient.

2 Table

Table 1 Results Scores of Human Capital Indices

Measurement of human capital indices, expressed in average values on the likert scale			
human capital indices	average scale likert workers	average scale expert group	average scale customer interviews
workers' creativity	3.2	3.3	3.4
satisfaction and motivation	3	2.9	3.2
moral and material stimulation	3.3	3.4	3.4
innovation capability	3.4	3.6	3.2
job qualification	4.3	4.5	4.2
occupational health and safety conditions	3.6	3.7	3.5
job stability	3.5	3.6	3.4
teamwork	3.7	3.9	3.6

Table 2 Final Gross Value Added

Institution	Institution studied (A)	I 2	I 3	I 4	I 5	I 6	I 7	I 8	I 9	I 10	I 11	I 12	I 13
Wage spending/ gross value added	0.010	0.081	0.383	0.136	0.043	0.0116	0.0906	0.0569	0.1173	0.1642	0.4205	0.0505	0.120

Table 3 Economic Efficiency Analysis

Indicators	Year 1	Year 2	Year 3	Year 4	Year 5
Income	303988.6	309567.7	288759.3	275321.6	230987.4
Expenses	54445.9	53897.5	55477.4	43403	35205.1
Utility	249542.7	255670.2	233281.9	231918.6	195782.3
Salary Fund	2596.07	2648.94	2675.50	2737.96	3431.43
Average number of workers	415	425	427	438	537
Average salary	521.3	519.4	522.15	520.92	532.5
Material expenses	540.6	546.2	545.5	861.8	1027.0
Services purchased	1765.2	1877.9	1964	1363	1376.3
Value added	301682.8	307143.6	286249.8	273096.8	228584.1
Productivity	726.95	722.69	670.37	623.51	425.67
Wage spending/ gross value added	0.0086	0.0086	0.0093	0.0100	0.0150

3 Data and Methodology

The research methodology used for the determination of specific hypothesis and sub hypotheses was realized using the scientific inquiry scheme commonly used by authors studying intellectual capital.

Research hypothesis was assessed through a questionnaire prepared for this purpose, using a non-probabilistic sampling, to 150 workers of the financial institution, the expert group criteria of banking leaders were analyzed and customer interviews were conducted. The procedure used in three-stage: character of the institution, creation of questionnaire and selection of experts and customer for data retention and finally evaluation of the results. The use of the likert scale allowed obtaining average ranges of perceptions of human capital assets, which were evaluated using the questionnaire questions. (Sampieri R. 2014).

The experts established an order of influence of the variables that make up the intangible assets analyzed giving it a value of 1 to 5 (no. 5) (the greatest influence corresponded to the smaller number). Then the matrix of weights was formed. Using the Kendall W status, and the goodness of the W coefficient that allows obtaining the level of concordance of the judges between 0 and 1. A value of 1 means a total criterion match and the value 0 means a total disagreement.

To establish inferences about the value of economic efficiency indicators, the behavior of their value in several consecutive years was taken as references to growth or decrease.

4 Results

The analysis of the influence of intangible assets of human capital on the generation of value is based on the presumption that the asset creates value only when the results are tangible, which is why it is necessary to use indices that allow measure whether these assets are creating value. The above allows subsequently its management, as long as it is known and measured can be managed.

The least-scored human capital indexes are the job satisfaction and motivation of workers. Previous statement sits that an inadequate management of the leaders of these indicators succeeds. The assessed indices of regular or poorly were moral and material stimulation, job stability, and worker creativity.

The indices job qualification occupational health and safety conditions and teamwork achieved higher scores, indicating that leaders perform better management of these indicators and are considered as sources of worker satisfaction. See table 1.

Results of the triangulation of techniques:

Human capital behavior strengths

• The interpersonal and intergroup relationships that are established are harmonious, based on collaboration rather than competition.

• Workers perceive that organizational objectives and roles are clearly defined as well as strategies for achieving them.

• Members of this organization value head-subordinate relationships positively.

• The perception of management is also based on elements that speak in favor of good professional preparation and the skills necessary for the exercise of administrative functions.

• The functioning of the organization is perceived as efficient, teamwork is encouraged and its development prospects are favorable.

• Workers are satisfied with the Human Resources Policy carried out by the organization and the quality of it.

• There is a sense of belonging to the group, backed by satisfaction with the center.
• High satisfaction with the content and working conditions, as well as their own job performance, is noted.

Human capital behavior weaknesses

• Workers are more in need of participation and influence in the functioning of their jobs and in the organization of organizational activities.
• The need for greater autonomy and spaces for creativity when carrying out its work is noted.
• There is no correspondence between the responsibility and complexity of the work that is done with what is perceived as wages.
• Dissatisfaction with the stimulation system, for the need to better combine moral and material stimulation.
• Workers appreciate that formal and informal communication channels are not fully effective.

The data collected in the research show that there is the management of intangible assets of human capital in the financial institution is not enough, which shows a goal-oriented management style rather than people. Another important aspect is that motivation management and job satisfaction are not managed positively, which can influence long-term outcomes. However, the management of professional improvement is given great value.

It is clear that the management system must pay more attention to low-scoring indices because although short-term economic results show good benefits, the institution has an internal weakness that deserves to be studied.

Comparison of gross value-added wage expenditure of the Cuban National Banking System.

The values of the financial institution are displayed in relation to the gross value added salary spending indicator in a given period with respect to the financial institutions that make up the National Banking System. Note that the institution studied has the lowest index relative to the rest, which while smaller is the highest positive correlation value shows and evidences financial growth in this period. See table 2

When we compare of the main indicators of economic efficiency of the isntitution over a period of five years, we appreciate a decrease in some indicators. This may be related to the management of intangible assets.

The table above shows that it is the institution under study that generates the most wealth of the Cuban national banking system, due to its function as a state bank, monetary issuer and regulator of the country's monetary policies.

Comparing the economic efficiency indicators between five years shows that efficiency rates were declining by the end of the last year. See table 3

There is a decrease in productivity and gross value added and an increase in the average number of workers, as well as in the wage fund in the last year analyzed. It is important to evaluate other external factors that could affect these results. The comparison between years is a reflection of the management strategies adopted, where it is appreciated that for four years the institution maintained a growth in its indicators of economic efficiency.

The causes that led to this decline may have multiple triggers making it a multicausal phenonomene and requires a comprehensive analysis across all dimensions of the organization, including concomitant external factors. It is important to assess the regulatory role of the financial institution in the development of the economy which differs from the business sector, where productivity growth is a true indicator of efficiency.

In this case it is taken into account but is not compatible with its nature, so this variation can be considered normal. It is also appreciated that the institution, despite having a slight decline at the end of the fifth year analyzed, is not destroying added economic value of its main assets and indicators but shows stability over time. In addition, other indicators such as income, productivity, do not deteriorate, although if you see a decrease in the indexes in the last year.

This institution measures their efficiency by meeting work objectives, which analyses indices such as inflation, growth in the amount of money outstanding: monetary stability, interbank market behavior, and monetary and banking supervision policies, so economic efficiency indexes do not provide a real means of management.

It is therefore not possible to assert the direct relationship between the assessments of human capital indices carried out by subjects and experts with respect to the efficiency results of the institution.

The results shed light on the need to apply an intangible asset management model that allows identification and then management first. To do this, the Intellectual Capital Model must be adapted to Cuban companies designed by Borras F. (2015), and determine the indexes of intangible assets defined by Cuesta A. (2017), such as: the job satisfaction rate, the commitment index, the utilization rate of the working day, the training index.

Intangible assets are the main factor of value creation in organizations, so their institutional philosophy provides for adequate and contextualized planning. The institution's value chain must be redesigned to include intangible assets that add value. Subsequently, it is identified the main management processes and keys of the organization, and it is proposed to measure intangible assets. In addition, redesign the competences of the institution, the competences of the processes and jobs. Identify assets that are having an influence on economic efficiency and manage them intensely.

Review the strategic alignment of human resources objectives with respect to the institution's main objectives. Include in the annual report the analysis of the impact of intangible assets on efficiency. Update training and stimulation plans and include the indexes of intangible assets that need to be managed, and propose solutions to improve moral and wage stimulation. Apply new incentive policy.

Continue working on the securities awareness program and work on the intangible assets associated with the organizational values. Update the policies of the Efficiency and Innovation Committee and include intangible assets that must be managed as innovation. Identify the current results of innovations and enhance it through the Economic Efficiency Event. The results of these proposed measures can be evaluated and compared with the results of this study. Continue working on the implementation of the requirements of Cuban Standard 3000, 3001,3002, Integrated Human Capital System, modifying the Human Resources policy of the institution.

5 Conclusion

Low investment in intangible indicators of human capital is evident as the perception of workers in showing little or no management. It is important that the management of variables, indicators, measurement criteria and intangible asset tools is based on models validated by international practice.

No direct link was found between the results of the management of intangible human capital assets with respect to the economic efficiency results of the institution under study. It is necessary to measure the efficiency rates of human capital that are influencing the generation of value, so that if we can measure it we can better manage it, or if intangible assets are destroying value in the institution.

The rates of human capital that have low management are job satisfaction and motivation. Also, moral and material stimulation, job stability and creativity of workers. Job qualification is the most attention. The management of intangible assets in the institution studied is low. Human capital policies that act directly on these intangible assets need to be adopted.

There was a decrease in the institution's economic efficiency indicators at the end of the last year analyzed. The analysis of us indicators shows that it is not destroying added economic value, but it is not possible to make direct inferences about its relationship with the management of the intangible, for them it is necessary to establish direct correlations.

There is a broad theoretical-conceptual basis on the measurement and management of intangible human capital, which has been enriched by Cuban empirical studies in which international models are interrelated, establishing alliances in the way of analyzing the influence of intangible assets and the value they bring to the institution. It shows the need to measure and manage intangible assets and minimize the negative effects they can have in the long term. By obtaining the average value created by intangibles allows the company to raise economic efficiency rates

Due to the nature of the institution that measures its efficiency management through the fulfillment of policy objectives and not by the traditional indicators of the Cuban business system it is not feasible to establish direct relationship between the economic efficiency indexes and the management of intangible assets, it is necessary to calculate the costs of investment in intangible assets and their long-term effect.

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The Implementation of Atkinson's Flexible Firm Model on Starbucks Operational Flexibility in the Open Talent Economy Context

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Abstract: This article uses the literature review method to put Atkinson's Flexible Firm Model in the context of an open talent economy and explores the role of this classic model in the new context. This article takes Starbucks as an example to study the strategy of Starbucks in allocating human resources and believes that Starbucks has applied this model in the process of human resources management and achieved good results. Through research, the author believes that Atkinson's Flexible Firm Model still has strong guiding significance in the current open talent environment, which can improve the flexibility and competitiveness of the company's operations.

Keywords: Starbucks; Human resources; Atkinson's Flexible Firm Model; Open talent economy

1 Introduction

Starbucks Inc. is a multinational chain of coffee shops in the United States and the world's largest chain of coffee shops (Lamiman, 2018). It was founded in 1971 and is the birthplace and headquarters in Seattle, USA.

Starbucks was successfully listed on NASDAQ in 1992. The successful listing of Starbucks has promoted the company's business growth and laid the foundation for the company's international development. In 1996, Starbucks began its global expansion and entered Asia, Europe, the Middle East and Africa. Starbucks first entered Fortune Magazine in 2003 and became one of the top 500 companies in the United States. In 2004, it was ranked as the world's fourth largest brand by international consulting organizations.

According to Starbucks Reports Q3 Fiscal 2019 Results (2019), by the beginning of 2019, Starbucks has more than 30,000 stores in 80 countries and regions around the world. The United States and China are the two largest markets in Starbucks (Lamiman, 2018). As of March 2019, Starbucks has over 14606 stores in the United States with 181000 employees and over 4000 stores in China with 55000 employees.

2 Literature Review

In the context of intensified overall economic competition pressure and the continuous development of an open talent economy, companies have greatly increased their practice of work flexibility. In recent years, researchers have focused on analyzing the company's flexibility strategy, flexibility practices, and the impact of flexible employment patterns on company performance. Whyman et al (2015) used data from workplaces in the UK to study the relationship between flexibility practices in the workplace and company performance. Lind (2018) proposed different regulatory measures for different employees in a flexible human resource strategy. Martinez-Sanchez et al (2020) analyzed a sample of Spanish industrial companies and found that companies with good human resource flexibility have better innovation output capabilities.

In the past five years, academic research on the Starbucks has focused on marketing, social

networking, consumer behavior research, and customer service. Research related to Starbucks human resource management mainly focuses on employee management and leadership development. Liu and Zhang (2019) used relevant motivation theories to discuss Starbucks' organizational management advantages and teamwork effectiveness. Nan and Li (2017) analyzed the correlation between corporate culture and employee morale development. Ardi and Wahyuningtyas (2020) studied the relationship between job satisfaction and employee turnover rate and believed that job satisfaction and employee turnover rate were negatively correlated. At present, researchers still focus on the research of Starbucks' human resources management from the perspective of corporate culture, employee satisfaction and internal governance of the company. Few researchers have put Starbucks' overall human resource management strategy into the context of an open talent economy for research. This article intends to use Atkinson's Flexible Firm Models to analyze how Starbucks has developed its human resources strategy in the current economic environment.

3 Starbucks' Practical Application of Atkinson's Flexible Firm Model

3.1 Open talent economy

The open talent economy is a collaborative, technology-driven, transparent, and fast-looping approach to talent management (Liakopoulos et al. 2013). The open talent economy has the following characteristics: The talents in the talent pool come from all over the world; The flow of talents between organizations has no boundaries; Talents and organizations are more equally two-way choices rather than only organizations hold the option and recruitment on demand.

The open talent economy forms a mixed workforce, and the concept of employees is no longer just full-time employees belonging to an organization, but also subcontractors, freelancers and outsourcing (Liakopoulos et al. 2013).

According to Barry et al (2016), temporary workers, contract workers and part-time workers already account for one-third of the global workforce and continue to grow. More and more talents have no formal relationship with the companies that employ them.

3.2 Atkinson's flexible firm model and the application on starbucks

In the context of the fourth industrial revolution (Schwab, 2016), with the rapid development of globalization, mobility and technology (Liakopoulos et al. 2013), Organizations must remain resilient to survive and thrive in the fierce market competition (Denyer,2017). According to BSI (2017) analysis of organizational resilience, a key factor in maintaining organizational resilience is flexibility.

The Flexible Firm Model proposed by Atkinson in 1984 still has important guiding and practical value in the 21st century. In the context of an open talent economy, organizations can use this model more flexibly to maintain competitiveness.

Atkinson believed that the most important way for an organization to maintain competitive was to implement Flexible staffing arrangements (Atkinson, 1984). Atkinson's Flexible Firm Model divides an organization's employees into three distinct groups: the core group, the first peripheral group and the secondary peripheral group (Taylor, 2019). The core group consists of the organization's full-time employees, who generally have high levels of skills and knowledge and experience that are difficult to replace. They are the human resource base of an organization. The first peripheral group is also the internal staff of the organization, who are often less skilled and less experienced. The second peripheral group is made up of large volumes of agency staff, outsourcing and sub-contractors (Taylor, 2019).

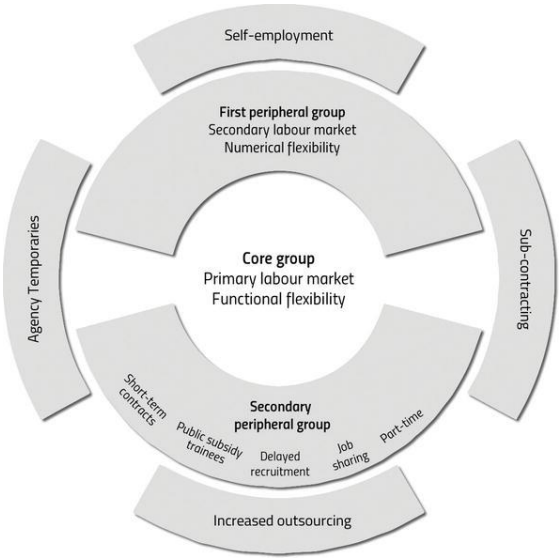

Figure 1 Atkinson's Flexible Firm Model

Atkinson identified three different forms of flexibility within an organisation: functional, numerical and financial (Atkinson, 1984). In recent years, Taylor (2019) argued a new type of flexibility, temporal flexibility.

3.2.1 Functional flexibility

Functional flexibility is mean promotes multi-skilling for the core employees, it is mean less demarcation between jobs, More team-working and Flat management structure (Taylor, 2019). Functional flexibility is mainly applicable to the core working group, the members of this group are difficult replaced internal core employees have high-level skills and experience. The company can cultivate multiple skills of core group employees through comprehensive training so that they can complete different tasks interactively and achieve horizontal and vertical skill integration. In general, companies that practice functional flexibility, people can be deployed where they are most needed at any time. The work more efficient, costs saved, and customers are served more quickly (McDonald et al. 2009), at the same time, functional flexibility enables employees to realize self-management, enjoy the improvement of work speed and performance, which is conducive to enhancing the sense of responsibility and cooperation ability (Wick-ramasinghe & Wickramasinghe, 2016).

In Starbucks' human resource strategy, training occupies a very important position. Every Starbucks employee needs at least 80 hours of training, including proficiency in coffee knowledge, understanding of company culture, and learning how to communicate well between positions. At the same time, Starbucks' human resources department implements a series of employee growth plans, such as employee stock ownership, pension plans, and support for employees' further education, with the goal of maintaining as much as possible the retention rate of core employees.

3.2.2 Numerical flexibility

There are several typical forms of Numerical flexibility, such as part-time contracts, temporary contacts, subcontractors, and homeworking （Taylor, 2019）. Operating digital flexibility can reduce the company's fixed costs, attract high-quality talent, and help the company acquire temporary professional skills during seasonal peaks. (Wickramasinghe et al. 2019), Wachsen and Blind (2016) found that companies that implement digital flexibility have more advantages in process innovation capabilities.

Numerical flexibility is mainly applicable to peripheral groups. In 2006, Starbucks outsourced its IT infrastructure business and information services business to UNISYS. In the same year, Starbucks (China) also incorporated manpower in China The resource management business was outsourced to a software company called BenQ Competing, which was responsible for the maintenance of Starbucks (China)'s human resources management information platform, attendance data recording, and salary management. In 2007, Starbucks outsourced its global human resources business process services to Convergys. Starbucks said this move greatly improved Starbucks' ability to handle human resources data and manage payroll. In 2010, Starbucks closed its call centre in Seattle, USA, outsourcing call centre operations to SITEL, which handles Starbucks customer feedback (Stuart, 2010).

Starbucks' flexible company model is also reflected in its flexible raw material supply chain. Due to high transportation costs and third-party logistics costs, Starbucks increased supply chain operating costs in 2008. In order to reduce costs and improve efficiency, Starbucks began to purchase coffee from coffee producing countries around the world, and invested more than 100 million US dollars to support the coffee community, and through the Starbucks Global Farmer Foundation to provide loans to suppliers in 13 countries to stimulate local farmers to grow Coffee and sold to Starbucks (Starbucks, 2020).

3.2.3 Temporal flexibility

Temporal flexibility is mean move away from setting specific hours of work. The types such as flexitime, term-time working, annual hours, zero hours, compressed hours, and financial flexibility (Taylor, 2019).

Temporal flexibility can be used for core groups and peripheral groups. For the core group, temporal flexibility means flexible working time arrangements, and employees can freely choose their work and get off work hours (Wickramasinghe & Wickramanayake, 2013). Temporal flexibility is more applicable to the company's peripheral groups, and employers can set up flexible employment models to attract more part-time employees to serve. Part-time employees are a typical form of talent employment in an open talent economy. These independent professionals and the company’s internal core employees combine with each other, which not only saves the employer time and money, but also ensures that the internal core team experience Own value.

Starbucks also attaches great importance to the development of flexible work, Starbucks Human Resources has launched an employee benefit called “Career Coffee Break”, which allows employees who have worked for the company for more than 10 years to get a holiday of up to 12 months. In addition to its core employees, Starbucks also encourages college students, housewives to work part-time in the company, and offers a variety of flexible work programs.

4 Conclusion

As the top 20 most flexible companies in the world, Starbucks has been practicing flexible company models throughout its operations. As a company repeatedly selected as the best employer and most attractive company in the world by Aon, Universum, and LinkedIn, Starbucks draws heavily on Atkinson's Flexible Firm Model in its human resource management and strategy to maintain company flexibility, and obtained a good outcome. Implementing flexible staff arrangements and appropriate outsourcing of some businesses can not only save costs for the enterprise, but also improve the efficiency of the enterprise and enable the enterprise to always maintain flexibility.

With the continuous development of an open talent economy, in the future, Starbucks will also be affected by the following operations: adjust the company's talent pool structure. Streamline the core

group and expand the peripheral group and outsourcing; Implement different flexible policies across different groups; Practice functional flexibility in the core group and practice numerical flexibility and temporal flexibility in the peripheral group; Expand the types of talent pools, in addition to the internal core staff, Starbucks also need to create a diverse talent pool, including but not limited to partnership talent, borrowed talent, freelance talent and open source talent.

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Impact of Engagement and Satisfaction of Employees on Organizational Innovation:The Moderating Role of Employee Commitment

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Abstract: The scientific organization in Thailand is considered an organizational innovation, due to the organization is able to create innovation as well as being able to register intellectual property patents. This study objectives to explore the impacts of employee engagement and employee satisfaction on organizational innovation, as well as the interferences between employee commitment and employee engagement and employee satisfaction. A questionnaire survey was applied to employees that have gathered 333 respondents. The linear regression analysis has employed as the methodology of the research using SPSS 23. The findings present that there is an impact on organizational innovation from employee engagement. However, it does not impact employee satisfaction. On the other hand, compassion from employee commitment play as moderating variables that interfere with employee engagement and job satisfaction. It eventually impacts organizational innovation.

Keywords: Employee engagement; Employee satisfaction; Organizational innovation; Employee commitment

1 Introduction

Organizations in Thailand have made efforts to restore business potential. Organizations must adapt themselves to survive in the competition. Many organizations need to differentiate their business and develop themselves into organizational innovation by creating new inventions, new technology, or new management methods. The organization that the researchers interested in this study are a scientific organization in Thailand, is important in creating and registering intellectual property patents. The researchers demand to study the factors that impact the scientific organization's personnel to be able to produce concrete and practical innovations.

Obviously, innovation is the main to being competitive and maintaining a balance between future chance and efficient current operations (Stromquist and Monkman, 2014). On the other hand, there are various strategies to achieve innovation in organizations. One of these approaches is human resources. As the theoretical evidence guide, employees are engaged, more satisfied, more committed, and more innovative (Lau, 2010). Literature indicates the importance of commitment to the learning and knowledge-sharing activities that underpin innovation (Sung & Choi, 2014). Furthermore, research has evidenced related between employee engagement and commitment and their influence on learning behaviors (Rayton & Yalabik, 2014)

That have been associated with successful innovation. Regarding the discussion, the purpose of this study is to investigate the impact of engagement, satisfaction and commitment of employees on organizational innovation.

2 Literature Review and Hypotheses Development

The researcher conducted by previous literature regards the new base of organizational innovation as to employee engagement, and employee satisfaction has been investigated and clarified in various

styles. However, establishing that heretofore were usually yet progressing. Notwithstanding, the researcher has analyzed it and emphasize the previous literature into four assumptions, which are;

2.1 The relationship of employee engagement on organizational innovation

Employee engagement brings about a positive relationship between the organization and the personnel in a way that results in productivity improvement (Eldor and Vigoda-Gadot, 2016). A high level of employee engagement provides a route to innovative behavior (Minhaj, Jamil and Hadi, 2019). Moreover, engagement and innovation encourage each other (Rao, 2016). Employee engagement stimulates creativity and innovation in employees (Gichohi, 2014). According to a study, the indispensability of employee engagement in organizational innovation cannot be denied. Therefore, it is hypothesized that:

H1: Employee engagement is positively related to organizational innovation

2.2 Employee engagement has a moderating effect on organizational innovation, under employee commitment

Findings show that engaged employees are more likely to participate in creative and innovative behaviors (De Spiegelaere et al., 2014). Furthermore, Yusuf (2017) noted that commitment is the capability that imagined as the process of enhancing a person's potentiality to work. What's more, the operation in the innovative features is continual if the organization consists of employees with a high level of commitment. Krajcs âk, Z (2017). Further, Sanders and Yang (2015) examined the links between employee engagement and commitment, and innovative behaviors. As discussed in the literature above, it can be inferred that:

H2: Employee commitment positively moderates the relationship between employee engagement and Organizational innovation

2.3 The relationship of Employee satisfaction on organizational innovation

Employee satisfaction is clarified as the degree of the sense which every employee perceive about their workplace. At the point of staff fulfillment with their work, they tend to pay a lot of effort into the organization. It may bring innovation. Lambert and Hogan (2010) stated that organizational innovation had significant positive associations with employee job satisfaction. Moreover, Tien and Chao (2012) expressed that job satisfaction has an impact on organizational innovation. Besides, Ghoochkanloo and Talebieshlaghi (2016) posited that an employee's job satisfaction has a significant effect on the innovation of the organization. Thus, we have the following hypotheses:

H3: Employee satisfaction is positively related to organizational innovation

2.4 Employee satisfaction has a moderating effect on organizational innovation, under employee commitment

Commitment to organizations has been found to be positively related to such organizational outcomes as job satisfaction (Bannett, 2002). Studies have explained that commitment contribute satisfaction in the employee's job role (Zhang, Wu, Miao, Yan and Peng, 2014). Rostami, Veismoradi and Akbari (2012) found that there is a significant relationship between employee's organizational commitment and innovation. What's more, Holliman (2012) stated that there is a relationship between employee's organizational commitment and innovation, and higher levels of commitment were correlate with higher levels of innovation. Hence, we test the following hypothesis:

H4: Employee commitment positively moderates the relationship between employee satisfaction and Organizational innovation

We obtained a research framework for the impact of employee engagement and employee satisfaction on organizational innovation under employee commitment from the collection of literature mentioned above. The framework is presented in Figure 1

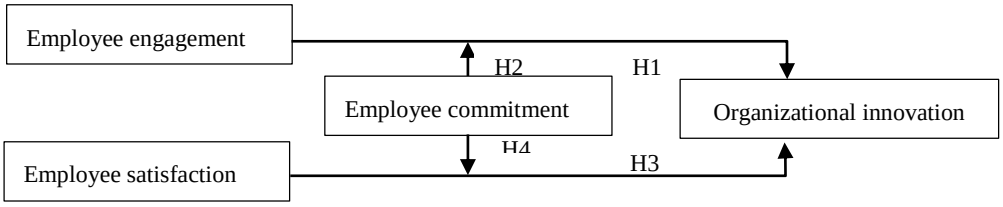

Figure 1 Framework

3 Methodology

3.1 Data collection

This study used a quantitative approach in the form of survey design to carry out this study. We used an online questionnaire collected from the employees of a scientific organization in Thailand. There were 333 questionnaires successfully filled. The questionnaire was divided into two sections; demographic and opinions about employee commitment, employee engagement, employee satisfaction, and organizational innovation. There was a 5-point Likert scale from strongly disagree to strongly agree.

3.2 Data analysis

The Linear regression is applied in this study to test the direct hypothesis and the moderating hypothesis. Besides, the descriptive statistic is used for the analysis of demographic data. The SPSS23 program is suitably used for data analysis for this case. The result is appearing with P-value, T-test, R, $R^{2,}$ and the significance level, which determine if hypotheses are accepted or rejected.

3.3 Reliability and validity tests

Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity for its validity test, while the Cronbach's alpha is used to test the reliability. The values of total variables display as reliable with the Cronbach's alpha value more than 0.60, and the value of KMO and Bartlett's test reported as valid with the value 0.905.

Table 1 Cronbach's Alpha Test

Variables	No. of Items	Cronbach's Alpha value
Employee satisfaction	8	0.761
Employee engagement	15	0.878
Employee commitment	5	0.647
Organization innovation	17	0.640

Table 2 Kaiser-Meyer-Olkin (KMO) and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.905
Bartlett's Test of Sphericity	Approx. Chi-Square	3479.591
	Df	378
	Sig.	0.000

4 Results

The analysis of demographic information was conducted for the returned questionnaires. The descriptive statistics variable, including gender, age, education, work experience, and employee type. We found that the sample group, there are females with 71 % and males with 29%. As for the age range, the age range of 38-52 years is the most 41.5%, followed by the age range 22-37 years, accounting for

39.2%. When considering education, the bachelor's degree education is the most, which is 47.7%, followed by a Master's degree in education, accounting for 40.3%. The work experience's employee is taken as a variable; the work experience range 0-5 years is the most 44.3%, followed by the work experience up to 20 years, accounting for 22.7%. The last one is employee type; the staff member is the most, which is 56.5%, followed by the worker, 39.2%. Results of fundamental statistical analysis to the questionnaire items in five described dimensions all responses to those asked questions had the average within the range 2.59 ~ 4.20 and standard deviation between 0.495 ~ 0.651. In this study, a linear regression analysis was done for the related employee engagement and employee satisfaction on organizational innovation. After that analysis to determine the moderation effect, that is Employee commitment. The analysis was performed as follows:

H1: Employee engagement is positively related to organizational innovation

From Table 1, under the condition of the significant level $\alpha = 0.05$, Regression analysis results indicate a positive relationship direction of Employee engagement that can contribute to forecast organizational innovation, which can jointly predict the variance in organizational innovation by 2.2 %. There is a correlation coefficient equal to 0.147, which will give an equation to predict factors that impact on organizational innovation as follows:

organizational innovation = 1.409+0.960 (Employee engagement)

Table 1 Regression Analysis Results of Employee Engagement Is Positively Related to Organizational Innovation

Variable	B	S.E.	Beta	t	Sig.
Employee engagement	0.960	0.355	0.147	2.704	0.007
Constant	1.409	0.676		2.084	0.038

R =0.147, SEE= 0.621, R^2= 0.022, R^2 adj = 0.019, F = 7.310, Sig of F= 0.007, P<0.05

H2: Employee commitment positively moderates the relationship between employee engagement and Organizational innovation

It can be learned from table2 that, Regression analysis results indicate a positive relationship direction of Employee engagement x Employee commitment (moderation effect) that can contribute to forecast organizational innovation, which can jointly predict the variance in organizational innovation by 2.4 % (0.2% percent increase). There is a correlation coefficient equal to 0.154, which will give an equation to predict factors that impact on organizational innovation as follows:

organizational innovation = 1.898+0.350 (Employee engagement x Employee commitment)

Table 2 Regression Analysis Results of the Employee Commitment Positively Moderates the Relationship between Employee Commitment and Organizational Innovation

Variable	B	S.E.	Beta	t	Sig.
Employee engagement x Employee commitment	0.350	0.123	0.154	2.840	0.005
Constant	1.898	0.472		4.019	0.000

R =0.154, SEE= 0.621, R^2= 0.024, R^2 adj = 0.021, F = 8.063, Sig of F= 0.005, P<0.05

H3: Employee satisfaction is positively related to organizational innovation

We learned from Table 3 that, under the condition of the significant level $\alpha = 0.05$, it was indicated insignificant of Employee satisfaction on organizational innovation.

Table 3 Regression Analysis Results of Employee Satisfaction Is Positively Related to Organizational Innovation

Variable	B	S.E.	Beta	t	Sig.
Employee satisfaction	0.435	0.296	0.081	1.473	0.142
Constant	2.341	0.608		3.850	0.000

R =0.081, SEE= 0.626, R^2= 0.007, R^2 adj = 0.004, F = 2.171, Sig of F= 0.142, P<0.05

H4: Employee commitment positively moderates the relationship between employee satisfaction and Organizational innovation

The Regression analysis results were reported in Table 4. It indicated a positive relationship direction of Employee satisfaction x Employee commitment (moderation effect) that can contribute to forecast organizational innovation, which can jointly predict the variance in organizational innovation by 1.2 %. There is a correlation coefficient equal to 0.109, which will give an equation to predict factors that impact on organizational innovation as follows:

organizational innovation = 2.339+0.217 (Employee satisfaction x Employee commitment)

Table 4 The Regression Analysis Results of the Employee Commitment Positively Moderates the Relationship between Employee Satisfaction and Organizational Innovation

Variable	B	S.E.	Beta	t	Sig.
Employee satisfaction x Employee commitment	0.217	0.108	0.109	2.004	0.046
Constant	2.339	0.448		5.219	0.000

R =0.109, SEE= 0.625, R^2= 0.012, R^2 adj = 0.009, F = 4.015, Sig of F= 0.046, P<0.05

5 Conclusion

As a result, we were confirmation of the hypothesis, which means the first hypothesis employee engagement is positively related to organizational innovation. The second hypothesis, employee commitment positively moderates the relationship between employee engagement and organizational innovation. The fourth hypothesis Employee engagement positively moderates the relationship between employee satisfaction and Organizational innovation were all accepted, except the third hypothesis Employee satisfaction is positively related to organizational innovation was rejected.

Therefore, commitment is an important moderator between employee engagement and organizational innovation and between employee satisfaction and organizational innovation in like manner. Consequently, if an organization needs to enhance its ability to design new products and services, should pay attention to those factors. To put it another way, if the employees in the organization are already engaged in the organization, raising the commitment will help to upgrade the effectiveness of innovation in the organization. On the flip side, satisfied employees do not directly affect creating innovation in the organization. The human resources department or the leader in the organization must initiate the commitment of work to the employees. Thence, the organization must support and encourage commitment, or engagement among the employees. As well as build a positive role of employee involvement in the developing and maintaining organizational innovation.

Significantly, creating an innovative organization should require the freedom of thought for the employees so that they can use their expertise to work to achieve their goals. Moreover, employees should be rewarded with appropriate opportunities to demonstrate acceptance of creativity and innovation that advantage the organization, what's more, the swift support and response from the executive, and the organization's strong promotion. It shows the importance of employee work and stimulates employees to be creative continuously. In summary, discovering and championing techniques

that enhance engagement and commitment, including the encouragement from management are seen as the path to achieving organizational innovation

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Application of Data Mining in Early Warning of Tumor Diseases

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Abstract: With the rapid development of the current data era, people use data more and more frequently. In this paper, partial methods of data mining are used to analyze medical data from the data aspect, and the urgency of building a malignant tumor platform is proposed. At the same time, the data analysis capability of this platform can enable people to obtain the data processing situation and results they need. For example, the cluster discrimination can help people quickly change a lot of complex data into the category data that people need and process the unknown data. It is concluded that using the data mining capability of this platform to centralize the processing of malignant tumor data can bring about more effective and faster results than collecting, analyzing and obtaining individual malignant tumor data. We aim to assist medical treatment from the perspective of data.
Keywords: Data mining; Malignant tumor medical data; Data analysis

1 Introduction

With the rapid development of science and technology today, data has also begun to come into people's vision. The derived data mining discipline is a scientific and authoritative application tool in the current era of big data. The powerful analysis ability of data mining lies in its ability to get the important information that people need from the data from a bunch of chaotic data. And that information is the answer to that question. For example, is the first thing we consider when shopping with women? Appearance or price? We can apply the classification operation in data mining; So for the judgment of unknown samples, we can use a series of problems to make a judgment -- this is another method of data mining: judgment. Data mining is a series of methods used to find the answer to our question.

At the same time, part of the operations we need to carry out in the construction of malignant tumor big data platform are based on data mining. For example, it requires a series of methods to process data such as clustering, discriminating, constructing functions and making predictions.

In the meantime, malignant tumor is a kind of disease that seriously threatens the health of Chinese residents. As population aging in our country is gradually increased, the accelerating process of industrialization and urbanization, and chronic infection, the unhealthy life style, the environment risk factors, such as accumulation, China's new cases of malignant tumors and deaths respectively global new cases of malignant tumors and 23.7% and 30.2% of the deaths, in 185 countries or regions in the world, China's malignant tumor morbidity and mortality in the average level. The burden of malignant tumors is increasing in China, with large differences between urban and rural areas and uneven regional distribution. The situation of prevention and control of malignant tumors is grim.

Similarly, in the literature of recent years, foreign and domestic platforms have been built against the background of big data. Not only that, but the study of individual diseases has reached a fever pitch. On this basis, I put forward the construction plan of a comprehensive malignant tumor platform, and set up a comprehensive platform integrating monitoring, analysis and report.[1]

Therefore, it is urgent for us to combine the objectivity of data with medical treatment, analyze the data of malignant tumor with medical treatment, and overcome this serious problem in human history.

2 Theoretical Framework and Research Techniques

2.1 Data mining overview and method demonstration

Data mining is a basic data subject adapted to the era of big data. In the development of database and computer, data flow gradually emerges. People begin to realize the hidden information in the data and gradually seek answers from the data. With the birth of the subject of data mining, a solution to this kind of problem is proposed.

In data mining, the mainstream methods mainly include: K-means, support vector machine, neural network, decision tree, CART: Classification and regression tree and naive Bayesian model... In this part, the main purpose is to process and classify the data, obtain the classification standard equation and discriminate the unknown data, so as to achieve the purpose of analysis and prediction.

In this paper, we introduce the algorithm of data mining and emphatically introduce the analysis method used in this paper:

(1) K-means

A clustering algorithm that assumes that object factors come from spatial vectors and aims to minimize the sum of mean square errors within each class to achieve the effect of grouping data.

(2) Support vector machine

A supervised learning method widely used in statistical classification and regression analysis.

(3) Neural network

A nonlinear adaptive information processing system composed of a large number of interconnections of processing units. A mathematical model applied to information processing. It has the ability of supervised learning and unsupervised learning.

(4) Decision tree

A supervised learning classification method that solves classification problems by constructing trees.

(5) Naive Bayes

One of the most widely used classification methods. Naive Bayes method is a classification method based on bayes' theorem and independent assumption of feature conditions, and it is simplified on the basis of Bayes algorithm, that is, it is assumed that attributes are conditional independent of each other when given target value.

(6) Correspondence analysis[2]

A categorical variable applicable to more than one category can reveal the difference between the categories of the same variable and the corresponding relationship between the categories of different variables. The cross contingency table of two variables is taken as the research object by using the "dimension reduction" method, and the relation between variables and different categories of variables is directly revealed by means of graphics.

We abstract the obtained cross contingency table into an $m \times n$ matrix:

Table 1 $m \times n$ Matrix of cross Contingency Table

f11	f21	...	fm1
f12	f22	...	fm2
...	...		...
f1n	f2n	...	fmn

If n columns of the matrix are regarded as n samples, and these N samples are put into a certain dimensional space, n sample points can be obtained, and the coordinates of each sample point can be obtained. Again, we put these m rows in that dimension, and we get m sample points.

If the two factors are not independent, the following corresponding analysis is carried out. We carried out the chi-square test on the obtained matrix, and only after passing the non-independent test among matrix elements can we carry out the following research.

Look at the n columns of the matrix and calculate the covariance matrix A of the n variables. Calculate the characteristic roots of the covariance matrix A, and $\lambda 1>\lambda 2>\lambda 3>...>\lambda n$. And the characteristic equation vector I. Then we determine the number of extracted featu $\mu 11\sqrt{\lambda 1}$ re roots according to the cumulative variance contribution rate, which is usually 2, and calculate the corresponding factor loading matrix.

Table 2 The Corresponding Factor Loading Matrix

$\mu 11\sqrt{\lambda 1}$	$\mu 21\sqrt{\lambda 2}$
$\mu 12\sqrt{\lambda 1}$	$\mu 22\sqrt{\lambda 2}$
...	...
$\mu 1n\sqrt{\lambda 1}$	$\mu 2n\sqrt{\lambda 2}$

Also, we can also do related to line variable as above, so that we get the two factor loading matrix, and the two factor loading matrix, the n 2 d points and m a 2 d drawing in a common plane of work coordinate system, form the corresponding distribution, by observing the corresponding distribution of each sample points in the near and far will be able to determine the connection between the various don't. The above methods are all the methods used in data mining to process data. In the malignant tumor platform, k-mean clustering and discriminant function are used most. We can do this kind of analysis for the significant difference factors in the malignant tumor data, and score the different factors to get the most susceptible tumor types; At the same time, the discriminant function can be used to classify patients with localized malignant tumor by scoring, or to provide a focus on prevention of malignant tumor diseases in normal people under a certain environment. To achieve the effect of being able to classify and discriminate between known and unknown data. At the same time, we will also apply some statistical methods for data processing, such as principal component analysis and correspondence analysis. Principal component analysis can extract important factors from malignant tumors and reduce the correlation of factors as much as possible. Correspondence analysis can see whether there is a correlation between some factors.

Next, we will introduce the malignant tumor platform further.

2.2 Structural causes and basic principles of malignant tumor platforms

2.2.1 Structural reasons

This malignant tumor big data platform USES the data from the direction of statistics for data mining and analysis. In order to promote the work of screening and early diagnosis and treatment of malignant tumors in China for the purpose of serving patients with malignant tumors.

For patients with malignant tumors, the patient's family history, genetic genes, living habits, living environment and other personal specific data will be comprehensively analyzed with big data and statistical knowledge, and the report will be formed through data mining, mathematical modeling and

data analysis. Find out the cause of the disease and put forward the treatment plan to prolong the life of the patient. To contribute to targeted prevention and control work.

2.2.2 Basic principles[3]

(1) Combined with relevant knowledge of statistics, it is compatible with a variety of databases including SQL, Sybase, DB2, ACCESS, Oracle, etc. to achieve data compatibility and sharing. And extract from a large number of data mining unknown, valuable patterns or laws and other knowledge.

(2) Combine traditional statistical methods, geographic information system and machine learning algorithm from time dimension and space.The incidence of malignant tumors was analyzed in dimension, and the cases of malignant tumors over the years were collected in time dimension to form the annual report system of malignant tumors. In spatial dimension, the incidence of malignant tumor in different regions was analyzed.

(3) By introducing the collected data into Eviews, establish a multiple linear regression model, explore the factors affecting the high incidence rate of malignant tumors, and establish an ARMA model for short-term prediction through time series analysis, so as to do a good job in the early monitoring of malignant tumors.

(4) Make correct decisions on the current situation of malignant tumors and put forward reasonable Suggestions by using decision tree method and Bayesian decision, so as to achieve early diagnosis and treatment and reduce the mortality rate of malignant tumors.

3 An Example

3.1 The data analysis

In order to introduce the operation of the big data platform for malignant tumors in a more profound way, I made use of the platform's ability of classification and correlation analysis of data and a small amount of data for malignant tumors to conduct the following data analysis.[4]

A total of 100 patients with four types of tumors were selected and classified, so as to conduct discriminant analysis of the tumors and find out the influencing factors.

3.1.1 Import data (take part of the data as an example) :

The data included patient number, region, and eating habits (1, irregular diet; 2. Eat normally; 3) Diet, smoking, drinking, working environment (1) Poor environment; 2. Medium environment; 3. Good environment), drug abuse, tumor type (1. Lung cancer; 2. Esophageal cancer; 3.Gastric cancer; 4.liver cancer).

The data is standardized, and we can experiment directly.

3.1.2 Data processing

Here, we use the correspondence analysis in the data mining algorithm to carry on the data association processing. In the correspondence analysis, because there are so many factors, here we only introduce two of them (eating habits and working environment) for analysis. Let's look directly at two factors. In this way, the degree of correlation between tumor type and other factors can be directly seen in the class association diagram. It may also indicate that, to some extent, this is an effective regression.

4 Results

4.1 Dietary habits and tumor types

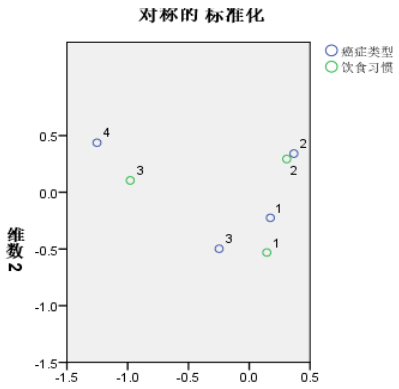

Figure 1 Corresponding Analysis of Tumor Types and Dietary Habits

After corresponding analysis of tumor types and dietary habits, this figure was obtained. It can be seen that the blue circle represents tumor types and the green circle represents dietary habits. The type 2 diet was most similar to type 2 cancer, indicating that a normal diet was most likely to be associated with esophageal cancer. Diet 3 is relatively close to tumor type 4. Suggesting that dieting is the most likely cause of liver cancer. Tumor type 1 and type 3 were most similar to diet type 1, suggesting that irregular eating and overeating can lead to lung and stomach cancer.

4.1.2 Working environment and tumor type

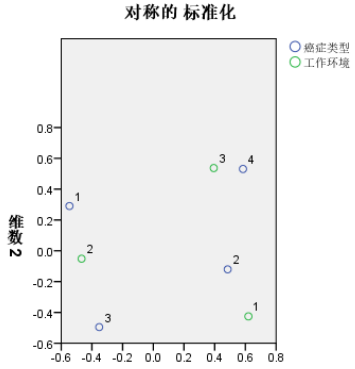

Figure 2 Corresponding Analysis of Tumor Types and Environment Factors

Again, we can do the analysis in this diagram, which is derived from the corresponding analysis of work environment factors and tumor types. In this diagram, the same blue circles represent tumor types and green circles represent working environments. It can be seen that the working environment of Tumor No. 1 is similar to that of tumor No. 2, which indicates that lung cancer may not be contracted only in a poor environment. More likely in a medium environment, similar to: shopping malls, office buildings. However, the type of tumor No. 2 is similar to environment No. 1, indicating that there is a correlation between esophageal cancer and poor environment, which is a factor that may lead to esophageal cancer. However, tumor No. 4 is relatively close to environment No. 3, indicating that people are more likely to suffer from liver cancer under a good working environment. The possible reason is that, since the position with a good working environment is basically at the level of middle and senior management, this group of people have more social contacts and the incidence of liver cancer is relatively obvious. However, tumor No. 3 seems to have no correlation with the working environment, which can be expressed as:

gastric cancer has no direct correlation with the working environment.

5 Conclusion

We concluded that by using data and relying on rational and objective thinking to analyze cancer factors and tumor types, the correlation between some factors could be obtained. Contribute to medical oncology by means of adjuvant therapy. Both of the above methods are analyzed by means of corresponding analysis to obtain the correlation diagram, in which we can find two or more points closest to the tumor type. The closer you are, the more relevant you are. Therefore, we can use this method to find the most influential factors for a certain type of tumor, so as to start from these influential factors, for the treatment of patients or positive defense against cancer.of tumors.

In this article, in addition to the outside of a single variable factors were analyzed, also can use multiple factors analysis, the optimal scale, the analysis solved only by single factor analysis of the disadvantages, with multiple factors within the community a list now, better and more intuitive see between factors and factors, factors and the differences and correlation between tumor types.

When we use the data mining capability of this platform to collect, process and analyze the data of malignant tumors in a centralized manner, the results we can bring are much more effective and faster than those obtained by collecting and analyzing the data of a single malignant tumor. Moreover, we can focus on the correlation and difference between each tumor, so as to better treat and prevent malignant tumors.

Of course, the above data factors are few and the data volume is low, which is not from the medical point of view, and the data results may be different from the actual situation. But this article is not from the medical point of view. From the perspective of data mining, we can find a variety of factors for different diseases, and find the most relevant factors. From these factors, we can effectively prevent and treat tumors and make a contribution to the treatment of tumors.

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To Help or Not to Help?! When Being Helpful at Work is Not the Best Choice

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Abstract: This conceptual paper supports recent stream of research that develops detrimental effects of helping behaviors at work on individual and on an organizational level. Helping behaviors based on lack of resources are often made out of discomfort associated with refusal to provide help for the help-seeker. This not only negatively affects employee's well-being (job satisfaction, career satisfaction, perceived job stress, etc.) but also life satisfaction of the individual – new concept for management research – which is the ultimate goal of human existence and antecedent for number of organizational outcomes (job performance, organizational commitment, turnover intentions, etc.). We also suggest the new for work-related research field concept of counter-dependent personality as a predictor of level of discomfort associated with refusal to help.

Keywords: Helping behaviors; Counter-dependency; Life satisfaction; Employee well-being; Organizational outcomes

1 Introduction

Once, when I was working in a company, a new employee approached me and requested that I reviewed a letter template that he had prepared for a client. I replied that I could not help him, due to the fact that I was extremely occupied in my new position. But few minutes later I returned and helped my colleague.

Why did I change my mind about giving a hand? When I refused to help my colleague, I experienced a whole range of negative emotions: shame, selfishness, guilt, I felt like I was a bad person. What happened after I helped? I would have expected to feel relief, satisfaction or joy. In reality, the emotions that I experienced during the refusal greatly reduced the level of satisfaction I was supposed to feel after help. Moreover, I offered help at the expense of finishing my work on time resulting in me having to change my after work commitments.

I was taught that helping others is good, that it brings satisfaction and happiness. My question now is why didn't it work this time? Perhaps, if I had refused to help my colleague without feeling shame and guilt, I would have done my work efficiently, on time, not having to change my plans and felt much happier?

In this paper we offer conceptual framework to answer these questions.

2 Literature Review

2.1 The concept of helping behaviors at work

Organizational citizenship behaviors (OCB) reflect to behaviors of employees at the workplace that are not formally specified in their job descriptions but are considered to have implications for organizational functioning. Helping others at work is a characteristic marker of OCB and culturally valued behaviors that help promote functioning in organizational systems including the workplace (Smith, 1983). It was found that OCBs are important not only for the organizational success (Podsakoff, et al.,

2014), but individuals may themselves receive benefits from engaging in OCBs, including more favorable performance reviews (Rosen, et al., 2017), help from coworkers (Lyons & Scott, 2012), and enhanced work attitudes (Koopman, et al., 2016). It is not surprising that past research has been focused on positive outcomes of OCBs while neglecting to consider potential negative outcomes.

Recently scholars started questioning the prevailing belief that OCB are uniformly beneficial (Bolino, et al., 2013). For example, it may have detrimental effects on performance and long-run career outcomes for individuals who perform more of this behavior than others (Rubin, et al., 2013), may increase workload and stress, lower job satisfaction (Reynolds, et al., 2015).

In this paper we support recent stream of research that develops detrimental effects of helping behaviors at work. We tend to think that in some cases decision do not help would lead to higher job and career satisfaction, life satisfaction of the individual, lower job stress and higher outcomes for the organization.

2.2 To help or not to help

While making decisions people consciously or unconsciously go through decision-making process. Decision-making is regarded as a cognitive process resulting in the selection of a belief or a course of action among several alternative possibilities. Every decision-making process produces a final choice. In our case is the choice to offer or do not offer help.

Recent researches on organizational citizenship and help at work are drawing from resource drain theory (Deery, et al., 2017). According to resource drain theory personal resources such as time and energy are finite and resources expended in one domain are not available in another. Therefore every decision-making process includes the choice of an alternative based on availability of personal resources. Previous research on estimating the likelihood to agree to provide help to help requests has demonstrated that helpers often agree to provide assistance because of the discomfort they associate with refusing to help (Bohns, et al., 2011).

In our study we are intended to answer the following questions:

(1) whether decision to help, based on lack of resources (desire to help, competence, energy, time, etc.) and influenced by discomfort associated with refusal to provide help, negatively affects employee well-being and organizational outcomes?

(2) why some individuals experience higher level of discomfort to say “no” to help-request while others lower?

2.3 Counter-dependency at work as a predictor of discomfort associated with refusal to provide help

The literature on counter-dependency is not extensive. Research on this concept is held mostly in attachment theory (Joplin, et al., 1995), (Quick, et al., 2007), health research (Ak, et al., 2004), group therapy research (Spivack, 2008), and group / team development research (Wheelan & M., 1996).
The most extensive research on relatively new discovered problem of counter-dependency at the present stage was done by American psychologists Janae B. Weinhold и Barry K. Weinhold.

Weinholds suggests the concept of counter-dependency: people with counter-dependent behaviors appear strong, self-confident and successful on the outside. On their in-side they are weak, insecure, fearful and needy. They may function well in the world of business, but often they failure in the world of relationships. Frequently they have poor relationship skills, are afraid to get close to others and avoid intimate situations. They are also very well defended against anyone seeing their secret weaknesses and

vulnerability. In short, they keep very busy trying to show other people that they are okay and do not need anything from anyone (Weinhold & Weinhold, 2010).

Counter-dependent models of interaction are the reason for the development of dysfunctional relations in various fields of personal activities.

Moreover, Weinholds consider counter-dependency a social and cultural problem that is not only supported but promoted in the modern society, especially in work area. When looking at the primary characteristics of counter-dependency (e.g., strong, self-made, independent), it is easy to see how modern culture not only supports but actually promotes them as healthy, functional behaviors. Many companies require their workers to put in long hours and ignore their family responsibilities in order to retain their jobs. Being strong, hard, manipulative, dominating, self-made and ruggedly independent is all part of the mythical hero of American dream. Many Americans in the 1970s and 1980s applied this rule to have counter-dependent behaviors (Weinhold & Weinhold, 2010).

Despite all that, serious problem of counter-dependency for a long period of time has been virtually ignored and only nowadays this concept started moving from developmental psychology into work-related and management areas of research (Gianakos, 2013).

The following two characteristics of counter-dependency are the most relevant to develop our concept:

reluctance to ask for help when needed or refusal to accept help of others (Weinhold & Weinhold, 2010); repression of emotions (Ak, Sayar & Yontem, 2004).

The concept of another person (CAP) was introduced by Galina Abramova and allows more accurately explain the general tendency of a person's behavior in relation to other people. Sufficient number of studies is known confirming the existence of relationships and mutual influence between the self-concept and concept of another person (self-acceptance and acceptance of others, self-attitude and attitude to others): the more positive the self-concept of a person - the more positive the CAP (and vice versa) (Abramova, 2018).

Therefore if individual is unable to ask for help or refusing help of others, he consequently does not expect others to ask for help.

On the other hand, repression of emotion takes hiding uncomfortable emotions in one's unconscious to the extent that one is no longer aware about experiencing them.

Levin delineates how, as an individual's personality develops and the experience of shame becomes increasingly internalized, various thoughts or impulses become capable of eliciting shame even in the absence of situational exposure. As a result – and in order to protect oneself against feeling shame – these thoughts and impulses must be avoided (Levin, 1967, 1971).

Counter-dependent coping style may be resulted from avoidance and denial (Ford & Urban, 1963) that are used to cope with feelings of quilt or shame(Kohut & Wolf, 1978).

Therefore, person with counter-dependent patterns may either do not feel shame / guilt or may not notice that he experiences those kinds of feelings, that makes it easier for him to refuse to provide help than to those who does not usually repress his / her emotions.

2.4 Life satisfaction as a predictor of number of organizational outcomes

In addition, we include to our model new for work-related field of research concept of Life Satisfaction as an outcome of employee well-being (job/career satisfaction, job stress, competence, etc.) and a predictor of number of organizational outcomes (job performance, organizational commitment, turnover intentions and turnover) as it was proposed by Erdogan (Erdogan, et al., 2012) in order to see

how help at work (OSB) is infuencing emloyee well-being, life satisfacton of the individual and some of the organizational outcomes.

3 Research Gap

In this study we are supporting recent stream in research that is highlighting negative side of helping behaviors at work.

We insist that decision to help, based on lack of resources and influenced by discomfort associated with refusal, negatively affects employee well-being, life satisfaction of the individual and organizational outcomes.

In the past research helping behaviors and its effect on the employee was mostly associated with employee well-being (job satisfaction, etc.). We would like to relate helping behaviors to the new concept of life satisfaction. Life satisfaction is a broader and newer concept for management field; it is the ultimate goal in human existence and antecedent for number of organizational outcomes (performance, commitment, turnover, etc.) (Erdogan, Bauer, Truxillo & Mansfield, 2012).

In order to find out why some individuals experience higher level of discomfort, associated with refusal for help-request, while others – lower, we explore the concept of counter-dependency as an indicator of level of discomfort.

The following model (Figure 1) is to explain the proposed concept in more systematic manner.

4 Research Methodology

Helping behaviors and discomfort associated with refusal to provide help will be measured by adapted story design used by Newark, 2017 (Newark, et al., 2017).

Constructs related to employee well-being (job satisfaction, career satisfaction, perceived job stress) and organizational outcomes (job performance, organizational commitment, turnover and turnover intentions) will be measured by management questionnaires.

To measure life satisfaction we are going to utilize the five-item Satisfaction with Life Scale (SWLS) by Diener et al., 1985 (Erdogan, Bauer, Truxillo & Mansfield, 2012).

Reliable and validated measures of counter-dependency are lacking despite the importance of this construct in the contemporary workplace. We are planning to use questionnaire to identify counter-dependent interaction models developed by Weinholds (Weinhold & Weinhold, 2010).

5 Conclusion

To conclude the idea presented in this conceptual paper, we would like to emphasize that helping others at work, which was previously considered as an action that leads to positive outcomes, is not always the best choice to make in order to enhance employee well-being, life satisfaction level and organizational outcomes.

In some cases (e.g., decision to help based on lack of resources and made out of discomfort to say “no”), decision do not help would lead to higher job, career and life satisfaction of the individual, lower job stress and higher outcomes for the organization.

Also we consider one of the predictors of some people experiencing lower discomfort associated with refusal to help while others feeling higher discomfort – is counter-dependent personality pattern.

We would like to test this idea in our research.

Future research will be needed to address the limitations of the present study. The limitations that have already been seen at this stage of research are as follows:reliable and validated measures of counter-dependence are lacking despite the importance of this construct in the contemporary workplace (Kahn, 2002). We are going to utilize questionnaire to identify counter-dependent interaction models developed by Weinholds (Weinhold & Weinhold, 2010);data collection is planned to be done on Russian and ex-Soviet Union working adults and will not represent the entire population.

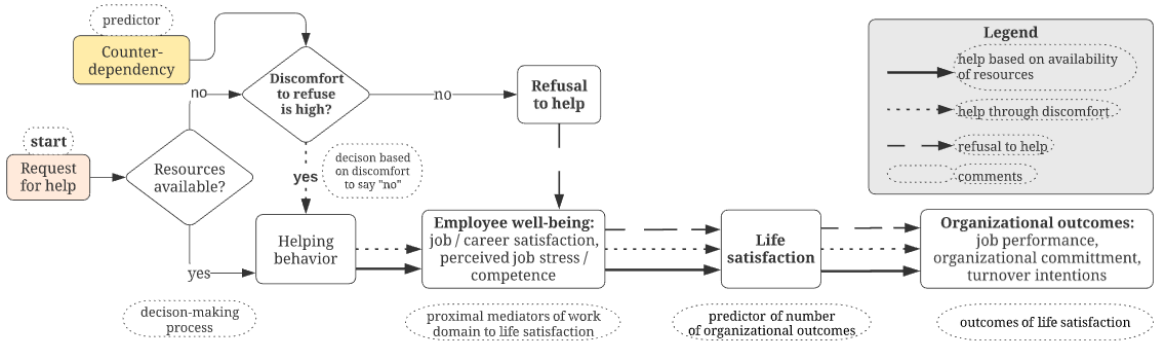

Figure 1 Conceptual Framework

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Research on the Relationship between Corporate Office Physical Environment Satisfaction, Office Crowding Stressors and Job Anxiety

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Abstract: This article discusses the impact of corporate office physical environment satisfaction and office crowding stressor on employees' job anxiety. Corporate office physical environment satisfaction scale, office crowding stressor scale and job anxiety scale were employed to investigate 765 employees from 6 enterprises. AMOS 17.0 and SPSS 19.0 were used to verify the scale structure and the relationship between corporate office physical environment satisfaction, office crowding stressor and job anxiety. The results show that corporate office physical environment satisfaction scale is an effective measurement tool with good reliability and validity. Corporate office physical environment satisfaction has a negative predictive effect on job anxiety, while office crowding stressor has a positive predictive effect on job anxiety. Among the influences of corporate office physical environment satisfaction on job anxiety, office crowding stressor plays a complete mediating effect. Corporate office physical environment satisfaction can indirectly affect job anxiety by influencing office crowding stressor. Reducing office crowding stressor can relieve job anxiety and promote learning activities.

Keywords: Corporate office physical environment satisfaction; Office crowding stressor; Job anxiety; Mediating effect; Survey

1 Introduction

Job anxiety has been a key field of research in recent years. Furthermore, physical environment satisfaction and crowding are two significant research topics in Environmental Psychology. However, few empirical studies have been conducted to discuss the relationship between corporate office physical environment satisfaction, office crowding stressor and job anxiety. The current study is aimed at exploring such intricated relationship through quantitative research methods.

2 Literature Review

2.1 Corporate office physical environment satisfaction

Corporate office physical environment involves the size of office space, furniture setting, color, lighting, ventilation and other factors. Many researchers have carried out researches on the categories of corporate office physical environment, and it is generally believed that there are four common factors in the corporate office physical environment: (1) visual factors including lighting quality, color and corporate office environment layout; (2) auditory factors mainly related to noise; (3) temperature factors including heating, cooling and ventilation; (4) spatial factors composed of office space, office density and table and chair arrangement (Steg et al.,2016; Hu Zhengfan & Lin Yulian, 2018). Researchers generally hold the view that corporate office physical environment satisfaction can exert certain influence on the employees' job anxiety (Fang Huicong, 2019). Chronic noise can produce physiological stress and can also lead to significant increases in blood pressure for both adults and children, in the use of

cardiovascular prescription drugs, and in the incidence of heart attack and stroke. Furthermore, strong, unpredictable and uncontrollable noise can produce negative emotions, such as anger, anxiety and learned helplessness. Meanwhile, noise will exert negative influence on memory, performance and motivation (Fang Huicong, 2019).

Horr *et al*. (2016) agreed that insufficient light, dim color and low temperature in the office would cause employees to feel tired and distracted, have headaches and even generate negative emotions such as anxiety. In addition, adequate lighting was the basic requirement for corporate office physical environment, and high-quality lighting could promote employees to form helping behaviors and effective working behaviors. On one hand, high temperature could change happiness, social relations and behavioral performance; on the other hand, it could also produce physiological changes that could lead to irritability, fatigue and anxiety.

In this study, "corporate office physical environment satisfaction" refers to employees' comprehensive evaluation of and overall satisfaction with corporate office physical environment. The researcher will use a Likert scale to evaluate comprehensively various factors of corporate office physical environment.

2.2 Office crowding stressor

"Density" and "crowding" are different concepts. "Density" refers to the number of people in a unit space, that is, the objective ratio of the number of people to the area of the location, which can be accurately measured by measuring instruments. The larger the space area occupied by the individual, the lower the density. Fang Huicong (2019) defined "crowding" as a subjective psychological experience, namely, people's psychological needs for objective space. If the actual space cannot meet this psychological need, people will feel a lack of freedom, a loss of control, and a kind of crowding experience. Individuals feel crowded because their behaviors are interfered and restricted by others or they cannot guarantee that their privacy has not been violated. In short, "crowding" refers to the subjective evaluation of the actual number of people in the environment that exceeds personal preferences or expectations.

Office crowding stressor can negatively affect employees' work performance and increase employees' job anxiety. Studies have indicated that crowded environments can reduce employees' cognitive abilities to solve difficult tasks, reduce their concentration on and persistence of work tasks, and lead to learned helplessness and anxiety, which can then affect work performance. Office crowding stressor can also result in social withdrawal of employees and hinder the formation of social support relationships; simultaneously, it can increase the employees' aggressive behaviors (Bilotta, Vaid & Evans, 2019).

In the current study, the researchers will conduct subjective crowding experience research in the context of Chinese culture. The researchers maintain that the reason why people feel crowded is that the physical and social environment creates negative emotional experience, and such emotional experience is enhanced as the number of people in a particular space increases.

2.3 Job anxiety

Anxiety is either stimulus-related or general by nature. It is observed in different features, such as panic attacks, phobic reactions and worrying. According to the state-trait-anxiety model, the individual proneness for acute (state-) anxiety reactions is partially dependent on the level of trait-anxiety (Li Sha & Ouyang Jianshu, 2019). One type of state-anxiety is the phenomenon entitled "job anxiety". Job anxiety is a stimulus-bound type of anxiety, i.e., it is related to and occurring in the workplace or when

thinking of the workplace (Wen Shuang, 2019).

An important feature of anxiety is that it can result in avoidance behavior towards the anxiety-provoking stimulus. As a consequence, job anxiety can result in avoidance of the workplace by sick leave, work absenteeism, or early retirement (Wen Shuang, 2019). A workplace is an essential area in life and has significant influence on a working person's general well-being and health.

3 Methodology

3.1 Subjects

A total of 830 employees from six companies in Xi'an participated in the survey. There were 765 valid questionnaires finally recovered (92.17% recovery rate), including 367 (47.97%) male employees and 398 (52.03%) female employees.

3.2 Research instruments

3.2.1 Corporate Office Physical Environment Satisfaction Scale

The researcher designed a single-factor corporate office physical environment satisfaction scale consisting of 10 items to measure employees' satisfaction of the corporate office physical environment. The categories of corporate office physical environment involved in the scale are as follows: cleanness and tidiness, lighting conditions, ventilation conditions, temperature adjustment, noise adjustment, color adjustment, supervisor's desk placement, employees' seating pattern, decoration and overall design. The designing of the scale items is based on the previous studies of Horr et al. (2016) and Marín-Restrepo et al. (2020).

Meanwhile, this study conducts in-depth interviews with 60 employees of the above-mentioned enterprises to increase the scale items with localized characteristics. This scale is a 5-point Likert scale, with 1 representing very dissatisfied and 5 representing very satisfied. The higher the score, the higher the satisfaction with the corporate office physical environment. The Cronbach's alpha coefficient of this scale is 0.90, and the split-half reliability is 0.92. Both of them have reached an acceptable level with a high test-retest reliability: the correlation coefficient of the two scores is 0.72, reaching a significant level. This scale has also reached an acceptable construct validity (KMO=0.93, $p < .001$).

3.2.2 Office Crowding Stressor Scale

The researchers compiled office crowding stressor scale to measure office crowding stressor under the Chinese culture background. The scale has 49 items and is composed of the following five factors: insufficiency of office space (9 items), uncontrollable interference and restriction (13 items), low colleague support (9 items), low supervisor support (13 items), and low privacy level (5 items). The scale can represent the connotation of office crowding stressor under the conditions of localized Chinese culture. Respective examples of these five factors are as follows: "I feel that there are too many employees in the office"; "I feel that it is inconvenient to walk back and forth in the office"; "My relationship with my colleagues is not harmonious enough"; "Supervisors often ignore my presence"; "My private personal information is usually glanced at by the colleagues around me". The scale is a 5-point Likert scale, with 1 indicating strong disagreement and 5 implying strong agreement. The higher the scale score, the greater the office crowding stressor. In this study, the Cronbach's alpha coefficients corresponding to the total score of the scale and the scores of the five sub-scales are 0.932, 0.825, 0.815, 0.773, 0.842 and 0.663 respectively. The researcher adopted confirmatory factor analysis *(N=765)* to evaluate the goodness of fit of this measurement model and the sub-scales of the office crowding stressor scale to their respective potential structures. Figure 1 shows that the measurement model fits the data

well, with CMIN/DF = 1.820/1 = 1.820, RMSEA = 0.033, GFI = 0.999, AGFI = 0.986, NNFI = 0.996, CFI = 1.

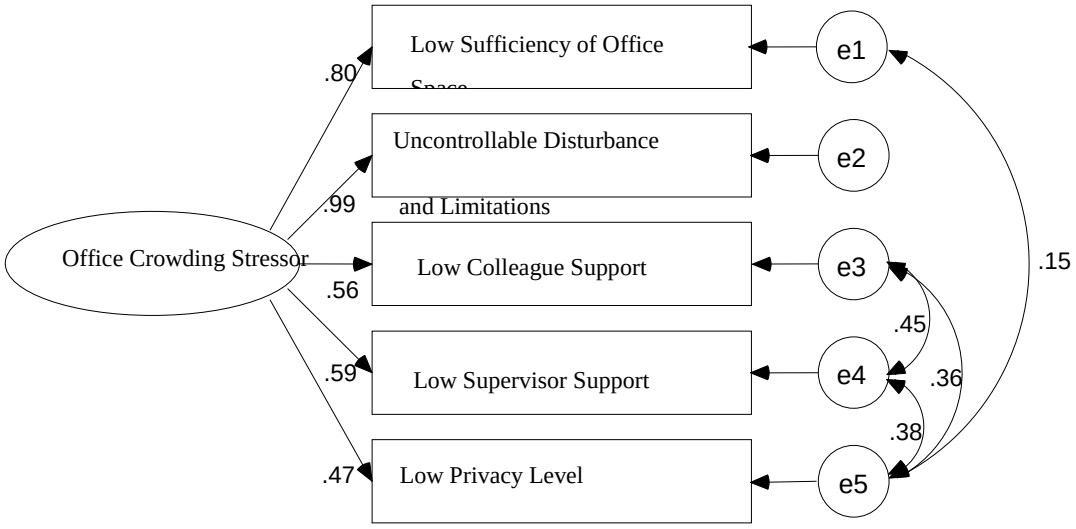

Figure 1 Confirmatory Factor Analysis of Office Crowding Stressor Scale (*N*=765)

3.2.3 Job Anxiety Scale

The "job anxiety scale" proposed by Ren Huizhu (2017) is divided into three dimensions, including psychophysiological health anxiety, insufficient cognitive anxiety and work survival significance anxiety . The scale is composed of 30 items. For instance, "The current poor working conditions make me nervous"; "I worry that my working abilities are insufficient for the current job"; "After work, I feel more urgent to leave the office than others". The scale is a 5-point Likert scale, with "1" standing for "very inconsistent", "2" representing "inconsistent", "3" showing "uncertain", "4" meaning "consistent", "5" indicating "very consistent". The Cronbach's alpha coefficients of the three sub-scales in this study are 0.88, 0.91 and 0.89 respectively. AMOS17.0 is adopted to analyze the construct validity of the job anxiety scale. The results show that the value of x^2/df is between 1 and 3; Besides, the RMSEA is less than 0.08, and all the other indicators are above 0.8, which meets the standard and can indicate that the construct validity of this scale is fine.

3.3 Data analysis

For corporate office physical environment satisfaction scale, SPSS19.0 software is used for exploratory factor analysis and principal component analysis. Among 765 subjects, all of the variables are subjected to descriptive statistical analysis and demographic differences are calculated. Next, correlation analysis between variables is further implemented. The study employs hierarchical regression analysis to examine the predictive power of demographic variables, corporate office physical environment satisfaction and office crowding stressor on job anxiety. AMOS17.0 was adopted to conduct confirmatory factor analysis of the corporate office physical environment satisfaction scale in order to verify the construct validity of the scale. In addition, the same statistical analysis method is used to evaluate the measurement model and goodness of fit of the office crowding stressor scale. Furthermore, in order to explore the influence of corporate office physical environment satisfaction upon job anxiety through the mediating effect of office crowding stressor, this study uses a structural equation model for statistical analysis.

The researchers use various fitting indices to evaluate the goodness of fit of the measurement model: root mean square error estimation (RMSEA), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), non-normal fitting index (NNFI) and comparative fitting index (CFI). The values of GFI, AGFI, NNFI and CFI are 0.9 or above, and the value of RMSEA is 0.08 or below, which all indicate that the model has a great goodness of fit (Hair *et al*., 2006).

4 Results

4.1 Validity and reliability of corporate office physical environment satisfaction scale

The researcher applies principal component analysis (*N=119*) to analyze the 10 items in the corporate office physical environment satisfaction scale.

Kaiser-Meyer-Olkin (KMO) sampling adequacy measurement and Bartlett spherical test are used to assess the goodness of fit of the factor model. The results manifest that KMO is 0.93, $\chi^2(45) = 2169.73$, $p < .001$. The gravel diagram shows that the eigenvalue of only one factor is greater than 1; therefore, it is more appropriate to keep one factor, which can explain 88.48% of the total variability. The load factor of the 10 items is between 0.92 and 0.96 and the commonality coefficient is between 0.85 and 0.92. The preceding data demonstrate that corporate office physical environment satisfaction scale consists of a single factor, which is named as "corporate office physical environment satisfaction". Confirmatory factor analysis *(N=765)* confirms that the model fits well. CMIN/DF = 78.522/28 = 2.804, RMSEA = 0.049, GFI = 0.980, AGFI = 0.961, NNFI = 0.977, CFI = 0.986. Figure 2 shows the measurement model. These data validate the single-factor model assumption of the "corporate office physical environment satisfaction scale", which has nice construct validity.

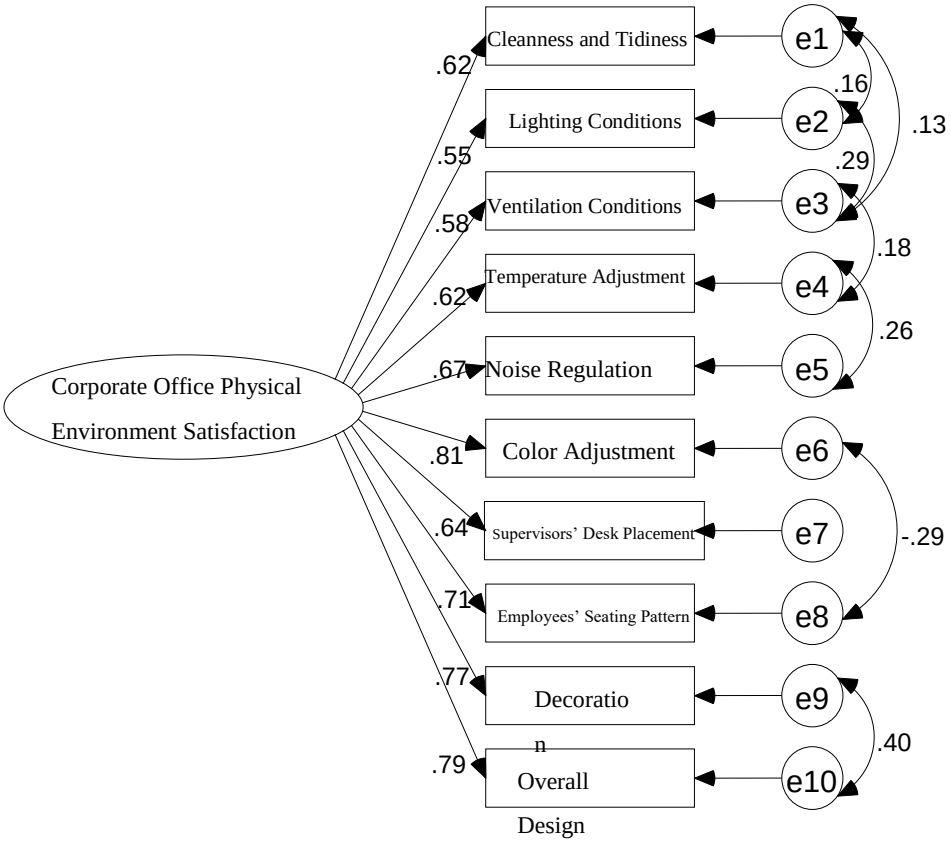

Figure 2 Confirmatory Factor Analysis of the Corporate Office Physical Environment Satisfaction Scale (*N=765*)

In the sample of 765 employees, the "Corporate Office Physical Environment Satisfaction Scale" showed good internal consistency (Cronbach α=0.90). Guttman's split-half reliability coefficient is 0.92, which indicates that the scale has good split-half reliability. In the test-retest reliability test, the correlation coefficient between the initial test value and the re-test value is 0.72, which shows that the re-test reliability is high.

4.2 Correlation analysis, regression analysis and mediating effect test of the three variables: corporate office physical environment satisfaction, office crowding stressor and job anxiety

The single-factor analysis of variance is used to test the gender differences in the total scores and scores of various factors of the corporate office physical environment satisfaction scale, office crowding stressor scale and job anxiety scale. The research results are shown in Table 1. All in all, compared with female employees, male employees experience a higher level of office crowding.

See Table 2 for the Pearson's correlation coefficient between corporate office physical environment

satisfaction, office crowding stressor and job anxiety. There is a negative correlation between corporate office physical environment satisfaction and office crowding stressor. There is a negative correlation between corporate office physical environment satisfaction and job anxiety. There is a positive correlation between office crowding stressor and job anxiety, that is, the higher the office crowding stressor, the higher the job anxiety.

Table 1 Comparison of Gender Differences in All Measurement Factors (*M*±*SD*)

	Female Employees (398)	Male Employees (367)	*F*
Corporate Office Physical Environment Satisfaction	3.23±0.70	3.23±0.76	0.00
Insufficiency of Office Space	2.87±0.85	3.04±0.92	7.65**
Uncontrollable Interference and Restriction	2.95±0.73	3.05±0.73	3.66
Low Colleague Support	2.31±0.72	2.51±0.72	14.09***
Low Supervisor Support	2.49±0.71	2.57±0.74	2.56
Low Privacy Level	2.42±0.78	2.67±0.83	18.39***
Total Score of Office Crowding Stressor Scale	2.61±0.61	2.77±0.63	13.47***
Psychophysiological Health Anxiety	2.94±1.19	2.82±1.24	1.94
Insufficient Cognitive Anxiety	3.25±0.80	3.13±0.89	4.39*
Work Survival Significance Anxiety	2.87±1.12	2.81±1.10	0.46
Job Anxiety Scale	3.02±0.82	2.92±0.84	2.83

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 2 Pearson's Correlation Coefficient between Corporate Office Physical Environment Satisfaction, Office Crowding Stressor and Job Anxiety *(N=765)*

	1	2	3	4	5	6	7	8	9	10
2	-.49**									
3	-.50**	.80**								
4	-.31**	.44**	.56**							
5	-.40**	.49**	.58**	.63**						
6	-.28**	.45**	.46**	.52**	.55**					
7	-.50**	.81**	.85**	.77**	.80**	.75**				
8	-.11**	.20**	.25**	.29**	.24**	.21**	.29**			
9	-.21**	.19**	.24**	.25**	.25**	.24**	.29**	.33**		
10	-.06	.08*	.15**	.23**	.17**	.18**	.20**	.47**	.44**	
11	-.16**	.19**	.27**	.33**	.28**	.26**	.33**	.81**	.70**	83**

* $p<0.05$, ** $p<0.01$

1.Corporate Office Physical Environment Satisfaction; 2. Insufficiency of Office Space; 3. Uncontrollable Interference and Restriction; 4. Low Colleague Support; 5. Low Supervisor Support; 6. Low Privacy Level; 7. Total Score of Office Crowding Stressor Scale; 8. Psychophysiological Health Anxiety; 9. Insufficient Cognitive Anxiety; 10. work survival significance anxiety; 11. Total Score of Job Anxiety Scale.

Then, under the prerequisite of controlling demographic variables, hierarchical regression analysis is implemented to study how corporate office physical environment satisfaction and office crowding stressor can have an influence on employees' job anxiety. The researchers input the variables in sequence according to the following three steps: In the first step, enter the demographic variables and focus on the "gender" variable. The second step is to input “corporate office physical environment satisfaction” variable. The third step is to input “office crowding stressor” variable. The results are shown in Table 3.

After "gender" variable is controlled, corporate office physical environment satisfaction can explain 2% of the job anxiety changes (Model 2), and office crowding stressor can explain 12% of the job anxiety changes (Model 3). In addition, when the variable of office crowding stressor is input into the regression model (Model 3), corporate office physical environment satisfaction has no significant predictive effect on job anxiety.

Table 3 Hierarchical Regression Analysis of Predictor Variables on Job Anxiety (*N=765*)

Variables	Model 1	Model 2	Model 3
Step 1 (Control Variable)			
Gender	0.06	0.06	0.11**
Step 2			
Corporate Office Physical Environment Satisfaction		-0.14***	0.01
Step 3			
Insufficiency of Office Space			-0.09
Uncontrollable Interference and Restriction			0.14*
Low Colleague Support			0.22***
Low Supervisor Support			0.05
Low Privacy Level			0.12**
F	4.62*	7.45***	16.09***
R^2	0.01	0.03	0.15
ΔR^2	0.01	0.02	0.12

All regression coefficients are standardized, and independent variables are decentralized
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Therefore, this study uses structural equation model to explore whether office crowding stressor plays an mediating role in the influence of corporate office physical environment satisfaction on job anxiety. Table 3 illustrates the path diagram of the relationship among corporate office physical environment satisfaction, office crowding stressor and job anxiety. The path diagram is presented in the form of standard path coefficient. The fitting results show that the model has good goodness of fit: CMIN / DF = 100.403/21 = 4.781, RMSEA = 0.070, GFI = 0.972, AGFI = 0.939, NNFI = 0.949, CFI = 0.970. As shown in the path diagram in Table 3, the path from the corporate office physical environment satisfaction to job anxiety is not significant (t=－0.75, β=－0.03, p > .05) , and the path from corporate office physical environment satisfaction to office crowding stressor is significant (t=－15.64, β=－0.55, p < .001), the path from office crowding stressor to job anxiety is significant (t= 6.83, β=0.28, p < .001). In the path model, there is no significant relationship between corporate office physical environment satisfaction and job anxiety. This indicates that corporate office physical environment satisfaction does not play an independently significant role in the process of affecting job anxiety, at least in the statistical control of other variables in the model. Office crowding stressor is the only variable that can directly affect job anxiety. The lack of direct influence of corporate office physical environment satisfaction on job anxiety indicates that the variable of office crowding stressor plays a complete mediating effect between corporate office physical environment satisfaction and job anxiety.

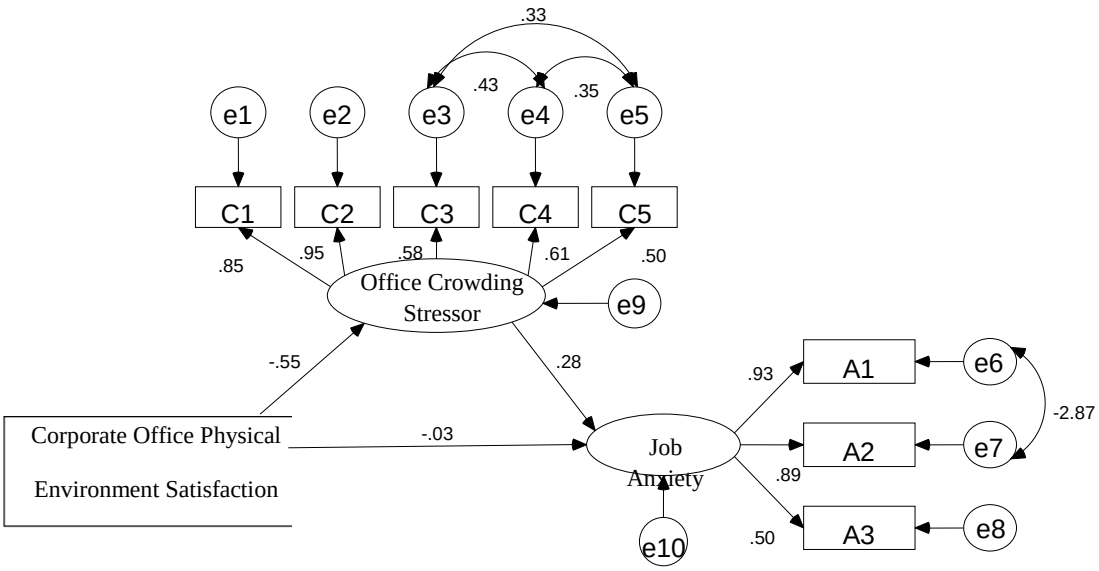

Figure 3 The Path Diagram of the Relationship between Corporate Office Physical Environment Satisfaction, Office Crowding Stressor and Job Anxiety

5 Discussion

The first research purpose of this study is to compile corporate office physical environment satisfaction scale and office crowding stressor scale, and to check validity and reliability of the scales. As a result, the preceding scales have good validity and reliability. The second research purpose is to investigate the relationship between corporate office physical environment satisfaction, office crowding stressor and job anxiety. The research results show that corporate office physical environment satisfaction and office crowding stressor have a predictive effect on job anxiety, and office crowding stressor plays a complete mediating role in the relationship between corporate office physical environment satisfaction and job anxiety variables.

Corporate office physical environment satisfaction scale involves students' subjective evaluation of the office physical environment. This study also uses multiple methods to test the validity and reliability of the scale to achieve triangulation. Exploratory factor analysis and confirmatory factor analysis confirm the single-factor structure of the scale, and show that the scale has high construct validity. Reliability data indicate that corporate office physical environment satisfaction scale has high internal consistency reliability, split-half reliability and test-retest reliability. The abilities of this scale to predict job anxiety also verify that the scale has high external validity. In previous studies, the researchers did not specifically compile relevant scales for corporate office physical environment satisfaction. The compilation of such a scale can compensate for the shortcomings of previous studies to a certain extent.

This survey shows that corporate office physical environment satisfaction, office crowding stressor and job anxiety display individual differences. Undoubtedly, there are numerous factors that can influence crowding, including physical environment variables, personal variables (such as gender, age, personal space preference, crowding regulation abilities), interpersonal variables (such as interpersonal similarities, amount of information provided), cultural and community variables. In this study, in terms of gender differences, male employees are more likely to experience crowding than female employees, which indicates that males have higher personal space requirements and are more sensitive to personal space invasion, which is consistent with the results of the previous studies (Gifford & Sacilotto, 1993) .

Correlation analysis shows that employees having higher satisfaction with corporate office physical environment tend to experience less office crowding stressor and present a lower level of job anxiety. There is a significant positive correlation between the five factors of office crowding stressor scale and the three factors of job anxiety scale. This indicates that the higher the level of office crowding stressor, the higher the level of job anxiety. The results of the current study are consistent with previous findings on the impact of crowding on job anxiety. For example, crowding can lead to job burnout, reduced cognitive abilities, and concentration on and persistence of work tasks (Bilotta, Vaid & Evans, 2019).

The results of hierarchical regression analysis show that corporate office physical environment satisfaction can effectively predict job anxiety. In addition, three factors of office crowding stressor scale, i.e. the "uncontrollable interference and restriction", "low colleague support", and "low privacy level", have good predictability for job anxiety. However, when the variable of office crowding stressor enters the regression model, the predictive effect of corporate office physical environment satisfaction on job anxiety disappears. Subsequent structural equation model testing can confirm this effect. To put it in another way, although the current research results cannot prove that corporate office physical environment satisfaction can have a direct influence on job anxiety, it shows that corporate office physical environment satisfaction can have an indirect effect on job anxiety by affecting office crowding stressor. This verifies that corporate office physical environment satisfaction is considered to be an exogenous variable that can influence office crowding stressor, and office crowding stressor in turn will further affect job anxiety in this causal relationship.

6 Conclusions

6.1 Major Findings

The research results indicate that the self-compiled scale of corporate office physical environment satisfaction has high reliability and validity, and can be used as an effective measurement tool to evaluate the satisfaction of corporate employees with their physical environment. At the same time, corporate office physical environment satisfaction can relieve job anxiety to a certain extent. Corporate office physical environment satisfaction has a negative predictive effect on job anxiety, while office crowding stressor has a positive predictive effect on job anxiety. Office crowding stressor plays a full mediating role in the relationship between corporate office physical environment satisfaction and job anxiety. This illustrates that corporate office physical environment satisfaction can indirectly influence job anxiety by affecting office crowding stressor.

The actual contribution of this research is that it can play a certain enlightening role in improving corporate office physical environment, alleviating job anxiety, and promoting the physical and mental health of corporate employees.

First of all, corporate office physical environment satisfaction is negatively correlated with job anxiety, indicating that improving corporate office physical environment can relieve job anxiety and work pressure to a certain extent. Appropriate corporate office physical environment is the basic condition to ensure the smooth progress of work. The enterprise management department should strive to improve all aspects of the corporate office physical environment, such as realizing sufficient lighting, color coordination, suitable temperature, good ventilation and comfortable space. When employees' basic needs for the corporate office physical environment are met, their behaviors will be more thoughtful and their work will be more effective.

Furthermore, corporate managers can effectively alleviate office crowding and the corresponding negative effects by reducing the number of employees in each office, thereby improving the efficiency of employees and promoting the physical and mental health of employees. Because office crowding stressor plays a complete mediating role in the influence of corporate office physical environment satisfaction on job anxiety, the impact of office crowding stressor on job anxiety is more important, and reducing the perceived office crowding can more effectively relieve job anxiety. Reducing office staff density can reduce interpersonal interference among colleagues and better protect privacy. Additionally, with the increase of support from colleagues and department heads, office crowding stressor is reduced, which can ultimately relieve job anxiety and improve work efficiency.

6.2 Limitations and Suggestions for Future Research

First of all, categories of the current research subjects are limited. More subjects with diverse cultural backgrounds can be randomly selected from different cities in the future.

Secondly, only quantitative research methods are adopted in the present study. In the future studies, in order to increase validity and reliability of research results, researchers can apply qualitative research methods simultaneously, such as semi-structured interview, participant observation, visual anthropology etc. The application of mixed methods can realize triangulation.

Thirdly, this study is characterized with being cross-sectional. Longitudinal studies can be conducted in the future.

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Research on Employment and Entrepreneurship Education in Universities

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Abstract: In order to actively cope with the increasing employment pressure, it must be focused on cultivating new engines for mass entrepreneurship and innovation, promote innovation and entrepreneurship to drive employment, and continuously deepen the reform of employment and entrepreneurship education in universities. This paper studies and expounds the establishment and improvement of the training mechanism of employment and entrepreneurship education in universities from the aspects of training objects, key contents, system construction and training methods.
Keywords: Universities; Employment; Entrepreneurship; Education

1 Introduction

In order to fully implement the fundamental task of moral education and cultivate people, and actively adapt to the new normal of economic development, take the promotion of college students' employment and entrepreneurship as the theme, take the improvement of college students' employment and entrepreneurship ability as the core, establish and improve the training mechanism of employment and entrepreneurship education in universities, and constantly improve the level of employment and entrepreneurship education in universities.

The needs of employment guidance in universities "can not only be satisfied with providing information, choosing careers and guiding career choices", which indicates that college employment education has been given a plan to expand the career development of college students. And design, enhance the function of employability. At the same time, it puts forward that "entrepreneurship education is a kind of idea", which aims to "enhance students' innovative consciousness, creative spirit and entrepreneurial ability". Ordinary colleges and universities must take the road of close contact between schools and enterprises, establish the mode of production university research cooperation education, and rely on local governments. With the cooperation and support of enterprises, marriage with enterprises, industries and society, the whole society will be regarded as a big stage for the cultivation of compound and applied talents, so as to strengthen practical teaching.

2 Training Objects and Contents of Employment and Entrepreneurship Education in Universities

According to the requirements of the reform and development of college students' employment and entrepreneurship work under the new normal, the training objects of employment and entrepreneurship education in universities mainly include: leaders in charge of universities, responsible persons and managers of relevant departments, full-time and part-time course teachers, college graduates, small and micro enterprise operators.

2.1 Employment and entrepreneurship leadership training

For the leaders in charge of universities, carry out employment and entrepreneurship leadership training. Closely around the current needs of the reform and development of college students' employment and entrepreneurship, it focuses on training the situation and policies of employment and entrepreneurship, laws and regulations, teaching reform of employment and entrepreneurship education, social service and characteristic development of universities, reform of talent training mode of higher education, and construction of employment and entrepreneurship work system and mechanism. According to the new requirements of "Internet plus" and "big data", further develop our thinking, management, and leadership in the leadership and management of university employment and entrepreneurship schools. Further develop our thinking, renew our ideas, raise our understanding, enhance our scientific decision-making ability, and promote the construction of the system of employment and entrepreneurship management with the characteristics of universities. Employment education and entrepreneurship education are gradually integrated in content. Teaching material is the main carrier to reflect the content of education. According to the survey of 152 current representative college employment and entrepreneurship education textbooks, 116 of them (accounting for more than three-fourths of the total) are written with employment education and entrepreneurship education as a whole, while 22 textbooks with single employment guidance content, 12 textbooks with career planning and only 2 textbooks with entrepreneurship education content.

2.2 Training of employment and entrepreneurship management ability

In view of the competent departments of employment and entrepreneurship in universities, the responsible persons and managers of relevant colleges and departments should carry out the training of employment and entrepreneurship management ability. The main contents include employment and entrepreneurship situation and policies, laws and regulations, education innovation, management practice, planning and coordination, guidance and service, supervision and evaluation, etc., focusing on professional management and practical training, focusing on updating knowledge structure, developing management ideas, and striving to improve scientific management level. For the employment and entrepreneurship consulting service personnel, carry out the theory, knowledge and skills training of counseling practice and technology, enrich the counseling methods and channels, and focus on improving the theoretical level of policy and counseling skills. Further improve the comprehensive quality of information and data statistics, market development, employment procedures and other aspects of employment and entrepreneurship services.

Table 1 Training Objects and Contents

Classification of Training Objects		Training Content
Training Management Team	Leaders in Charge of Universities	situation and policies laws and regulations teaching reform social service and characteristic development of universities reform of talent training mode of higher education construction of employment and entrepreneurship work system and mechanism
	Responsible Persons and Managers of Relevant Departments	situation and policies laws and regulations education innovation management practice planning and coordination guidance and service supervision and evaluation
Education and Teaching Team	Full Time and Part Time Teachers of Guidance Courses	cultivation of teachers' ethics professional quality basic theory professional concepts and policies teaching design team counseling and personalized career consultation improvement of scientific research ability
Graduates	Unemployed Graduates	professional skills hands-on ability
	Graduates to be Employed	pre job training
	Graduates at Work	on-the-job training skills competition
Small and Micro Enterprise Operators		business management model enterprise competitiveness enterprise human resource management staff training system implementation and evaluation rewards and punishments mechanism service experience and brand

2.3 Employment and entrepreneurship education teaching ability training

For the full-time and part-time teachers of career development and employment and entrepreneurship guidance course, carry out the training of employment and entrepreneurship education teaching ability. According to the course teaching objectives and the needs of college students' career

development and employment and entrepreneurship, focusing on the cultivation of teachers' ethics, professional quality, basic theory, professional concepts and policies, teaching design of career development and employment and entrepreneurship guidance course, team counseling and personalized career consultation, and improvement of scientific research ability, etc., through discussion and exchange of course teaching design, curriculum teaching and big data combination, teaching methods and teaching content reform and innovation, improve the professional quality and teaching management level, improve the pertinence and effectiveness of curriculum teaching, and lead the teaching reform of employment and entrepreneurship education in universities. Focus on summing up the experience of education and teaching, refining the laws of education and teaching, through the modular training of special topics, teachers can master the method of teaching design, improve the ability of organization, implementation, evaluation and correction, and solve practical problems in the process of classroom teaching, have the ability of applying modern educational information technology to assist classroom teaching and carry out teaching research, and cultivate a noble and professional teacher full-time and part-time teachers with solid professional foundation, strong practical teaching ability and self-development ability.

2.4 Graduates' employment and entrepreneurship training

For college graduates, carry out employment and entrepreneurship training. For the unemployed college graduates, according to their major, focusing on the strategic emerging industries, advanced manufacturing industries, and modern service industry needs, it should be focused on training targeted training to make up for the short board of skills and improve the practical ability of employment skills. For college graduates to be employed by enterprises, pre job training focusing on fixed post training should be carried out, and "college students' skills improvement class" should be set up in cooperation with enterprises to improve their ability to adapt to the post. For graduates of science and engineering who have certain skills and are working in skill posts, they should actively carry out post skill training through various ways such as on-the-job training and skills competition, so as to speed up the cultivation of a group of high skilled talents.

2.5 Enterprise management ability training

For small and micro enterprise operators, carry out enterprise management ability training. Focusing on the business management model, enterprise competitiveness, enterprise human resource management, staff training system, implementation and evaluation, rewards and punishments mechanism, service experience and brand, etc. Set up a special lecture on "Internet plus" in terms of enterprise decision making and operation, innovative thinking and innovation management, innovation driven and achievement transformation, venture innovation financing and incubation, etc. Innovation in system, science and technology, operation and management innovation will help small and micro enterprise operators broaden their horizons, innovative thinking and enhance their ability.

3 Construction of Employment and Entrepreneurship Education and Training System in Universities

3.1 Adopt modular education and training content setting

According to the overall requirements of broad foundation, emphasizing practice, multiple choices and focusing on effect, training modules are set up in different categories, levels and positions, and a curriculum system of "module-menu-standard" mode is established to meet the job requirements of the training personnel of employment and entrepreneurship education in universities, so as to improve the pertinence and effectiveness of the training.

3.2 Implementing diversified education and training the construction of teaching staff

Relying on the teaching management personnel with solid theoretical foundation and rich practical experience, and combining with high-level experts from the government, enterprises and social organizations, establish a team of training teachers and experts with a combination of full-time and part-time, good quality, dedication and reasonable structure. In particular, establish and improve the training mechanism for entrepreneurial mentors, cultivate a group of professional entrepreneurial mentors, and encourage entrepreneurs, angel investors, experts and scholars with rich experience and entrepreneurial resources to serve as entrepreneurial mentors or form a mentoring team. Strengthen the research and training of training teams, implement the chief expert system of training projects, improve the assessment and evaluation system of training teachers, and form a dynamic management mechanism of training teachers.

3.3 Construction of high quality education and training curriculum resource system

By means of development and introduction, diversified high-quality curriculum resources will be cultivated. Implement the construction plan of excellent course resources for teacher training, carry out

a series of teaching and research activities such as "lesson preparation, class evaluation, and observation", establish a high-quality curriculum resource database for teacher training, and promote the co construction and sharing of high-quality curriculum resources. Universities are encouraged to rely on large enterprises to establish an open innovation platform to serve the public entrepreneurship, and to organize entrepreneurship training activities such as entrepreneurship salon and entrepreneurship training camp. Establish and improve the recommendation and selection system of high-quality curriculum resources.

4 Ways of Employment and Entrepreneurship Education and Training in Universities

4.1 Centralized training

Based on the investigation of training needs, actively explore and innovate effective centralized training mode, and highlight the experience and practical ability of trainees. In terms of training methods, various forms can be adopted, such as special lectures, experience exchange, experience report, organization observation and so on, so as to form the sharing effect of "one person learning, many people benefiting". Pay attention to the follow-up guidance after the training, expand the training time and space, and improve the training efficiency, quality and effect. Make full use of high-quality training resources inside and outside universities, actively guide college employment and entrepreneurship education training instructors to participate in special centralized training organized by the state and social organizations, and encourage relevant personnel to enter the government, enterprises and other universities for temporary study.

4.2 Seminar training

Combined with the reality of universities, according to the needs of professional development of various types and posts, clear objectives, improve the content, and take effective forms and methods to carry out research and training activities. Actively employ entrepreneurs, industry success figures, experts and scholars to participate in the research and training work, improve the practical level of research and training personnel, and improve the effectiveness of research and training in universities. According to the needs of the work, the education authorities organize experts to provide training program design, curriculum setting, teacher recommendation and other supporting support for university seminar training.

4.3 Distance training

Relying on the employment information network of local government graduates, integrating the network training course resources and training platform of universities, realizing the combination of entrepreneurship and innovation, entrepreneurship and employment, online and offline. According to the training course content standards, actively research and develop online vocational assessment tools, develop and construct distance training course resources, and incorporate relevant development and maintenance costs into the overall arrangement of information construction costs of public employment service institutions at all levels, and build an open, compatible, resource sharing, standardized and efficient online training service system in universities. Strengthen the guidance, management and service of distance training, strictly enforce the management and assessment system of students' learning process, and effectively improve the participation rate, learning rate and training quality. Randomly select 20% of the students who have passed the examination for re inspection, and strictly follow the assessment standards of the professional practice ability training program. If the pass rate exceeds 80%, the assessment results will be effective. If the pass rate is lower than 80%, the assessment must be re organized.

5 Conclusion

From the training objects and targeted training contents, the construction of teaching staff and curriculum system, a relatively perfect and integrated college employment and entrepreneurship education and training system has been constructed, and gradually achieved initial results in the practical application of employment and entrepreneurship education and training in universities. With the deepening of the reform of college students' employment and entrepreneurship education, the system and mechanism of college employment and entrepreneurship education and training will be more perfect and perfect.

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Organizational Culture and Competitive Strategy: A Research on the Banking Segment

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Abstract: This article investigated the organizational culture and competitive strategy style a financial institution uses. The result of this research reproduced the hypothesis of a relationship, which was proposed on the theoretical reference, and illustrated the cultural type perceived as hierarchical, characterized by a focus on the internal environment and an appreciation for stability. The defensive competitive strategy was identified, marked by conservatism and strong control mechanisms. The group cultural type was identified as desired. The group type is based on appreciating the bonds established by its members. This would correspond to the reactive strategy described in cases of strategy absence, where the promotion of strategical actions would only take place in face of concrete threats from competitors. The theoretical reference that confirms the cultural types is Quinn and Rohrbaugh's model (1983), which allows for a comparative cultural study based on the main predominant values in the company. To analyze the competitive strategy, Miles and Snow's model (2003) was used. This model typifies competitive strategy into four configurations, according to determined corporate behaviors that are present in the organization. In order to relate cultural typology and measured competitive strategy, the association proposed by Quinn and McGrath (1985) was used.
Keywords: Culture; Strategy; Strategical alignment; Organization

1 Introduction

The need for companies to adapt and survive in competitive markets that are increasingly fiercer impose an unnegotiable necessity for companies' managements: they cannot have, on either their strategic choices, or their organizational culture, limitations capable of compromising the organizational performance. Based on the developments of this research, the potentiality of these two organizational factors are inferred, as well as the subtlety of details that can transform them into obstacles on the management process and impair the effectiveness of the adaptation process when necessary.

Porter (1996) states that the strategic choice is related to the alternative which best connects the organization to both opportunities and threats on the external environment. Schein (1992), when discoursing about the analyses of organizational cultures, stated that they depend on how they relate to their surrounding environment. Unlike competitive strategy, which is subject to the best objectives among the ones available perceived by the company (Porter, 1996), culture is abstract. It can only justify any evaluation on being good or bad, functional or dysfunctional, when it is evaluated in comparison to the perceptions about the environment to which it intends to adapt.

Therefore, organizational culture as the biggest obstacle in the effectiveness of organizational changes or as maintenance of achieved stability, and orientation of competitive strategy in organizations in comparison to their environment are critical factors for the search or maintenance of the companies' competitive edge.

Based on this stream, the problem of this research may be defined as follows: is there a correlation between the organizational culture and the strategic style chosen by the studied organization?

Moreover, there is an intention to explore complex thinking on the administrative field, which comprises this relationship between organizational culture and strategy as a complex phenomenon, for a better understanding of the dynamics on the organizational environment and its interdependencies. Complex thinking seeks to unite what does not operate separately and coexists with different realities that alternate as cause and effect in the same environment (Morin, 2007).

When analyzed along with complex systems, the coexistence of organizational culture and competitive strategy result in systems outlined by processes that are called dialogical, which share ideas and bring new meanings to the organizational environment, instead of an incomplete and fragmented view of such reality, which is not simple (Genelot, 2011). Since they are viewed as systems, they open a path for the manager to recognize the emergence of a new broad cognitive process, based on learning, from a proposal of a systemic and integrated view (Bertalanffy, 1977; Senge, 2000; Hofstede, 1990; Morin, 1996).

On the specific context of this research, the peculiarities of the Brazilian banking market are

highlighted. This market's recent evolution over the past few years has demanded more attention to the adaptation processes of the big conglomerates that compose this sector.

2 Literature Review

The organizational culture is seen as something the organization has or something the organization is. The first stream is followed by those who are supporters of corporate culture, or the functionalist stream which approaches organizational culture as a dependent variable. As a reference for management, they use examples of success cases and models that can be replicated in other organizations. With a predominantly practical approach, they highlight the importance of having active leadership that creates new values or spreading the main cultural traits of the organization.

On the other hand, for those who consider organizational culture as something the organization "is", also known as supporters of organizational culture, or the cultural idealism stream, cultural management in companies may be seen as something more difficult and only possible through long-term intervention actions. They try to follow an interpretive stream of the cultural phenomenon based on anthropology, seeking to manage both the employees and the company's expectations, even though they often seem conflicting or incompatible.

Despite the apparent antagonism of the organizational culture management proposals, they are not contradictory. In addition, they often coexist with a typical trait of complex phenomena, which manifest alternately, according to the necessities and the stages of strategic management in the organization, since its conception until the execution of the operational plan.

Authors from a branch of cultural organizational studies classified as the corporate culture stream, also called functionalist school (Smircich, 1983), which uses a pragmatic interpreting method that seeks to establish direct connections between organizational behavior and the assertiveness of decision-making and the effectiveness level of organizations. They tend to associate the leadership exercise on the cultural field as a management tool to reach goals previously chosen as ideals from success experiences, (Deal and Kennedy, 1982; Ouchi, 1986).

The organizational culture diagnosis for a company according to Quinn's model (Quinn and Rohbaugh, 1983), called Competing Value Model (CVM), presents a quantitative picture of its main cultural traits and a more detailed analysis of attention points for intervention and adjustment actions.

The Competing Value Model shows companies' culture in cultural quadrants, divided in two dimensions, which identify its common traits divided in cultural and organizational abilities. Each quadrant represents a specific set of indicators for organizational effectiveness, chosen on this panel by specialists who created it, so with characteristics that are predominantly valued by its members, and represent the main guides for action and decisions in organizations:

-As a group: it values company management based on participative leadership that seeks human being's development as the key element in organizational success, stimulating their members' commitment and engagement.

-Innovative: it is based on a more dynamic management model that values exposure to higher risks, entrepreneurial and creative behaviors that stimulate innovation for its members.

-Hierarchical: It is characterized by the strength of its hierarchical structures, which are formally structured and stable in its relationships. Since they are very predictable, they have their management process guided by larger internal coordination and monitoring.

-Rational: Since it is focused on achieving bigger results, they seek higher levels of productivity and profit. Having a management model based on searching for higher productivity, the focus is mainly on the company's result.

Each cultural typology represents predominant values which characterize the means to achieve goals, and companies may illustrate a balance between them that is considered ideal (Santos, 1992).

According to Cameron and Quinn's classification model (2011) it is possible for an organization to have cultural traits in more than one type and have one of them as predominant.

Regarding the competitive strategy, many are the influences on semantic formation of strategy for its use in administrative science (Mintzberg, 2010). From its creation to express war generals' skills, to economic sciences and biology, its use revolves around contexts of competitivity, survival and the means employed in this dynamic.

Exponents of the configuration school and, comparable to Porter as great reference academics and acceptance of generic strategy models, Miles and Snow (1978) treat and classify the strategic style of organizations according to their competitive behavior. The essence of the Configuration school is to consider the study of the strategic organizational phenomenon as an integrated universe of relationships between strategy, structure, processes and its surrounding environments.

Despite the complexity of the organizational phenomenon, Miles and Snow (1978) consider the strategic process to be only partially predetermined by environmental conditions. The authors attribute a strong

influence on competitive behavior to the choices made by managers regarding critical matters when guiding the organization through developing the strategic process.

Such competitive behaviors are described in adaptive cycles according to choices regarding the relationship between product and market (strategy), followed by the development of internal mechanisms created to support the chosen strategic intention (structures and processes). The authors describe the organizational behavior represented on adaptive cycles according to the way they solve three fundamental problems that are considered strongly related: the entrepreneur's problem, the administrative problem, and the engineering problem.

Corporate strategies are related to decisions a given company makes regarding what type of business they will be in, and not to the way they behave when solving fundamental problems (Hambrick, 1983). Even though the relationship between types of strategy and environment is the central concept of Miles and Snow's model (1978), the main dimension of analysis of this typology is the orientation of the company regarding the product-market matter, which complements the other relationships between organizational processes and structures on the context of strategy implementation.

The resolution of these fundamental problems, which are viewed as a selection process for organizational adaptation, categorize four generic strategic types. These strategies preserve the relationship between competitive posture and structure, as well as the organization's processes as a whole coherent enough to support the intensity of the predicted transformations on the strategic process, besides a type considered as the absence of strategy, behaviors considered incongruous and reactive. According to Miles et al (1978), they are:

-Prospectors: it is considered as a new competitive style, which creates changes and value exploring new opportunities in the environment, focusing its attention on the answers' speed considered as tendencies and emerging news.

-Defenders: it is a behavior marked by conservatism and low risk exposure, and its main goal is to preserve the stability of its products and services.

-Analyzers: it moves between the strongest points in prospective and defensive behaviors on the same strategic style proposal, which makes it a convenient option that combines stability and low risk exposure to explore new opportunities, following successful experiences only.

-Reactors: it defines an organization that only reacts to the incentive of being threatened by one of its competitors and such threat is considered a risk, a "non-strategy" due to its incongruence that does not allow the classification of a competitive behavior.

3 Methods

This study's goal was to determine if there is a relationship between strategy and organizational culture, identifying the possible existence of congruence between the chosen strategic style and organizational culture based on Quinn and McGrath's proposal (1985), which relates Quinn and Rohrbaugh's cultural typology (1983) and Miles and Snow's proposal of generic competitive strategies (1978).

Organizational culture and competitive strategy are part of a transformation process in companies whenever there is need for changes in strategic positioning (Miles and Snow, 1978; Mintzberg, 2000). For the authors, the strategies that represent corporate behavior, in a specific moment of their existence, must have a configuration that corresponds to its organization, which includes organizational culture as a critical condition for the effectiveness of organizational efforts and strategic management mechanisms on the actual exercise of organizational practices.

This research is classified as exploratory and descriptive. The exploratory aspect seeks to provide more comprehension on the phenomenon predicted in the objectives, which is determining the cultural type of the organization that is being studied, as well as the company's style of strategic positioning in comparison to its surrounding environment. On the other hand, the descriptive approach – which has the purpose of verifying the occurrence of a phenomenon on the population – evaluated the congruence between the perceptions of current and desired cultural type, as well as the congruence of the company's style of strategic positioning. As to problem's approach, this research is classified as quantitative for determining the cultural type identified on the studied company and the perception of its predominant cultural traits, as well as verifying the perception of the competitive strategy style chosen by the studied company, which represents how it relates to its surrounding environment. The quantitative method is indicated in cases when it is necessary to know the extent of the studied object, identifying the level of knowledge and opinions about the problem (Gonçalves and Meirelles, 2004).

The data collection was performed with managers of baking agencies in the capital of São Paulo that are part of a financial institution of the National Financial System which operates as a financial

conglomerate all over the country. The collection instrument had 48 questions, composed by a construct for Cultural Typology six variables, and a construct for Competitive Strategy also comprised of six variables, which measured the perception of the organization's cultural type, as well as its competitive strategy from the point of view of these management-level employees.

The sample was intentional, not random and not probabilistic, due to the homogeneity of the sampled public subject to the research, contemplating 132 participants.

4 Data Analysis and Results

The cultural types represented in Quinn's model represent dilemmas that are characteristic of organizational systems based on a typical coexistence of complex phenomena (Santos, 2000). The construct for the OC has six dimensions of evaluation, dominant characteristics, organizational leadership, people management, organizational cohesion, strategic emphasis and success criteria, with four answer alternatives related to each of the four cultural types: group, innovative, hierarchical and rational.

For the current culture analysis, the research showed hierarchical culture as the one perceived by participants, which demonstrates the predominance of cultural traits that indicate an appreciation for stable environments, with less risk exposure and conservatism of their leadership chain.

The perception of the cultural type desired by the participants resulted in a more balanced distribution of cultural traits. The predominant trait was the group cultural quadrant, which emphasizes the bonds developed between the employees with emphasis on teamwork and collective acknowledgement of the group.

Among the grades assigned to the six dimensions of the cultural quadrants analysis on the desired context, the research demonstrated the following results (Table 1).

Table 1 Culture Typology in % of the Evaluated Strategic Effectiveness Items (C) Current and (D) Desired

Dimension	Group		Innovative		Hierarchical		Rational	
	% C	% D	% C	% D	%C	% D	% C	% D
Dominant characteristics	19.05	21.91	19.43	21.85	31.47	30.08	30.05	26.16
Organizational leadership	18.98	28.44	17.36	20.09	40.63	28.19	23.02	23.27
People management	20.03	30.77	14.91	19.03	34.64	28.64	30.42	21.56
Organizational cohesion	24.30	28.58	17.97	24.64	31.08	26.36	26.65	20.42
Strategic emphasis	21.53	28.41	17.21	23.30	37.00	26.98	24.25	21.31
Success criteria	19.78	28.98	18.98	23.08	35.70	26.31	25.59	21.64

To analyze the competitive strategy, the research indicated the defenders strategic type as the one perceived by the participants, which indicates the predominance of behaviors centered around stability, appreciation of lower risk exposure and conservatism regarding the relationship with their surrounding environment. Among the grades assigned to the six analysis items of generic strategic types, the research demonstrated the following results (Table 2).

Table 2 Typology of Competitive Strategy

Dimension	Competitive Strategy			
	Prospectors	Defenders	Analyzers	Reactors
Growth	22.33	34.89	26.77	16.00
Emphasis	30.96	23.84	26.91	18.29
Structural Form	32.07	25.44	21.95	20.53
Processes	12.40	57.66	18.63	11.31
Delegation of Authority	16.76	45.85	29.97	7.41
Risk	10.56	46.10	26.79	16.54

To describe the variables related to the Organizational Culture and the Strategy constructs, the methods mean, standard deviation and bootstrap percentile intervals at 95% confidence for means were used. To evaluate the relationship between the Organizational Culture and the Strategy constructs, as well as the variables that formed each construct, the Spearman correlation coefficient was used

(Hollander, et al., 2013).

Comparing the variables' intervals with the construct interval shows that the variable Organizational Leadership demonstrated a mean that was significantly higher than the Organizational Culture construct's mean. Moreover, it is also inferred that the Dominant Characteristics and Organizational Cohesion variables demonstrated means that were significantly inferior to the Organizational Culture construct's mean, given that the confidence intervals do not overlap; moreover comparing the variables' intervals with the construct interval shows that the variables Process and Risk show a mean that is superior to the Strategy construct's mean, and that variables Emphasis and Structural Form demonstrated means that are inferior in comparison to the Strategy construct, given that the confidence intervals do not overlap.

Overall, the Strategy construct (38.37) demonstrated a higher mean level than the Organizational Culture construct (35.09). However, this difference was not significant because the intervals overlap.
It is possible to state that there is a positive although small (r^2=0.25) and significant (value-p=0.004) correlation between the organizational culture and the strategy constructs. This means that the higher the level of organizational culture may mean a higher the level of company strategy tends to be, or vice versa. It is possible to highlight that 11 (30.55%) correlations were significant (Value- p<0.05), given that the Growth variable was positively although small correlated to variables Success Criteria (r^2=0.31; p=0.000), Strategic Emphasis (r^2=0.27; p=0.002), People Management (r^2=0.21; p=0.018) and Organizational Leadership (r^2=0.25; p=0.004). This means that to some extent the bigger the value for the Growth variable, the bigger the value for variables Success Criteria, Strategic Emphasis, People Management and Organizational Leadership will be.

The Delegation of Authority variable was also to some extent positively correlated with variables Organizational Cohesion (r^2=0.22; p=0.011), Success Criteria (r^2=0.28; p=0.001), Strategic Emphasis (r^2=0.27; p=0.002), People Management (r^2=0.22; p=0.010) and Organizational Leadership (r^2=0.29; p=0.001). This may mean that the bigger the value for the Delegation of Authority variable, the bigger the value for variables Organizational Cohesion, Success Criteria, Strategic Emphasis, People Management and Organizational Leadership.

The Risk variable was positively correlated, although not much, with variables Success Criteria (r^2=0.18; p=0.044) and Strategic Emphasis (r^2=0.20; p=0.019); so, to some extent the bigger the value for the Risk variable, the bigger the value will be for variables Success Criteria and Strategic Emphasis.

5 Conclusions

This study demonstrated the relative importance of considering the dynamics of the strategic process a complex phenomenon, characterized by the interaction of several factors. From this point of view, there is a broader comprehension of the possible relationships and the potential unfolding of coexistence between OC and CS. As a matter of fact it is already well known that OC fosters Competitive and Collaborative Advantages (Bevacqua, 2020); and nowadays with the Digital Revolution on its way and during and after the Present day Pandemia its becoming essential to build up a Positive Remote OC (Mircioiu, 2020), something on what the Banking Sector may have being getting involved already for some time (Thakor, 2017).

Moments when there are organizational changes of strategic transformations concentrate the efforts and coordination of management practices. The relationship between OC and CS was verified, based on several interpretive streams that describe the strategic phenomenon through different perspectives and schools developed about such topics (Mintzberg, Ahlstrand, Lampell, 2000).
Besides the technical aspects that are specific to the main elements of CS, the human factors related to the socialization process and the development of mechanisms for organizational learning are very important. This strategic alignment contributes to clarify the areas that can be improved and identify the necessity for intervention on the strategic management process of the organization (Porter, 1996; Kaplan and Norton, 2006; Nohria, Joyce and Roberson, 2003; Carmelli and Tishler, 2004; Hitt, Ireland, and Hoskisson, 2008; Fleury and Fleury, 1997; Bartellet and Ghoshal, 1994; Campbell and Alexander, 1997). More recently Deloitte has being organizing Surveys to find out how Global Human Capital Trends may offer benefits of Competitive Advantage (Deloitte, 2016); and they found out that the10 main trends in order of importance are: Organizational Design, Leadership, Culture, Engagement, Learning, Design thinking, Changing skills of the HR organization, People analytics, Digital HR and Workforce management. Moreover, the trends are now concern with the Social Challenges to fuse pepople and technology particularly concerning the future or work (Deloitte, 2020).

Without impairment from the other variables on the strategic process, the relationship between CS and OC develops as various "success formulas" which shape the identity of the organization and describe

how to commune with their surrounding environment.

New meanings are going to be created to all stakeholders as the essence of the relationship between OC and CS whenever there are new values being added and new goals to be met. It is what Genelot (2001) calls strategic conscience, which is not imposed or done automatically, but built with time in a learning process mediated by new values that reposition the organization in the search for new goals.

In this context, organizational culture resurfaces with unquestionable force, surpassing its condition of managerial fad and makes the use of the term in a vague and superficial manner alarming. Being a *sine qua non* condition on the reconfiguration process of the productive process, it starts to demand that managers rethink the entire administrative practice, from strategic planning to the execution process as a whole, which must work coherently enough to coordinate its growth (Acktouf, 1993; Chanlat, 1992, 1993).

Collaborative environments on the coordination of strategic organizational changes characterized by organizational learning cycles were determined to be extremely important. This search for new strategic goals announces organizational changes and the need for further collaboration with environments that are more open to learning in order to incorporate new behaviors based on new values. It is suggested that if this research is extended to other segments it is highly likely that the outline of hierarchical culture remains present along with strategies characterized by strong control mechanisms. However, in a globalized and competitive world, it is becoming increasingly necessary to migrate to an innovation culture that feeds collaborative strategies.

Open innovation is not just a goal, but a reality, especially in many European countries. Collaborative innovation thrusts cultural changes and, especially on strategic models, one important characteristic is the cooperation of young companies with already established companies seeking to share complementary resources and supporting innovative ideas (Alvarez, 2015).

These changes go way beyond the organizational walls. They extend to government policies and, mainly, on the role education must have in this context. There is a need to create a generation of leaders who are aware of the value corporate culture has, who are willing to take risks and support innovation by seeking to create new organizational values.

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Leadership Models and Their Impact on the Quality of Life at Work for Employees in Brazilian Companies

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Abstract: The purpose of this article is presenting a reflection on Leadership Models and their positive or negative impacts on the quality of life of employees in the company. To carry out the study, the theoretical part and bibliographic research were initially started, thus having an approximation of concepts, in addition to the identification of key factors to be evaluated. A quantitative descriptive methodology was used with a survey applied to employees of companies in several different areas of work. The field research took place between June 25, 2019and July 3, 2019. Regarding the nature of the data, the method used was an exploratory research with 20 questions on the subject of Leadership Models and the impacts on the quality of life of the worker. Questions were selected regarding the type of market the worker works in, gender, types of leadership, and autonomy at work, incentives and quality of life. The results show that it is possible that the leadership model has a significant impact on the quality of life at work and that even workers having access to their leaders most of the time and even having incentives at work, believe that the participatory leadership model interferes positively in the perception of quality of life at work.

Keywords: Quality life at work; Leadership models; Perception; People management

1 Introduction

The quality of life at work has long been a concern in modern societies, as employees are the driving force that makes companies grow and evolve, becoming competitive in the market. According to Ulrich (1998), "the main activities for managing employee contributions are listening, responding and finding ways to provide them with the resources that meet their varying demands".

For Limongi-França (2019), Quality Work Life - QWL is not just about improving the way companies work, but “looking for the factors or criteria that support his models.” In other words, as the forms of work change, there should be new actions and projects in QWL. It is important to note that the more complex the work grows, the greater the problems with QWL can be; the demands are greater: working time can be extended and stress and psychological disorders can also contribute to

biopsychosocial imbalance. According to Limongi-Franca: “The understanding of the process of building a new way of managing well-being can be improved in companies from the moment that they seek a new competence at work, where companies place new values reflecting on what QWL is”.

For McGregor and Doshi (2015) “Senior leaders can build and maintain a high-performance culture by teaching managers to lead in highly motivating ways. For example, a study of bank branch managers showed that offering high-quality leadership training led to a 20% increase in credit card sales and a 47% increase in sales of personal loans. CEOs must make a business case for culture (on a budget) and enlist HR and business leaders to improve the elements that affect culture, from job design to performance appraisals. "

The motivation in this case will help individuals to engage in actions seeking better results and developing their skills, as leaders are helping to build this knowledge and guiding actions that make the individual grow personally and professionally.

For Zarifian (1999 apud Fleury and Fleury, 2001), "competence is practical intelligence for situations that are based on acquired knowledge and transform it with even more strength, the more complexity increases." Le Boterf (1995 apud Fleury and Fleury, 2001), presents competence “as knowing how to act responsibly and which is recognized by others. It implies knowing how to mobilize, integrate and transfer knowledge, resources and skills, in a specific professional context.”

According to Malvezzi (2015), the effectiveness of this effort for the construction of collective skills is hampered and challenged by the diversity and instability of factors influencing behaviors, as observed in spontaneity, disagreements, priorities, meanings, among others, so that the results are achieved in a timely manner. effectively by the team makes leadership necessary.

Leaders have a fundamental role for organizations to function, generating value for their work and providing conditions for employees to produce and feel good in their work activity. According to Limongi-França (2019), “the administrator is the great propellant of the competences and values of the organizations of the post-industrial era”, being mediators between the company and the employees: they are agents of transition and forms of work, enabling its management in the pursuit of QWL.

Still for França (2006), “the theory of traits assumes that leaders have personality traits, which help them in their role.” Such a model does not emphasize other variables, which may interfere in the leader-led relationship, such as the context in which they are inserted, as well as the needs of the group in which they operate. Under such a focus the person is already born a leader.

For Costa and Mieriño (2016), "The interested leadership should strive to recognize and value, set an example, accept involvement in the process, create achievable goals, give freedom to creation with support, whenever necessary, not be cruel and not feel irreplaceable."

And, from this context, where there are leaders who mediate actions that can improve QLW, the following central question arises about leadership models that impact the quality of life of employees in companies.

Within this problem, it was decided to conduct a survey using a questionnaire-type collection instrument, in order to seek the appropriate answers to this question.

However, this study was based on elements such as companies (the industry), employees (male, female). In addition to other elements of the type: incentive to study, participation in actions, autonomy or even obedience at work, which are characteristics that leadership models have.

According to Bryman (apud Bergamini, 2008), “The contingency approach proposes that the effectiveness of a leadership style is a situationally contingent aspect. This means that a particular

standard style of behavior is effective in some circumstances (such as when the task brings intrinsic satisfaction, or when the subordinates' personalities predispose them to a particular style), but not in others".

Situational, or contingency, theory addresses the variables that the leader can go through, in his professional life in different companies, with different people, equipment and forms of work. It proposes that the individual (leader) is flexible, according to the situation to which he is exposed, that is, in the context of the moment in which he is a leader (Lopes, 2014).

2 Objective

The general objective of this work is to verify how the employees are able to understand that the Leadership Model interferes in their Quality of Life at Work, checking the hypothesis that the employees do not have the quality of life at work that they would like due to the leadership model in their company.

3 Data and Methodology

A methodology was constructed to answer the objective of the study. A quantitative research was carried out, with data analysis through a questionnaire with 20 questions, seeking answers regarding the models of leadership, companies and the impacts that the latter cause on the quality of life of workers. 118 people participated in it, who answered the questionnaires at the 3 levels of the organizational pyramid, namely, operational, tactical and strategic, all of which have a leader and a leadership model, or more than one in their company. These are from the industrial, trade, services, education and health sectors.

Lakatos and Marconi (2010) present the definition of technique as "a set of precepts or processes that use a science or art; it is the ability to use these precepts or norms, the practical part" being known that all science uses innumerable techniques to obtain its purposes.

According to the aforementioned authors, in addition to specific Social Science methods, such as approach and procedure, the qualitative and quantitative method are also very important in scientific investigations. The latter is mainly characterized by employing statistical instruments, such as percentage, average, standard deviation, correlation coefficient, regression analysis, among others. In addition, Lakatos and Marconi (2010) also state that 'the form of data collection and analysis also differs from a qualitative method.'

In that one, the researchers use large samples and numerical information, whereas, in the qualitative one, "the samples are reduced, the data are analyzed in their psychosocial and the collection instruments are not structured." (Lakatos and Marconi, 2010). The methodology, in general, encompasses two distinct moments: research / data collection and analysis / interpretation, when trying to investigate a certain subject; and in order to make the statistical analysis feasible, the dichotomous questions related to the same variable, within a construct, were grouped, using the Likert Scale from 0 to 100 points. The use of numerical scales, derived from questionnaires in a quantitative approach, "aims to obtain analyzes that would not be immediately available through formal records, or by simply observing the phenomenon to be studied." according to Hair et al. (2005).

4 Results

The present research tried to answer if the leadership models impact on the quality of life at work of the employees in the company and, for this, it was elaborated, looking for some important points such as, for example, the employee's relationship with the leader, as shown in Figure 1.

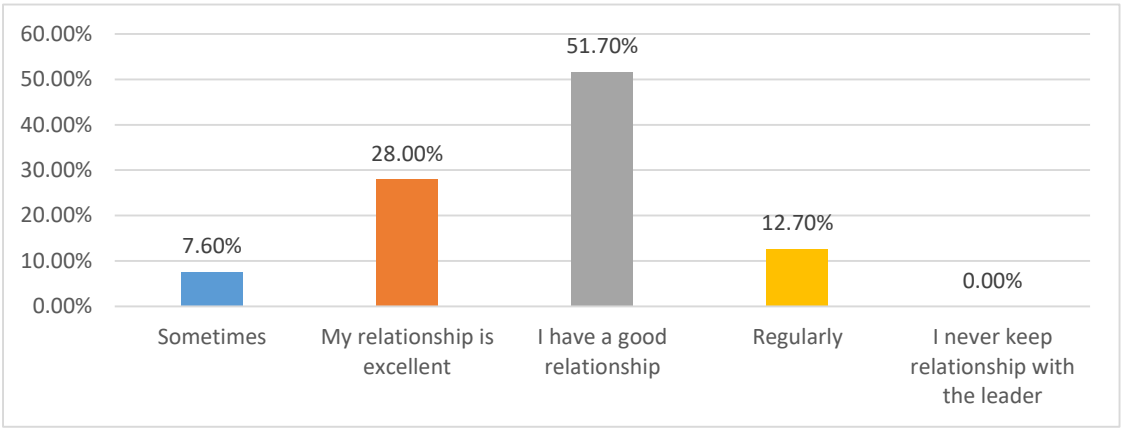

Figure 1 Relationship with the Leader

Data Source: Field research data (2019).

It was observed that most employees, who answered the questionnaire (51.7%), have a good relationship with their leader; 28% report having a good relationship. 9.7% of respondents have a positive relationship with their leaders and only 20.3% do not relate properly, opting for the option regularly, or sometimes; the acronym NR means that they never relate to the leader.

According to Malvezzi (2015), this process consists of reconstructing the interaction between individuals aiming at the sustainability of corrective action.

This interaction between leader and team member is important, as it makes it possible, in addition to mutual trust, to better communicate, interact and seek results expected by both parties involved in the process in relation to the objectives, whether personal or corporate.

According to Marinho and Oliveira (2011), "In any group of people, the leader has the power to awaken everyone's emotions and, if these emotions are channeled to enthusiasm, consequently, performance will increase".

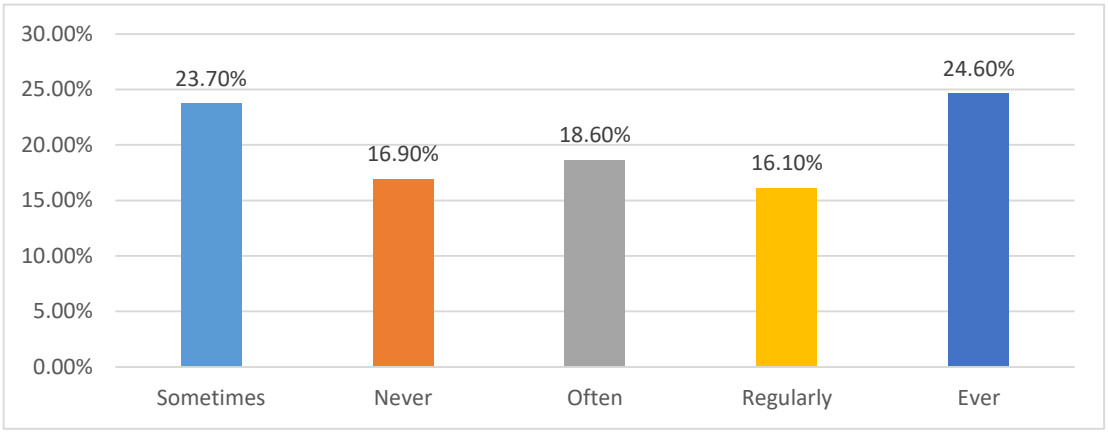

Figure 2 Does Your Leader Allow You to Participate in the Leadership-Building Process of Your Work Team?

Data Source: Field research data (2019).

The participation of the employee in the construction of leadership as shown in Figure 2 becomes important, because it makes individuals feel useful, and not only being part of the process, but collaborating to build leadership, and providing responsibility, performing an active role in the processes and improving the relationship between leader and team member.

According to Rabechini Jr. (2001, p.195), "The leadership starts to have reliability on the part of the team, as well as the participation and contribution, which is linked to the manager's ability to establish goals and make them meet by the followers. In this respect, leadership is closely linked to the concept of influence, that is, the leader's ability to influence his team, aiming at the results of the project".

In the work process, where there is mutual trust, this adds value to the work environment and the legitimacy of leadership is vital for there to be synergy between the team and the leader within the way of building it.

In an environment where there is respect between leader and team member, employees view the leader with empathy; the organizational climate is better; individuals avoid negative conflicts, and well-being is established in the work environment: therefore, having a good relationship with the leader is a fundamental point to provide QWL through well-being on the spot.

According to Hollander *(apud* Oliveira and Marinho, 2006), "... group members exchange their skills and loyalty for rewards ranging from physical aspects, such as salary and protection, to less tangible rewards, such as honor, status and influence. [...] leadership is an exchange process, and each leader develops a specific and unique exchange with each member of his team".

This exchange of information is important for building paths, and for creating leadership that is able to satisfy the needs of the organization, as well as those of employees. In this process, there is often recognition through rewards, whether for status, financial or social life.

According to França (2006), "leadership is a social process in which influential relationships are established between people. The core of this process of human interaction is made up of the leader or leaders, their followers, a fact or a social moment".

The social moment will depend on the situation in which the individuals and the leader are inserted in a certain company, so it is not something easy to be established: it will depend on the internal variables and the level of relationship and trust between the leader and the followers in a company.

The leader, on the other hand, must positively influence his followers so that there is confidence and alliances for the execution of the work, where both parties benefit from the leadership construction process. It is important to emphasize that the leader, by giving space for the participation of individuals in the construction of leadership, causes a vote of responsibility (also of confidence) on the part of employees in building the authority of a manager in the company.

Another important data is that of participation and suggestions for actions in the team leadership model, as shown in Figure 3.

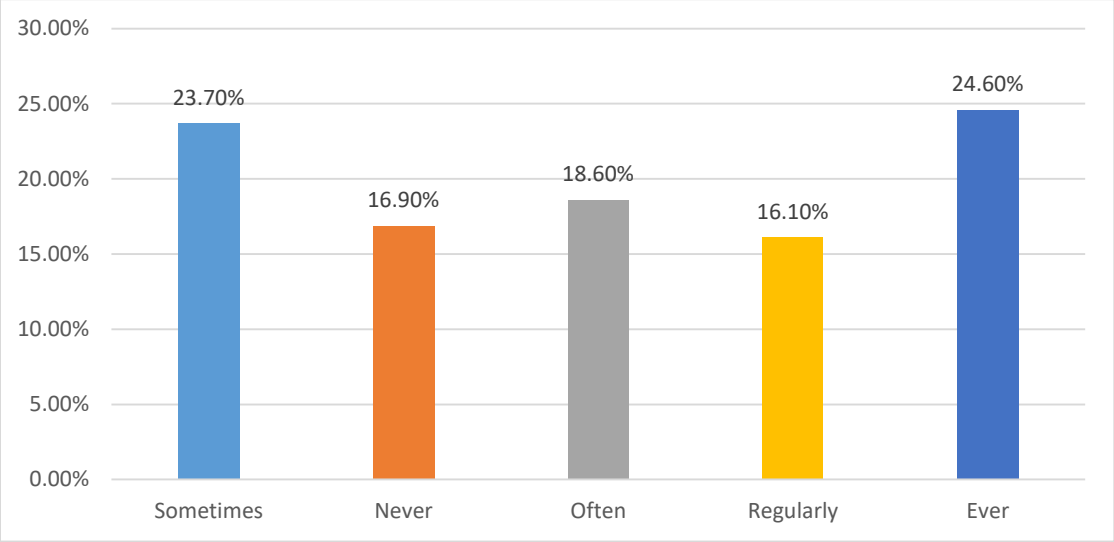

Figure 3 Does My Leader Allow Me to Give Suggestions on Team Leadership

Data Source: Field research data (2019)

Approximately 65.2% of leaders allow workers to participate in suggestions for improving the way of teamwork, with 28.8% of employees saying that they always participate in actions; 16.9%, almost always; 19.5%, regularly; and about 34.5% do not actively participate in the process, with 28.8% sometimes participating and 5.9% never. What draws attention to these data is that 28.8% say they always participate, but also, in contrast, 28.8% participate only sometimes.

According to Bergamini (2008), "the old jargon that 'my subordinates are all the same', used a lot by those invested with formal authority, proves even dangerous and compromising for the productive performance of the leader himself, as it takes second place the respect for individuality and to the special motivations of the different followers.

Table 1 Is There Professional Recognition by the Leadership?

Sometimes	Never	Often	Regularly	Ever
28,00%	10,20%	27,10%	13,60%	21,20%

Data Source: Field research data (2019)

According to Sanematsu & Costa (2020), one of the challenges of leadership is to find the most appropriate way to act in order to influence the outlines of your group of followers for the establishment and execution of goals.

It was observed that employees should be given the opportunity to actively participate in leadership, contributing to their own work and their environment, adding value to the well-being of all; leading to less noise and conflict in a team; providing motivation, and making them feel useful in their work activity. According to Malvezzi (2015), based on the theory of roles and the perspective that members of social systems occupy different roles necessary to maintain the system, leadership is defined as one of several well-defined, necessary and differentiated roles. The underlying idea is that different members of a group contribute differently to the scope the objectives of that group. Leadership is seen as a role that integrates. According to table 2, leaders exchange information with employees in their work and this is important, as it makes them feel useful and participative.

Table 2 Does Your Leader Exchange Information about the Work Process?

Sometimes	Never	Often	Regularly	Ever
31,70%	4,20%	26,30%	12,70%	26,30%

Data Source: Field research data (2019)

About 65.3% of workers affirm that the leader exchanges information about work, with 26.3% of respondents always pointing out; 26.3%, almost always; and, 12.7%, regularly. The results obtained demonstrate that workers feel more confident in the performance of their activity, adding value to what they do and providing satisfaction in the actions implemented in carrying out the tasks. 31.7% say that they sometimes participate in conversations with the leader and only 4.2% never talked about it.

According to Burmester (2014), leaders listen carefully and learn. To do this, they have to surround themselves with individuals who are more astute, talented and intelligent than themselves.

The leader, too, learns with the participation of employees, in the process of creating leadership, valuing these people, and counting on the capacity and competence of each one, to provide a more harmonious and healthy activity environment in companies.

In the organization, we have some types of power as France (2006 apud Montana & Charnov, 2001) describes below.

● **Legitimate power**: inherent to the organizational structure, such as a pre-defined or shared position or function in the company's culture, according to Fran ça (2006 apud Montana & Charnov, 2001). In fact, here the authors report to senior management, whether at the strategic or tactical level, such as directors, managers, supervisors, among others, who are invested with hierarchical positions and have the leadership in work teams in organizations.

Rewarding power: refers to the effort and recognition of a certain behavior or goal achieved, according to Fran ça (2006 apud Montana & Charnov, 2001). Since it is good to win, to be the first, to be the leader, it is possible to observe this a lot in team sports such as football, volleyball, basketball, among others, but one can also be an individual leader in the market. This may be seen in the best companies, such as those that have earned the most, or have achieved better quality in their products and services.

● **Coercive power:** it relates to the authority to apply punishments, which aim to eliminate, reduce or control unwanted behaviors and attitudes in a given social context France (2006 apud Montana & Charnov, 2001).

Table 3 sought to demonstrate which leadership model is most used in Brazil, according to employees.

Table 3 Is Your Leader More Autocratic (Bossy), Democratic (Shares Responsibilities), Liberal (Delegates and Trusts Your Service)?

Autocrat	Democratic	Liberal
22,50%	37,00%	40,50%

Data Source: Field research data (2019)

It could be noticed that in Brazil, more specifically in S ão Paulo, of the employees who participated in the research, 40.5% affirm that they work with a free or liberal leadership; 37.0% that she is democratic, while 22.5% understand that she is an autocrat, which leads us to consider that the practice of leadership has been transforming, in the search for better ways of working, and making employees feel better in your professional environment.

Based on this assumption, the questionnaire asked how the leadership model impacts the quality of life at work for employees and the answer was important for the research, which is shown below in Figure 3.

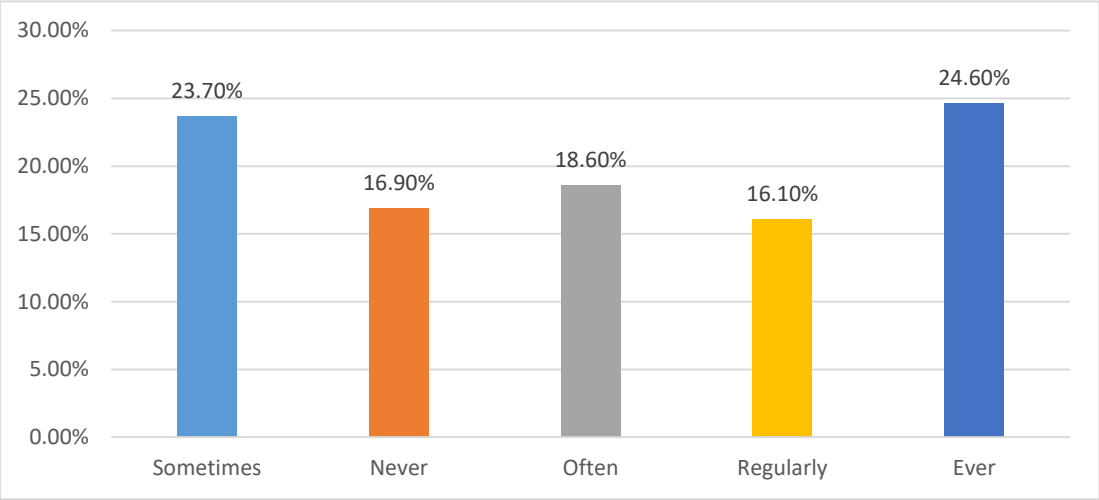

Figure 3 Do You Believe that Depending on the Leadership Model in the Company This Impacts on the Quality of Life of the Employees' Work?

Data Source: Field research data (2019).

It was also observed that, approximately 95.8% of employees understand that, depending on the leadership model in the company, its impact can be negative or positive, on the quality of life at the employees' work. Therefore, it can be said that leadership influences the QWL of employees in a company.

5 Conclusion

The present study indicates a clear relationship between leadership and quality of life and that, depending on the model used in the company, this impact, not only on the work process, but on the environment and the performance of tasks. It can also be pointed out that the higher the level of confidence of the leader in his team, the greater the information transmitted, as well as the more active the participation of individuals in the process of creating leadership in this team.

118 respondents answered the questionnaires at the three levels of the organizational, operational, tactical and strategic pyramid, all of which have a leader and a leadership model, or even more than one, in their company, which are in the industry: industrial, commercial, services, education and health.

The majority that answered the questionnaire is distributed as follows: women, 74.6%, while 25.4% are men, an important data to be taken into account; also the field of activity of these people is distributed in 7.6%, in the industry; 46.8%, in trade; 40.7%, in the area of education; and 5.1% in the health area. Therefore, the vast majority linked to the general public.

The questionnaire also asked questions related to satisfaction with leadership, as well as the recognition received, the incentive to study, as ways of motivating employees in their work and, thus, having well-being and enjoying what they do in your job.

For example, a question asked whether leadership encourages people to study: 39% of employees said yes; 11.9% that almost always; and, 11.0% regularly. In other words, in 61.9% of companies, the leader is an incentive and only 38.1% of them do not encourage employees to improve their education. It is also important to note that in a company the three models can coexist simultaneously, depending on the area and the type of service.

The results obtained, in relation to the employee's perception of the leadership model, clearly show that it interferes with the quality of life at work, whether in terms of treatment, exchange of information passed on by the leader or what is expected your team; in the relationship, as well as in the work environment and well-being in the execution of tasks.

For future research, new studies are suggested, with greater depth on leadership and its impacts on the quality of life and performance of employees, as well as other evaluation criteria, as these data may vary, depending on the city, the country and the type of employee, depending on other variables.

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Motivation and Engagement of People in Projects: A Cluster Analysis

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Abstract: The purpose of this article was to identify the relationship between motivation and engagement and project management. For that, we performed a cluster analysis with 529 articles. As a result of this research, the increase in the number of publications and the formation of 5 large groups that indicate different discussions on the theme, with emphasis on sustainability and local participation of interested parties, were evidenced, suggesting that these factors impact on the motivation of project teams. This research contributes to studies on motivation by pointing out its relationship with other issues of importance for project management with greater efficiency and effectiveness.
Keywords: Motivation; Engagement; Project; Bibliometry

1 Introduction

Motivation for work, defined as a set of energetic forces that originate within the professional and are external to him, that is, they interact between the professional and the environment (Latham and Pinder, 2005). According to Alderfer (1972), in empirical research, motivation is generated by material needs, interpersonal relationships and personal development. For Dulewicz and Higgs (2005) motivation is part of the set of emotional skills that a good leader must possess and generate in his team. The authors also define motivation as being the stimulus and energy to reach goals, knowing how to balance them in the timeline in an environment of constant rejection and questioning.

Modern managers need to continually develop their skills, so that if they do not progress permanently they will fall behind (Dimitrova, 2019). It was also shown that project managers and project teams are more motivated in innovative project environments and in ambiguous conditions (Gemünden, Lehnen and Kock, 2017). Project engagement, in turn, is related to the professional's commitment to the team and to the project's objectives.

Allen and Meyer (1996), affirm that there must be a connection between the professional and the organization,and this connection is made through the identification of the professional with the organization (affective engagement),costs of leaving the company(continuity of the relationship with the organization) and a sense of obligation with the organization(normative commitment). Motivation and engagement within the scope of Project Management has been studied in the areas of administration (Patankul,2016), construction and engineering (Voordijk,2016),Information Systems (Varajão, Silva and Pejic-Bach,2019)and non-economic motivations in megaprojects(Yang, He, Cui and Hsu, 2020).

Thus, this research sought to identify the relationship between motivation and engagement and project management. For that, we carried out a mapping of the literature, which is a variation of the systematic literature review, and which was used to understand the interaction between keywords and answer the research question that guided this study: what are the relationships between Project Management with Engagement and Motivation?

As a result, this work demonstrated its importance in pointing out the direction and interests that the subject has taken. We identified that the publications focus more and more on the concern with the

product or service to be generated in the project, as well as on the professional and emotional development and growth of the members of the project team.

2 Theoretical Background

Motivation, already studied for more than 60 years with Maslow (1954) in his pyramid of needs and with Alderfer (1972) that defined three basic levels of needs: Survival (material), Relationship (social) and Growth (development and power). More recently, Dwivedula and Bredillet(2010) analyzed motivation within hierarchical project-oriented structures, and identified four basic areas: support for employee training, a motivating, challenging and interesting work environment, a formal and informal communication, and job security that influence and promote motivation in the context of projects.

For Maloney (1985), motivation depends on the encounter between what is desired by the organization (expected behaviors) and what is desired by the employee (expected rewards). Patanakul, Pinto and Pinto (2016), inferred that aspects of motivation in multi-project environments involve four aspects: the difference in objectives between projects, the lack of resources, the heavy workload with conflicting priorities that lead to loss of morale, and productivity.

When analyzing the effects of unexpected incidents on working conditions and their consequences on the loss of motivation by the project team, Gällstedt (2003) considered 9 categories of incidents that may affect the team's motivation, among which we could notice issues related to resources, changing priorities, new stakeholders with different requirements and relying on support from others. Martin (2009) investigated through the 'Motivation and Engagement Wheel' how the capacity for evaluation and persistence affect positively and anxiety negatively affects project teams.

In seeking insights into project challenges, human factors and knowledge development that influence the nature of employee involvement in a project team within a global project-based organization, Bayiley and Teklu (2016) showed that human factors, including the manager behavior with feedback and recognition of effort, guidance and encouragement of collaboration are important in the team environment and the potential for learning and developing knowledge with the project and with the team positively influences engagement.

3 Methodology

In this work we use the Scopus database for representativeness with publications related to Project Management. The research was carried out on 05/14/2020 to select the works related to the objective of this study. The search term used was (Motivation or Engagement) AND ("Project Management") so that the combination should appear in titles, keywords or in the summary, which resulted in 2,276 documents. For refinement, we performed the filter in the Business, Management and Accounting and Social Sciences areas, which reduced the sample to 916 documents.

Then, we filtered only articles, reducing the sample to 561 articles and finally, we eliminated articles that were not aligned with the objective of our study but that appeared in our search for the use of keywords, with the result that the resulting sample was 529 articles. We then performed an analysis using the clustering technique of the VOSviewer software.

4 Results

When analyzing the most common Journals in our research, we noticed that the International Journal of Project Management as the main Journal in terms of the number of published papers, indicating a high

adherence to the theme by the Journal over time. We also noticed as representative the International Journal of Managing Projects in Business, Journal of Construction and Management, Construction Management and Economics and Engineering Construction and Architectural Management.

Table 1 presents the main keywords and the respective frequency identified in the analysis. Note that the word "project management" appears in 409 articles as a keyword, followed by "motivation" 108 times, words that made up the search string.

Table 1 Frequency of Keywords

ID	Keyword	Frequency (n)	Frequency(%)	Cumulative freq.(%)
1	project management	409	24,24%	24,24%
2	motivation	108	6,40%	30,65%
3	construction industry	77	4,56%	35,21%
4	students	44	2,61%	37,82%
5	societies and institutions	37	2,19%	40,01%
6	managers	35	2,07%	42,09%
7	decision making	34	2,02%	44,10%
8	stakeholders	33	1,96%	46,06%
9	Surveys	32	1,90%	47,95%
10	construction	30	1,78%	49,73%

From these two words it is possible to notice some areas that are more representative, such as the construction industry, educational area represented by the word "students", and aspects related to society and institutions. These first 5 records had an accumulated representativeness of more than 40% of all keywords and when analyzing the first 10 records it is noted that they represent 49.73% of the sample.

From the frequency analysis of the keywords, we performed the cluster analysis using the VOSViewer software, so that the keywords would have to have a minimum repetition of 10 times in the entire sample. Figure 1 shows, by color, the formation of 5 large groups.

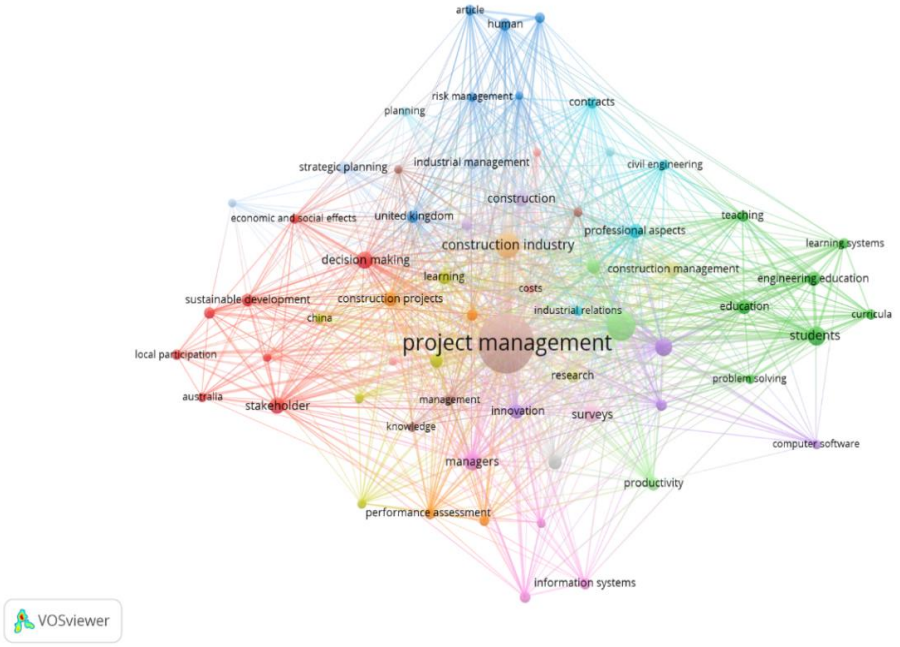

Figure 1 Grouping by Keywords

The grouping in blue suggests publications on risk management related to accident prevention and people management, there is a strong relationship with engineering and construction areas. In this context Xiong, Skitmore, Xia, Masrom, & Bridge (2014) defend the hypothesis that risk management positively influences the effectiveness of the work carried out by the project participants, since it may involve physical risks .

The green grouping suggests publications on development and training, which could be inferred, for example, by the keywords students, research and innovation. In "students" there are 44 articles such as Chen, Hwang and Chang (2019) that leads with the relationship between inverted classes and the learning time of each student within the context of learning projects. Divjak and Kukec (2008) work on the other hand deal with project management training in environments with different levels of motivation. The lilac cluster, which has some interaction with the green cluster, indicating a relationship with innovation and management. Gann and Salter (2000) considers innovation more as a form of project management in project-based organizations and the importance of integration within the organization, as well as with customers and suppliers. Pacagnella Júnior, Porto, Pac fico and Salgado Júnior [16] state that in an innovation environment, such as a science park, the project should focus on generating environments conducive to engagement, collaboration and learning for stakeholders.

The yellow group is related to issues related to leadership and development. Unger-Aviram, Zwikael and Restubog (2015), for example, discuss the leadership and the effects of the feedback given to the project team and the impact on the success of projects. The grouping in red suggests publications related to the environment, sustainability and community participation. The authors Wu and Low (2010), for example, show the importance of project management in the construction of green buildings, as well as the concern with the motivation of the workers.

In the case of Figure 2, keywords are organized according to the frequency identified in a time horizon, referring to the yellow words as being the most recent and, as they get darker, they characterize the frequency in old periods. Note that since 2000 the focus of interest was tending to more technical issues such as "planning", "risk management", "construction industry" and "contracts". For example, in the case of contracts, the selection returned articles until 2010 such as Bower, Ashby, Gerald and Smyk (2002) in which the characteristics and mechanisms of incentive contracting are described. Around 2008, development and training began to gain strength through the keyword “learning”, and among the most cited are Drinkwaard and Romijn (2010) with an article on a learning-based approach for small hydroelectric construction projects.

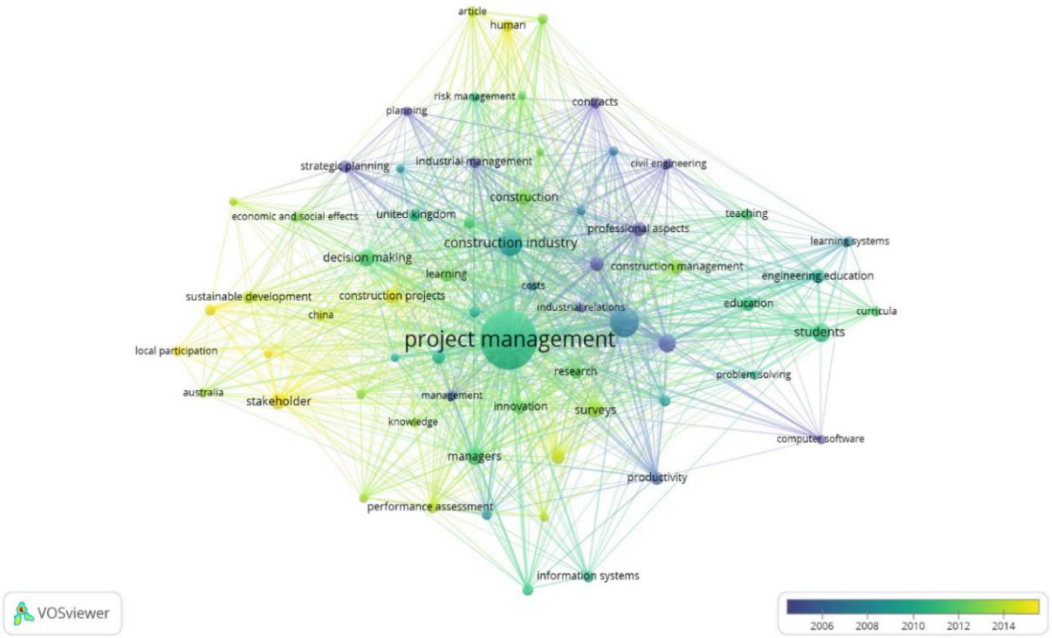

Figure 2 Keyword Overlay View

After 2008, the interest related to sustainability becomes more evident, with the keywords "sustainability", "local participation" and "stakeholders". In the case of "sustainability", for example, the first article selected is from 2008, with the largest number of publications belonging to the year 2019 (6 articles) such as Thomson and El-Haram (2019) dealing with methods of sustainability assessment in buildings.

5 Conclusion

By seeking to identify the relationship between motivation and engagement and project management, we were able to conclude that motivation in projects is strongly linked to professional development and growth, with increased interest in sustainability and in the relationship with stakeholders represented by the internal and external community of projects. In addition to the evolution of these interests over time, we can confirm that the motivation in projects remains strongly related to the technical factors of management and the safety of the work environment of the project teams.

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Perception of Work Performance in Home-office Mode: Comparison among Different Generations in Brazil

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Abstract: Work in home office mode is already a reality for many national and international organizations. In Brazil, according to Sobratt (2018), 45% of 315 companies from different areas of the economy have already joined this work modality. As a result of the pandemic of Covid-19, companies in sectors classified as non-essential, from both spheres, public and private, were pushed to adopt remote work to continue their business activities. So, this study aims to analyze the perception of work performance in the modality of Home-Office comparing the average indexes of different generations. Findings showed that despite of Y and Z generations are theoretically composed of a profile of people with greater skills for digital technologies (Kurz, Li, Vine, 2019) which seem to be a pre-requisite for adapting to remote work (FIA, 2020)[9], on average, Z generation reached a level (2.84) of perception below the average (3.0) considered for this study. In addition, Y generation, despite being above the average (4.06), obtained a lower index when compared to X generation (4.35).
Keywords: Perception; Work performance; Home office; Generation and labour market

1 Introduction

Historically, Human Resources (HR) or Human Capital (HC) management has been perceived as an important asset for companies (Cascio, Boudreau, 2011). Its core function is to mediate organizational and employees' goals and its practices are structured around assumptions contained different theories of organizational psychology (Zanelli et al., 2004; Kanaane, 2012; Cascio, 2015).

In a globalized and highly competitive economy, such as contemporary times, the overall performance of companies is intrinsically related to the performance of their employees, promoting the achievement of collective objectives (Souza & Souza, 2016).

To work in the Home-Office mode is already a reality for many national and international organizations. In Brazil, according to Sobratt (2018), 45% of 315 companies surveyed from different areas of the economy have already joined this work mode. However, because of the pandemic of Covid-19, companies in sectors classified as non-essential, from both spheres, public and private, were suddenly pushed to adopt remote work mode in order to survive in this unique environment of Covid-19.

In this scenario, companies in search for more synergies are reorganizing themselves to align their efforts to reach not only organizational but personal goals and targets to increase productivity and to enhance competitiveness (Kanaane, 2017). Thus, this is a unique opportunity to verify how different generations perceive their performance when work activities are done remotely.

Therefore, this study aims to analyze the perception of work performance in the home-office modality by comparing the average indexes of different generations under this new environment imposed by the pandemic of Covid-19. In summary, it allows the verification of how different generations

[9] https://fia.com.br/blog/home-office/

perceive their performance at work, when it is done remotely. By shedding light on this object of study, its results shall help companies in enhancing HR management practices to achieve greater assertiveness in this new modality of work.

2 Some Insights about Work Performance

One of the companies' goals is to obtain profit and this goal is empowered by the capacity of their workforce to perform activities efficiently and effectively. Keeping the workforce motivated and in high productivity level is an important variable for the company to reach their goals (Munsterberg, 1913; Taylor, 1990).

To keep the workforce motivated and in high performance level and productivity, companies have to measure and manage employees' work performance in order to align individual's and team's performance along with the company's goals (Cascio&Aguinis, 2008; Cascio, 2015). According to Bernardin and Beatty (1984), work performance is the result produced in a certain job or activity in a predetermined period.

Viswesvaran and Ones (2000) argued that, in practice, the management of work performance needs to consider several factors as each employee, most of the time, are involved in different functions. Because of the complexity of those functions, it is suggested the use of different metrics and indexes.
According to Borman and Motowidlo (1993), the analysis of employee's performance should consider two aspects: (a) performance related to the task and (b) performance related to the context where the employee is involved. Performance related to the task involves all tasks developed by the employee to accomplish certain activity. Performance related to the context considers the individual's voluntary behaviors which include extra efforts to complete the task, to support the organization's main goals and objectives and cooperation with others. Thus, it is pretty much associated to behavioral aspects of individuals.

Queiroga, Borges-Andrade and Coelho Junior (2015) showed that, although the analysis of employee's performance is always related to behavioral aspects, what distinguishes behavior and performance is the fact that the second is associated to the achievement of the organizational goal

3 Generations and Labour Environment

People who are born in a certain period form the set of generations. Each generation has characteristics that distinguish them from the others. What identify members of a certain generation - besides, they are born in a certain period - refers to the experiences acquired throughout their lives. A generation shares a historical identity in how they experience the world they live, their consciousness and identity, habits, and behaviors (Mannheim, 1982; Barros, 1987).

According to Kurz, Li, and Vine (2019), theoretically, there are several generations cataloged, but those that coexist in the contemporary labour market are:

i. Baby boomers. They are born between 1946 and 1964;
ii. Generation X, born between 1965 and 1980;
iii. Generation Y, also called Millennia, born between 1981 and 1997and;
iv. Generation Z, born from 1998 (Zemke et al., 2000; Culpin et al., 2015).

The period that separates each generation may differ from one author to another; however, the characteristics of each period seem to converge.

Considering the discussion of how each generation interacts with the labor environment, authors, such as Kanaane (2017), considers it very complex, independently of gender and age. He argues that the basic premises are that men and women of different generations have different professional aspirations and young people are more familiar with technology when compared to older ones. The author also argues that such assumptions are anchored in the statement that, in the case of generations, reality is socially constructed. It should be noticed that although people born in a given period of time might be classified by belonging to a certain generation, it does not imply generalization, because not everyone will have the same generational profile that are theoretically attributed to them (see Figure1 which summarizes personal characteristics and generational professional profile).

For Kannane (2017, p.170), knowledge and skills, which compose the professional profile, are elements acquired in the trajectory experienced by people at different times and which, in turn, have "social, economic, cultural, political determinants, psychological and anthropological" aspects, which are likely to influence individual and collective behavior in the labor market.

Table 1 Main Characteristics of Each Generation

Generation	Personal Characteristics	Professional Profile
X	Noticeable by creativity, self-confidence, willingness to entrepreneurship, rational and self-centered thinking; they do not like rules and prefer flexibility. They prioritize freedom over status.	Emphasis on intellectual development through greater academic training. Focus on goals, not deadlines. Seeks individuality without losing group life. Willingness to leadership and tendency to communication skills.
Y	Demonstrate resilience, spontaneity, dynamism, and immediacy; they are ambitious and unstable. They have a strong involvement with technology, have environmental and social awareness, tend not to be concerned with power and authority relationships, live well with ethnic, social and gender diversity and like challenges.	They share knowledge and prioritize jobs that provide challenges for their development. Job stability is not a concern. They are always connected to new technologies and new trends. Difficulties to handle with negative feedbacks of their job.
Z	Evidenceanxiety, greater adaptability; they are multitasking and hyper connected people; They have low political engagement and superficiality in interpersonal relationships. They do not care about geographic frontiers; they are a native digital born generation; prioritize relationships through technological means in the detriment of interpersonal due to frequent use of the internet.	They are change agentswhen introduced to the corporate environment; break pre-established standards and presents behaviors that do not respect functional hierarchies.

Source: Adapted from Kannane (2017).

4 Analyses and Discussion

For the analyses and discussion of data, this research opted for a quantitative approach and the use of descriptive statistics through the calculation of averages, which is a measure of central tendency in a set of numerical data.

As typicality, sample matches as a non-probabilistic sampling definition. The respondent's profile refers to people who were employed at the time of the survey and were designated to work remotely by their employers at the time of the pandemic of Covid-19. This survey used a questionnaire with closed question on a Likert type format of 5 points. Also, it was distributed through the Survey Monkey platform during the period between May 19 and June 26, 2020. The total of respondents was 399.

The scale used for data collection of self-perception performance at remote work in the Brazilian context, was validated by Queiroga, Borges-Andrade and Coelho Júnior (2015). The researchers decided for using a reduced version of this scale which contains six items on perception of work performance.

The age criterion was used to verify which generation the respondents belong to. From, the total of samples, 41% of respondents belong to X generation, 19% to Y generation and 40% belong to Z generation. Also, findings showed that 152 respondents are male, 243 female and 4 identified themselves as non-binary gender.

The scale used to measure perception of remote work performance was a Likert type format of 1 to 5 points. The midpoint was considered 3; below 3 are low levels and high levels above 3. The findings showed that the average was 3.75 and a standard deviation of 1.42.

The distribution by generation, as well as their levels of perception of performance, is organized in Table 2.

Table 2 Perception on Work Performance and Generations

	Generations		
	X	**Y**	**Z**
Average of perception on work performance	4.35	4.06	2.84

Source: Prepared by authors.

According to Table 1, the average of X generation was 4.35 (high level), Y generation 4.06 (high level) and Z generation was 2.84 (low level) against the midpoint of 3 established by this study. Z generation was the lowest average among other two (X and Y generations), and an ANOVA test show very significant differences among them ($F = 97.74$ and $p=0.000$). Although the number of respondents in each generation was unbalanced since this study did not propose deviation control, the outcome does not interfere in the calculation of the weighted average; and actually there is a significate difference even between Generations X and Y ($t=3.86$ and $p=0.000$).

Findings also showed different levels of perceptions on work performance grouped by gender, and generations (See Table 2). When data were grouped by gender, despite women have had a higher level of perception than men in X and Y generations, in Z generation they were below average, while men reached a level slightly above average.

As far as employment types such as public or private is concerned, findings showed that, among 134 respondents categorized as public employees, the average was 4.10 against 3.48 for private ones (265 respondents). This finding corroborates Cheng and Chan (2008) who argued that performance at work be guided by job security. That is the case of public employees whose jobs are secured by law in Brazil.

Table 3 Generation and Gender Identity

	Average by generations		
	X	**Y**	**Z**
Female	4.40	4.20	2.47
Male	4.30	3.93	3.97
p (t-test)	0.122	0.658	0.000

Source: Authors, 2020.

As this study was focused on the remote work model, findings showed that 90% of respondents work and live in the same city. According to FIA (2020), one of the advantages of the home office model is about eliminating the physical distance between people and their respective companies, which could lead to more satisfaction, reduction of stress and less delay.

5 Final Considerations

This study aimed to verify the level of perception of remote work performance under circumstances of pandemic of Covid-19 considering different generations. The respondents were all employees of public and private sector who were compelled to work remotely.

In general, findings showed that despite of Y and Z generations are theoretically composed of a profile of people with greater skills for digital technologies (Kurz, Li, Vine, 2019) which seem to be a pre-requisite for adapting to remote work (FIA, 2020), on average, Z generation reached a level (2.84) of perception below the average (3.0) considered for this study. In addition, Y generation, despite being above the average (4.06), obtained a lower index when compared to X generation (4.35).

The direct implications of this study seem to refer to the need to assess employees just before allocating them a remote working model such as home office. As this study did not approach other variables such as employees' income range, the findings are limited to compare remote work performance considering only different generations.

As a suggestion for future studies, researchers could carry out a qualitative strategy survey to understand the perception of remote work performance, even though, at least in the present study, X generation, which was considered the less likely to adapt to remote work model, was the one which achieved the highest level.

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Retention of Identified Professionals as Potential Successors

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Abstract: The implementation of the succession process as a strategy of mapping, development and retention of talent is gaining space in organizations. This article aimed to verify whether organizations have a structured process for retaining professionals identified as potential successors and whether there is differentiation according to the level of maturity of the succession process. A sample of companies seeking to differentiate themselves in terms of people management, consisting of 396 companies, was analyzed. For analysis, the Phi coefficient was used, and the survey results showed that a small number of organizations have a process of retaining professionals identified as potential successors, and that organizations that are more mature with respect to their succession process are more likely to work on retaining their talents in a structured manner, and the aspects that lead to most voluntary dismissals of professionals in the organizations surveyed are linked to compensation, career and development actions.
Keywords: Succession; Successor; Retention; Succession process; Succession map; Talent

1 Introduction

In an increasingly competitive environment, the retention of professionals with potential has proven to be a differential. According to Hills (2009), succession planning is more than filling positions, it is a talent management strategy that increases the retention of professionals with potential and the development of skills needed to respond to changes in the competitive environment. Erik Berggren and Jason Corsello (2017)[10] say that talent management today demands up to 20% of the CEO's time, because it was realized that the competitiveness of organizations depends on their professionals. The recognition of the importance of talent management becomes a positive step even for the retention of important professionals for the organization.

Organizations realize the need for this new demand; however, they are at different stages of maturity regarding the identification and retention of their talents from their succession process. Hall (1986), Ohtsuki (2013) and Ferreira (2015), Dutra (2015), and Dutra and Dutra (2016) have been working on classification criteria for these levels of maturity. These authors end up defining three different stages: the first related to the replacement of professionals when the position becomes vacant; the second is the structuring of the succession process, culminating in choosing a succession that helps in the prior identification of the candidate; and the third one that consists of structuring this process with a view to the future strategy of the organization, seeking to ensure its perpetuity. Therefore, the objective of this work is to verify whether organizations have a structured process for retaining professionals identified as potential successors and whether there is differentiation according to the level of maturity of the succession process.

[10] http://www.successfactors. com/research/talent-2017

2 Theoretical Reference

The retention of professionals identified to assume more complex positions occurs from the identification of candidates and their respective potentials (Hall, 1986; 1989; 1995). The professionals identified with high potential are usually named as talents of the organization (Charam; Drotter; Noel, 2009; Boudreau; Ramstad, 2005; Charan, 2008; Collings; Mellahi, 2009).

Talent Management, according to Serrat (2010) [11] is highly influenced by the context and peculiarities of each professional, and is not an end in itself, since its main objective is to support the organization in achieving the strategy and ensure its survival, since it is based on people able to keep it competitive (Cappelli, 2008).

Ballaro and Ponk (2017) say that a structured succession plan and the development of successors collaborate in the process of retaining professionals and achieving their strategy. For Ferreira (2015), succession planning is "characterized by mapping actions of potential talent and potential leaders as future successors. Kur and Bunning (2002) confirm this position, reinforcing that organizations should develop the leadership function and not individual leaders. Groves (2018), Dutra (2015) and Ferreira (2015) go further, drawing attention to the need for a succession process that emphasizes assessment, development and a talent pool at all organizational levels, based on its strategic objectives. However, in order to identify a talent and form this pool, succession planning needs clear rules and procedures, taking into account the business strategy and interacting with the organization's current practices for people management. The development of the succession map alone is not enough. It is necessary to form a succession management system that supports the organization's continuity and the achievement of its strategy. For this to occur, the criteria for the selection of talents and candidates for succession must be clear and transparent, minimizing noise in the organization and offering the same chances to participate in the process (Rothwell, 2005; Dutra, 2010**;** Ohtshuki, 2013; Veloso *et al.*, 2013**).**

Retention is a consequence of the evaluation and succession process, followed by dialogue between the person and the manager for the alignment of expectations, helping in the development of a motivating environment for each professional as it takes into account their desires. Nevertheless, to support this process it is necessary to have an integrated people management system that contemplates aspects such as career, remuneration, movement, recognition, that is, integrating the human resources subsystems in a structured manner (Dutra; Dutra, 2016). However, the authors found through a survey conducted in 2010 that organizations do not get to work on developing and retaining talent because they stop the succession process in the building of the map, which is nothing more than a fleeting picture of the organization and that without actions resulting from risk mapping, it is of no use.

It was observed in this research that after the meetings of the succession committees, the validation of the succession map in higher instances, discussion of the weaknesses of the organization, decision making to minimize the weaknesses and indicating the care with the people to be developed were developed. However, these actions did not actually take place, since they were treated individually and left to each manager. For these actions to occur, it is necessary to create structured rituals, perform follow-up and offer support to the manager. The monitoring of these actions must be included in the agenda of senior management so that they are effective and demonstrate the seriousness with which they are treated; however, they must be supported by the area responsible for the succession process by instrumentalizing managers with parameters based on indicators. Ferreira (2015) also found that the

[11]https://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1102&context=intl

realization of development and retention actions and their effectiveness are highly related to the fact that they are monitored and there is a demand for their implementation.

Groves (2018) states that working with the talent development and retention process can minimize the risks identified by the organization from the succession map design. The 2014 KornFerry survey[12] identifies the importance of working on talent development to generate internal promotions, as these actions allow deep understanding of the organization, allowing business intelligence to be passed on to the next leader, and allowing organizations to build the skills and leadership styles that meet their needs by helping attract and retain professionals and demonstrating that the organization is committed to the growth of its managers (Peter, 2014)[13]. These development and retention action indicators are usually established in the validation process and revisited throughout the monitoring process. The most common in the organizations researched and found in the literature by Dutra and Dutra (2016) were:

Development – in this case, it is the periodic investigation of the implementation of development actions and the evaluation of the immediate leadership on the progress of the person. This research is carried out quarterly in most organizations that have this indicator;

Valuing fixed remuneration – monitoring the position of people in the salary range and their history of salary movement in relation to other people in the organization. This is a relative measure, since it depends on the resources made available by the organization for salary movement. If there are procedures that are not consistent with the care of retention, the reasons should be investigated;

Valuation of variable compensation - monitoring of the variable compensation received by the group of successors in relation to the others and analysis in case inconsistencies are perceived;

Mobility – monitoring of the mobility of the group of successors in the organization and level of adaptation and results generated in new positions;

Satisfaction – interviews with people in this group in quarterly or four-month periods to see how people are feeling about their challenges and development;

Turnover – monitoring the turnover of the group of successors and the reason for their exiting the organization. In some organizations managers may not disconnect people from this group without superior authorization and must immediately report to the successor group if the person expresses an interest in leaving the organization;

Cross evaluation – periodically the coordinators of the succession process interview the people nominated for succession, immediate leadership and some members of the succession committee who know the person. This gives them a clearer picture of the results and effectiveness of development and retention actions;

External monitoring – the group of people thought for the succession undergoes interview and/or evaluation processes, at annual or biannual intervals, carried out by external specialists. In these cases, the process is recommended so that there is an external monitoring of the person's development.

Critical people management – indicating those people whose loss could have a major negative impact, defining criteria for electing them and indicating them. For these people, a differentiated retention program should be created.

As a matter of fact, companies tend to lose forty percent of the potential value estimated from their strategy for low performance and talent management (Mankins; Steele, 2005). Berggren and Fitz-Enz

[12] https://www.kornferry.com/insights/articles/816-korn-ferry-nacd-annual-survey-of-board-leadership-2014

[13] https://www.kornferry.com/insights/articles/seven-ceos-essential-purpose-succession-management

(2006)[14] identify with the authors by stating that the most successful organizations are those that identify and develop potential professionals and succeed in retaining them.

According to Galagan (2010), companies establish two parts of a succession plan: a plan to select the right people and a process to retain, promote and train the appropriate people to take up a new position. Given the importance of the development of the following professionals, a discussion on the structuring of the development process of the candidate for succession is carried out.

3 Methodology

The quantitative method will be used for this research, as it aims to identify the intensity of relationship between phenomena, relating stages I, II and III with various organizational characteristics and people management practices. For this purpose, the data analysis technique allows the identification of the association strength between the research variables (Creswell, 2010; Perdigon; Herlinger; White, 2011; Marconi; Lakatos, 2008; Sampieri; Callado; Lucio, 2006). Regarding the other characteristics of the quantitative research, this is a population survey, with delimitation of results and inference are the responding companies of the survey entitled "The 150 best companies for you to work for". This survey, developed in 1997, was based on studies on organizational climate management, and was carried out with companies that seek to excel in people management, with the aim of valuing good people management practices. In 2006, the research methodology was improved with the entry of the Administration Institute Foundation, which started to build the research based on the current literature on the subject and with the purpose of generating data for studies in the Human Resources Management area, contributing to the creation of knowledge in the area through the publication of articles, dissertations and theses, among other studies. Responding companies participate on a voluntary basis and researchers may enter their questionnaires as long as they relate to people management policies, practices and processes. The survey questions used in this study were inserted in the 2019 questionnaire, which had 497 respondents.

The analyses of the data from the survey took place in four steps: selection of the variables; cleaning of the headings and standardization of the variables; preliminary analyses of the answered cases; and statistical analyses. The interpretation of the results done after the conclusion of the analysis phase consists on the comparison with the aspects presented in the literature in contrast and/or agreement with what was empirically observed (Hair Jr. *et al.*, 2005a).

The selection of variables took place already thinking on testing the hypotheses of the study. The cleaning of the headers and standardization of the variables occurred due to the need of organizing the database for data processing in the statistical software. The preliminary analysis of the answered cases consisted in identifying patterns of questionnaire filling that are incoherent or anomalous. All steps of data analysis were performed in the Stata/IC 15.1® software.

For the data analysis was used the Phi correlation coefficient, and χ^2 is a 2x2 table, suitable for two dichotomous variables; and n is the sample size (Lira, 2004)[15]. The Phi coefficient may vary from $-1<\phi<+1$. When the sign is positive, it indicates that the variables have joint variation in the same direction, while the negative sign indicates the opposite, of joint variation in opposite direction. Regarding the magnitude of the relationship between the variables, it was decided to adopt the criterion proposed by

[14]www.successfactors.com/research

[15] http://www.ipardes.pr.gov.br/sites/ipardes/arquivos_restritos/files/documento/2019-09/sachiko_dissertacao_2004.pdf

Hair Jr. *et al.* (2005b): coefficient ± 0.91 to ± 1.00, very strong correlation; coefficient ± 0.71 to ± 0.90, high correlation; coefficient ± 0.41 to ± 0.70, moderate correction; coefficient ± 0.21 to ± 0.40, small more defined correlation; and coefficient ± 0.01 to ± 0.20, slight correction, almost imperceptible.

4 Analysis of Results

As may be seen on Figure 1, 62% of the companies surveyed do not adopt formal practices for retention of potential successors, only 38% do that. This corroborates with the Groves (2018) and Dutra and Dutra (2016) surveys, stating that most organizations do not have structured processes for retaining their talents. These percentages indicate that 149 companies claim to conduct a formal talent retention process; however, only 24%, corresponding to 34 companies, identify a talent pool developing structured practices for all potential successors, or approximately 9% of the total survey respondents. It is worth mentioning that the sample worked is composed of companies that seek to excel in people management. These numbers show that Brazilian companies still have a vast space to work on retaining their talents in a structured and strategic manner.

Most of the organizations that work to retain their talent, 77%, corresponding to 116 companies, still do so individually. This leads us to infer that they do not have a determined ritual with clear parameters and integrated with other people management processes to work on this retention process. This number corresponds to 29% of the total companies surveyed.

This tells us that only 38% of companies concerned on standing out in people management have some action to retain their talent. If talent is the organization's main competitive advantage, as Serrat (2010) and Cappelli (2008) state, and there are no actions to retain it by the organizations, they are putting their perenniality at risk.

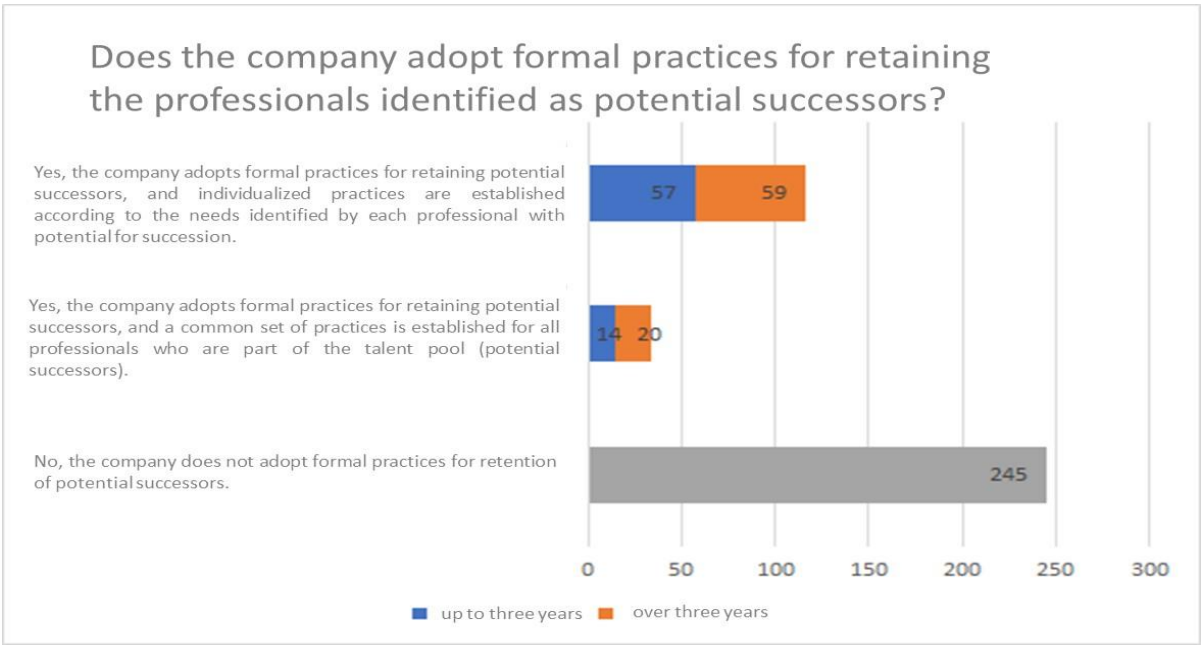

Figure 1 Retention Practices for Potential Successors

Source: Prepared by the authors

Now as may be seen in Figure 2 the data also brought a perspective on what are the main reasons for voluntary dismissal in the organizations surveyed, for which the companies were asked: "What are

the three main reasons for voluntary dismissal of employees of this company? Among the main reasons pointed out in relation to voluntary dismissal, 270 received proposals with better remuneration/benefits, 147 for proposals with more career prospects, 122 due to the employee's change of location, and 117 for proposals with more opportunity for challenges. This data supports the lack of a structured retention process. The construction of the indicators for development and retention pointed out by Dutra and Dutra (2016), aligned with organizational policies and a ritual of alignment of expectations carried out periodically between managers and potential candidates for succession, could minimize the risks of losing talent.

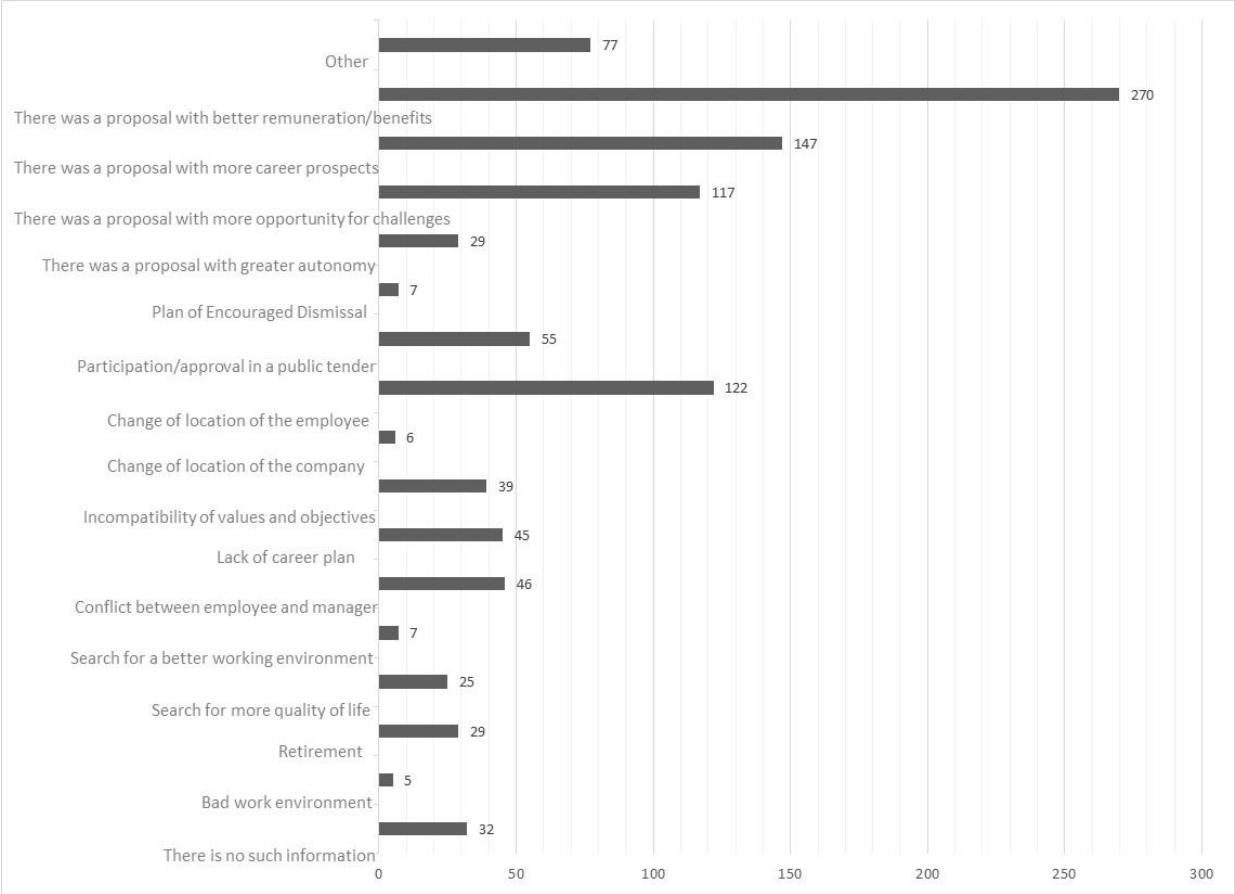

Figure 2 Main Reasons for Voluntary Dismissal

Source: Prepared by the authors

In order to cross-check the percentage of companies that have a structured talent retention process with the maturity levels of the succession process, a new data filtering was necessary, considering in the sample only the companies that answered the questions regarding having a structured succession process and preparing the succession map, reducing the sample to 396 companies, 222 of which were allocated in Stage I, for not having a structured succession process and preparing the succession map of the organization, totaling 56% of the valid cases in the sample. Both Stages II and III obtained the same number of classified companies: 87, a number that totals 22% in each of the groups, respectively. In stage II, the companies that reported having the succession process structured and building the succession map were classified. In stage III of maturity of the succession process, the organizations that have both and consider the future strategy of the organization in these processes are classified.

As may be seen in Table 1 all variables have some correlation with all stages of maturity of the succession process, except for the variable "Yes, the company adopts formal practices for retention of potential successors, and a set of common practices is established for all professionals who are part of the talent pool (potential successors)", because this variable has no correlation with stage II.

For stages I and III there is a weak correlation, almost non-existent; however, it is relatively stronger for stage III, since it is considered practically small, but defined with Φ = 0.2075.

The variable "No, the firm does not adopt formal practices for the retention of potential successors" is the strongest in all stages of maturity of the succession process, and is moderate in stage I and small, but it is defined in stages II and III (in stage III almost moderate) with Φ = 0.5411, Φ = 0.2490 and Φ = 0.3996, respectively.

The variable "Yes, the company adopts formal practices for the retention of potential successors, with individualized practices being established according to the needs identified by each professional with potential for succession" comes in second place in all stages, with the correlation moderate in stage I and small, but defined in stages II and III and the variable with Φ = 0.4750, Φ = 0.2713, and Φ = 0.2980, respectively.

It is observed that, although most companies do not have a formal retention practice in all stages, companies in stage III have proximity in the strength of the correlation between the two items that claim that the company adopts formal practices of retention of potential successors. This may imply that companies in stage III are more mature in this respect, not only developing professionals individually, but also defining common practices for those in the succession map.

Table 1 Distribution of Internships by Formal Retention Practices of Potential Successors

	Stage I		Stage II		Stage III	
Variable	**Phi**	**p-value**	**Phi**	**p-value**	**Phi**	**p-value**
No, the company does not adopt formal practices for retention of potential successors	0.5411	0.000	0.2490	0.000	0.3996	0.000
Yes, the company adopts formal practices for retaining potential successors, and a common set of practices is established for all professionals who are part of the talent pool (potential successors)	0.1646	0.001	0.0102	0.839	0.2075	0.000
Yes, the company adopts formal practices for retaining potential successors, and individualized practices are established according to the needs identified by each professional with potential for succession	0.4750	0.000	0.2713	0.000	0.2980	0.000

Source**:** Prepared by the authors

5 Final Considerations

The purpose of this article was to verify whether organizations have a structured process for retaining professionals identified as potential successors and whether there is differentiation according to the level of maturity of the succession process. As pointed out by Dutra and Dutra (2016) and Groves (2018), it was found that a small proportion of organizations have a process for retaining professionals identified as potential successors; and moreover finding top Performers for a Succession Plan may become critical (Ivanovich,2019). Hopefully according to a Gartner report in a few years from now a large number of enterprises with hourly paid workers will have invested in Workforce Management

Applications - WFM to support employee experience already based on cloud deployment methods (Grinter et al, 2020).

The aspects that lead to most of the voluntary dismissals of professionals in the organizations researched are linked to remuneration, career and development actions. These aspects could be minimized with simple actions, such as conversations about aligning expectations with these professionals and defining policies related to these aspects for the retention of these professionals. In addition, it was observed that as expected, organizations that were more mature with respect to their succession process are more likely to work on retaining their talents in a structured manner.

This study represents a contribution for alerting organizations about the importance of working on the structuring of the retention process of professionals identified as potential successors in the organization, and brings some suggestions for this process to be established. Regarding the academic contribution, reinforces the idea that the previous studies by Dutra and Dutra (2016) and Groves (2018) are still valid. Moreover suggest the need to do more research on this area to include now companies that seek to excel in people management, hence replication of this work to a significant sample of Brazilian companies where the percentage of companies that have a structured process for retaining potential succession candidates may even be lower, except perhaps in case of Family Organizations that are highly common (90%), and are leaders in Brazil, but where most of them (72%) they die when founder/lider dies; so they are not prepared[16]. This theme may also instigate other surveys related to the difficulties encountered in implementing this retention process and in formatting related indicators or policies.

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Integrating Cultural Diversity in Organizations: Recruitment and Selection

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Abstract: Given the still current scenario of disparity of opportunities regarding groups considered as minorities in several areas, such as education, income and work, cultural diversity in organizations remains relevant and fundamental in order to contribute to improve social conditions. To clarify the theoretical bias and encourage approaches on the topic, that is slowly gaining space, the basic concepts are first considered before going into the central focus of this work regarding potential organizational trends in the management of cultural diversity in Brazil and linked mainly to the processes of attraction and selection of talents. For this purpose, data from a recent survey of 109 Organizations in Brazil, allows to see how the concept management applied in an integral and uniform way in the organizational culture - and permeating all its processes – reflexes positively into business performance in addition to representing the practice of a social responsibility activity that is inherent to the subject. Moreover, results indicate the advantages in recruiting better talents, greater customer orientation, greater employee satisfaction and better decision making. This demonstrates that the gains reach, directly or indirectly, the organizational performance as a whole, and better, guided by principles that permeate an ethics of social responsibility that should be part of the organizational actions.
Keywords: Cultural diversity; Organizational culture; Organizational performance

1 Introduction

The evolution of contemporary society manifest by constant changes. Technology, globalization and demographic growth are driving forces of this complex dynamic global process and, as the speed of these changes increases, organizations - public and private - need to adapt their development strategies towards macro trends. Deep social, economic, political and technological changes are, at the same time, causes and consequences of the great tendencies that, in their definition, count on three crucial factors: scope, strength and duration (Castells, 2002; Naisbitt, 1982; Santos et al., 2018).

However fast constant changes may bring great risks in relation to the future; so we may need to foster resilience that help to deal with uncertainty. Bringing diversity into this context enhances the identification of opportunities and threats for understanding events and the defining action plans by organizations (Van der Heijiden, 2009). Diversity includes many aspects like gender, race, ethnicity or socio-economic background; and a multicultural enviroment may lead to a larger numer of different perspectives that help to deal more efficiently with threats and opportunities, particularly in a *VUCA*[17] dynamical context like the one we are living today.

This paper seeks to identify cultural diversity as a trend in the labor scenario, starting from the analysis of the recruitment and selection processes of professionals by companies, with the objective of contributing for them to become aware and better prepare themselves to develop and incorporate diversity programs. For that, it will be necessary to present culture as a concept and its consequences in incorporating it into organizational theory and in our case in particular into Brazilian socio-economic-

[17] VUCA = Volatile, Uncertain, Complex and Ambigous.

cultural development, analyzing the relevance of promoting and incorporating diversity management in order to provide better results, add value to organizations and dialogue about existing gaps that hinder a greater implementation of this management concept in the selection processes starting from opportunities found in both organizational and social spheres

The discussion about cultural diversity in organizations is relevant to the market scenario as it encourages organizational changes that applied in a cautious and well-structured way may lead to positive impacts for business and social environment, making it more fair and egalitarian and in the long term generate opportunities available to everyone as well as the academic environment, mainly in the areas of Psychology and Human Resources, since represents a contribution to the increase of available content on the topic that we believe is important but no so much widespread

2 Basic ideas regarding Organizational Culture

Cultural diversity has being gaining space in the academic and corporate environment, particularly in the last two decades, although the concept of culture has been debated by researchers for much longer, especially in anthropology. From the 1970s onwards, the theme began to be mentioned on organizational disciplines under the name of organizational culture or corporate culture. Since then, many works have appeared with different theoretical and methodological approaches with a range of concepts either complementary or mutually exclusive, revealing a lack of consensus on the topic among researchers persists in the area of organizational behavior. (Barale & Santos, 2017).

Culture is, therefore, a system of meanings that incorporates a structuring relationship of power - adding a vast stock of inventories, materials, behavioral repertoires, mental representations, social practices dynamically set in motion by different actors, generations and genders (Wolf, 1999, 2001); moreover already some time ago Linda Smircich (1983) pointed out three main trends for studies on organizational culture:

(1) Under a functionalist and managerial character, several authors suggested that:

a. The Organizations have a culture that reveals phenomena within the institution, which can enhance (or not) organizational performance;

b.Organizations can measure, manage, change or create culture depending on the application of methodologies;

c. Leaders shape and alter culture, these being their most primordial roles.

(2) From a critical and socio-anthropological point of view - with the aim of combating the managerialist perspective - authors center their argument on the impossibility of intentional manipulation of the phenomenon in all its aspects. According to this trend, the organization is a culture of shared actions to be explained by expressive, ideational and symbolic aspects.

(3) There are authors who believe in the existence of a single organizational culture (homogeneity), on the one hand, and other authors who, on the other hand, assume that there are multiple cultures within the organization (heterogeneity). From this dilema, three different ways of understanding organizational culture emerged:

a.The Integration: The organization must have the same culture;

b.Differentiation: There are several groups that have different cultures in the organization;

c.Fragmentation: The convergence between the interests of different groups with different cultures allows, albeit temporarily, the sharing of values and attitudes in order to condition the actions of these groups in the organizational environment (Martin&Frost, 2001).

3 Trends in Recruiting and Selecting seeking increasing Cultural Diversity

For the purpose of this study, it may be needed to first show that the search for increasingly diverse talents within the structure of organizations is now really gaining space in the agendas of meetings, since this represents a mindset transformation framework on its way; but first it is important to ask us what may be moving organizations to share this trend?

For this purpose one may seek deeper foundations of these process going on by considering the importance the three basic Platonic Values or principles of truth, beauty and goodness (ethics) regarding respect and appreciation of the human being when talking about diversity in order to promote socio-cultural enrichment; but on this paper however the focus will effectively be more on business results, on the competitive differential that appropriate corporate relationships may provide, after all, in the globalized and capitalist world in which we live, adding value and acquiring more resources, mainly financial, is an objective inherent to the business concept beside caring human resources.

According to the manual "How companies can (and should) value diversity" developed by the Ethos Institute of Business and Social Responsibility, the inclusion factor for diversity is directly associated with the quality of the relationship that organizations have with people who are in and out of them, which in turn has great weight in determining competitive advantage, especially in the scenario where there is greater availability of access to technological resources. It also highlights that this factor is critical to success, facilitates adaptation to the profile of clients, strengthens financial performance, reduces turnover in the organization, promotes improved productivity, increases job satisfaction, reduces legal vulnerability (related to labor actions based on discrimination), values the corporate image, makes the organization more flexible as it facilitates adaptation to changes arising from incorporations, mergers or even outsourced services and promotes adequate recognition. Regarding facilitating adaptation to the profile of customers, for example, the manual mentions that after hiring employees from the Chinese language, Banco Montreal, in Canada, increased its business within the Chinese community by 400%, between 1990 and 1995. But also reports that in order to establish a structure of the diversity program with an educational dimension that effectively results in the points addressed, the commitment of the management and the participation of the teams must be encouraged, establish the strategies that must be aligned with the defined objectives, define the evaluation metrics that they must be carried out periodically and promote the integration of the entire program into the business context (ETHOS, 2000)[18]. The McKinsey report "Diversity Matters" (2015)[19], already highlightened the advantages in recruiting the best talents, greater customer orientation, greater employee satisfaction and better decision making as the main factors why different companies perform better, since these factors generate a kind of virtuous cycle of increasing returns. It also carried out a survey of 366 public companies from different sectors in the United States, Canada, Latin America and the United Kingdom, using composition of senior management and financial results data as metrics. The results showed that organizations with higher racial and ethnic diversity are 35% more likely to obtain financial returns above the average of their respective national industries, while those with higher gender diversity have 15%. In addition an udated study after that one called "Deliverying throug Diversity"(2018)[20] reinforces the link between diversity and company financial performance. Diversity hence may be considered one of the factors that generate competitive differential as it was found an uneven performance between companies in the same country

[18] http://bit.ly/347Etuc
[19] https://www.mckinsey.com/insights/organization/~/media/2497d4ae4b534ee89d929cc6e3aea485.ashx
[20] https://www.mckinsey.com/business-functions/organization/our-insights/delivering-through-diversity

and in the same sector of activity. Moreover very recently on the McKinsey report called "Diversity Matters: América Latina"(2020)[21] based on a study of 700 of the most importante Industries located in Brazil, Chile, Peru, Argentina, Colombia and Panama; seems to indicate that diversity makes all the difference, as was to be expected, to foster innovation and collaboration, better talent retention and happier work environments.

It is important to reinforce the idea that the increase in diversity in any dimension does not automatically imply more profit, but rather obtains more potential chances of success by making the most of the opportunities that different teams provide. Management that encourages and opens up new ideas promotes the search for differentiated solutions. Regarding this aspect , a survey by Hay Groups with 170 companies in Brazil [22] concerning the perception of employees about diversity in the work environment reveals that organizations where diversity is valued employees become 17% more engaged and willing to perform beyond their activities than in organizations that do not encourage such an environment. In addition, showed half of the conflicts, leadership is best evaluated by employees and there is a maximization of 20% in high performance and effectiveness. Regarding financial performance, data from market climate surveys between 2010 and 2014 conducted by the group show that net revenue grew 4.5 times more in organizations with more motivated employees. No doubt organizations should seek to identify the factors that lead to the engagement of their employees to improve overall performance. However stresses the fact that in Brazil the progress in structuring the management of an enviroment diversity is still moving slowly as compared to more developed countries such as the United States and Canada, as a matter of fact still only 5% of companies seek to know if employees perceive diversity in the corporate environment, while the other countries mentioned, already reach for times this value.

In order to publish the practices already carried out by companies in Brazil, and also to encourage their expansion, EXAME magazine published in 2019 a first edition of a Diversity Guide , based on the analysis of 109 companies that promote best practices and development of inclusion of minority groups and on the highlights of the Ethos Institute's evaluation (technical partner in the initiative) - which addresses the topic of socio-environmental responsibility in organizations (EXAME Diversity Guide)[23]. The edition highlights 36 companies (which are located in 13 different sectors of the economy), promotes the mottos of "Everyone wins without racism", "For an environment without prejudice", "They can be whatever they want" and "Inclusion far beyond the quota "; and discloses that the results are more innovation, more profitability and more opportunities for all. More recently, the 2020 version of the survey[24] showed that almost all of the 52 participating companies claim to promote diversity and inclusion as a sustainable way to achieve positive business results, although they may still have a long way to go.

Diversity seems to be today the most adopted trend as may be seen on the "Global Recruiting Trends 2018" (Linkedin Talent Solutions, 2018)[25] reported that diversity is the most adopted trend, the result of a global average of 78% of acquisition and talent leaders and hiring managers who claim that this trend affects the way they hire. It was also shared the average percentage of the indicator in relation to some countries that stand out in the subject, as shown in figure 1. Regarding interview techniques, it was

[21] https://www.mckinsey.com/br/our-insights/diversity-matters-america-latina
[22] https://gwa.com.br/cliente/hay-group/noticias/noticia-14-10-15.pdf
[23] https://exame.abril.com.br/negocios/as-empresas-premiadas-pelo-guia-exame-de-diversidade-2019/
[24] https://www.ethos.org.br/cedoc/guia-exame-de-diversidade-divulga-resultados/
[25]https://business.linkedin.com/content/dam/me/business/en-us/talent-solutions/resources/pdfs/linkedin-global-recruiting-trends-2018-en-us2.pdf

reported that new techniques tend to complement traditional forms, such as online assessments soft skills ("social skills" - skills related to personality and which directly influence professional behavior) help to better know candidates, providing a more holistic image of them at the beginning of the process. This type of evaluation in the report is considered as the most used innovation in recruitment, with a representativeness of 59%. Focusing on soft skills such as cognitive flexibility, creativity and emotional intelligence may be considered a trend, since, when confronted with technological reality, hard skills ("technical skills") are easily replaced.

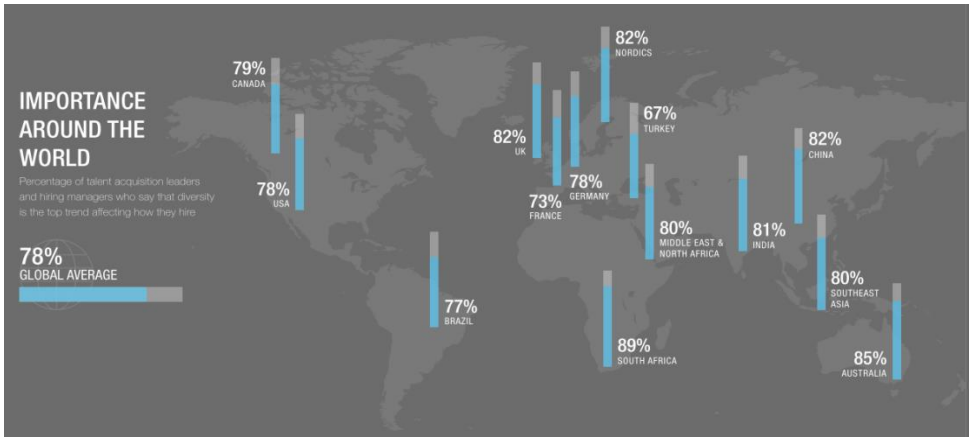

Figure 1 Importance of Diversity Concerning Hiring around the World

Source: Linkedin Talent Solutions (2018).

Encouraging a neutral selection with the objective of eliminating biases, preferences and even prejudices present in the processes is fundamental to bring a plurality of talents that bring different experiences, cultures, thoughts and ideas. For this to happen, information regarding gender, age, race / ethnicity and physical aspects, for example, are not considered. Moreover Artificial Intelligence (AI) and Machine Learning (ML) algorithms become facilitating allies for the diversity gap in the work environment, but it is important to ensure that previous data is not included since may impact information, after all, the software learns from the data and reproduces it automatically in order to propose solutions that assist in the decision-making process.

We know that the future is uncertain, but this shouldn't be a hindrance, since trends arise that may help to deal with uncertainties. Organizations use the brainstorming when they need new ideas or create creative solutions for their business, as well as other possibilities like Canvas and Design thinking. Bringing diversity into this context helps to potentiate the process, thus finding different driving forces (environmental forces that have implications where there is critical uncertainty); and finding them may made possible to identify patterns to understand the events and only then define action plans (Van de Heijiden, 2009).

One may hence concluded that investment in diversity in the corporate environment is a path that could give rise to motivation, dedication and a more pleasant organizational climate for employees, creativity and innovation for business ideas and, consequently, better financial results for the organization. However, in order to actually foster development and progress as a result from this whole process, it is essential that the organization its culture as a solid base and no only as a strategy to obtain competitive advantage.

4 Barriers in the Recruitment and Selection Process

Now the question arrises regarding the fact that once known the benefits of including and managing the concept of diversity by the body of organizations why is taking so much time to see this in practie at organziations. According to a Linkedin Talent Solutions survey (2018)[26] regarding biggest barriers to promoting diversity, 38% of the problem consist in finding different candidates to interview, 27% in retaining different employees, 14% in getting different candidates to pass the stage interviews and 8% in making several candidates accept the job proposal. Moreover according to this survey that included 9000 recruties and hiring managers form 39 countries "Diversity is the biggest game-changer and most embraced trend with over half of companies are already tackling it head-on". Hence viewing these numbers, it is possible to infer that much of the difficulty is exactly in the recruitment and selection process, as well as changing the cultural mind set of the organizations.

The fact is that qualified labor has not being keeping pace with demand. The skill gaps highlight that educational and socioeconomic issues must be deal as necessary social changes to promote effective change. In the meantime, employers must continue to compete for talent that as shown before is considered scarce by companies and in parallel, developing skills within their own organizations - and obviously taking care to retain them. As a matter of fact regarding recruiting and retaining young talent, the Diversity Matters McKinsey report(2015) mentioned before already mentions that a survey of 2,700 employers shows that only about one third of them believe they are doing a good job.

As part of the searching process for attracting and selecting a diversity of candidates, it is essential to highlight that bellow that there is still the challenge to engage the high leadership of organizations on their impact on the management of diversity. For this purpose one needs to reinforce the importance of the Training and Development area in encouraging and updating leadership on the management process of their teams, which tend to be more diverse, and even to identify and eliminate attitudes rooted in this process that do not match the strategies outlined by the organization. In addition, it is important to understand that management goes beyond the concept of equality and surrounds the concept of equity since after all people are different and have different needs, and organizations need to foster allingment in order to achieve the desired success as recommended by Richard Barrett (2017).

5 Conclusions

The methodological approach included first a study regarding cultural diversity and its respective historical and socio-cultural conditions in determining the current situation of the labor market, focusing on the Brazilian scenario, aiming at obtaining more in-depth and specific knowledge. Given the broad nature of the theme, the approach selected to guide the article was the Recruitment and Selection process, which allows the beginning of a diversity management. In addition included an analysis and comparison of the available labor market data, from the McKinsey & Company, Linkedin and the Ethos Institute report mentioned before; as well as data from the National Household Sample Survey (PNAD) Continuous of the Brazilian Institute of Geography and Statistics (IBGE)[27] allows to easily observe significant differences between variables. The Continuous PNAD takes place through a sample of households in order to follow continuous information on the insertion of the population in the workforce, associated with demographic and educational characteristics as well as for the study of the socioeconomic

[26]https://business.linkedin.com/content/dam/me/business/en-us/talent-solutions/resources/pdfs/linkedin-global-recruiting-trends-2018-en-us2.pdf

[27] https://agenciadenoticias.ibge.gov.br/media/com_mediaibge/arquivos/81c9b2749a7b8e5b67f9a7361f839a3d.pdf

development of Brazil. The information contemplates the period from 2012 to 2018 in order to portray a current context of the theme, although data prior to that period were approached to enable a comparative analysis of evolution.

In spite of the fact that they represent the majority of the population after 2005, according to population data consolidated by the Portrait of Gender and Race Inequalities collected annually by the Applied Economic Research Institute (IPEA) mentioned before, the various groups that represent cultural diversity actually represent a minority of the shareholders due to the difference in social treatment they still receive, so that access to job opportunities does not fall short of this reality.

Given that, the purppose of this study was to seek ways that may lead to encourage a change of context based on the positive results that management of cultural diversity provides in organziations, it was found that existing literature is still very limited regading the vision of diversity focusing mostly on the gender diversity, which is essential but does not represent the concept of cultural diversity as a whole, particularly in developing countries like Brazil. It may be for this reason that the advances found, even at a slow pace, both in Brazil and in the world, are related with exactly this category. According to data from the International Labor Organization (ILO)[28], in a global scenario, in particular female participation in the workforce grew still very slowly, on average, 0.5% in the period between 2012 and 2015 and 0.3% in the period between 2015 and 2018. In the Brazilian scenario, this share for the same periods increased by 1.16% and 1.82% respectively. Hopefully Goal 5 of Agenda 2030 may eventually help dealing with this challenge[29], and also the OECD is keeping a closed eye on Gender Wage Gaps[30].

We may finally conclude that, eventhough there is not yet enough work regarding the need for Integration Cultural Diversity in Organziations, a global crises like the one we are living now with the Pandemia may open new alternatives for dealing with new challenges with the help of more powerfull diversity teams that may help to improve Organizacional Performance as a whole.

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Executive Equity Incentive, Intellectual Capital and Financial Performance: A Comparative Study between High-tech and Non-high-tech Enterprises

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Abstract: In the context of China's economic development model transforming from high-speed to high-quality, the driving force of enterprise development has shifted from material capital to intellectual capital. According to the Value Added Intellectual Capital (VAIC) model developed by Public, human capital, structural capital and relational capital were quantified to explore their impacts on financial performance, as well as the moderating effect of executive equity incentive. The results showed that human capital and structural capital could significantly improve financial performance; executive equity incentive could significantly promote the positive impacts of the three components of intellectual capital on financial performance in high-tech enterprises, but could weaken the positive impacts of human capital and structural capital on financial performance in non-high-tech enterprises. Based on the comparative study of high-tech and non-high-tech enterprises, this paper put forward some useful suggestions and enlightenments for Chinese enterprises to organize intellectual capital investment activities and improve the equity incentive mechanism.
Keywords: Executive equity incentive; Intellectual capital; Financial performance; High-tech enterprises; Non-high-tech enterprises

1 Introduction

China's economic development model had been transforming from high-speed to high-quality, according to the 19th CPC National Congress. In this context, intellectual capital has replaced physical capital as the new core driver of economic growth. In recent years, technology-intensive high-tech enterprises has been springing up, according to the data of Torch High-tech Industry Development Center (under the Ministry of Science and Technology), from 2013 to 2018, the annual average growth rate of the number of high-tech enterprises was 25.91%, whose operating income rose 15.21% annually. The high-tech industry has become the new pillar of the national economy. Under the background of rapid social development and fierce market competition, how to dig deep into the internal and external resources of the enterprise to win sustained and stable competitive advantages, is the key issue of corporate governance in era of knowledge economy.

Intellectual capital was proposed by foreign scholars in the early stage, as a dynamic capital, it was considered as the most valuable asset of an enterprise (Stewart T et al., 2000). Domestic scholars have carried out active researches as well. After refining the existing theories, domestic scholars put forward that intellectual capital was the organic combination of internal and external resources owned or controlled by an organization, it was also the knowledge and ability which could create value consistently (Tian Guoshuang et al., 2019). The exploration of the constitution of intellectual capital had gone through a process from the binary structure theory, the ternary structure theory, to the pluralistic structure theory. The most classical and widely accepted theory is the ternary structure theory represented by Stewart, that is, human capital, structural capital and relational capital constitute intellectual capital.

Domestic and foreign literature has generally reached a consensus on that intellectual capital as a whole could promote corporate financial performance (Hashim M J et al., 2016; Gogan L M et al., 2016); however, there is still no agreement on the influences of its each component on performance. With the help of Public's Value Added Intellectual Coefficient and structural equation model, some scholars proved that all components of intellectual capital played a significant role in increasing corporate performance (Wei Linying, 2017; Kanishka Gupta et al, 2020); while some scholars found that not all the components of intellectual capital could promote the growth of financial performance, some components could weaken it in some cases (Xu Qinghua, 2017; Anwar Muhammad et al., 2020). Therefore, it is necessary to study the financial performance contribution of each component of intellectual capital in different situations.

Intellectual capital is the sum of all the resources that could bring economic benefits to an organization. But how could enterprises stimulate the vitality and potential of intellectual capital more effectively? The 19th CPC National Congress pointed out that taking effective property right incentive measures to energize the micro subjects. Up till now, the executive equity incentive policy has been adopted and implemented to a certain extent in Chinese enterprises. As a long-term incentive, what sparks could be generated by its combination with intellectual capital in different industries, is still a new subject

worth discussing. Considering that business scope and nature of high-tech enterprises and non-high-tech enterprises are quite different, the core driving force of value creation of the two may be quite different too. Therefore, a comparative study was carried out based on the data of high-tech and non-high-tech enterprises respectively.

2 Theoretical Basis and Research Hypothesis

2.1 Constitutions of intellectual capital

The exploration of the constitution of intellectual capital had gone through a process from the binary structure theory, the ternary structure theory, to the pluralistic structure theory. Later scholars continued to expand, deepen and refine on this basis, but the essence never changed. The most classical and widely accepted theory is the ternary structure theory represented by Stewart, that is, human capital, structural capital and relational capital constitute intellectual capital.

Human capital refers to the knowledge, skills, experiences and abilities attached to executives, technicians and other employees. Structural capital refers to the stable governance mechanism, institutional norms, organizational structure and corporate culture, which is deeply rooted in an organization, and does not move with the flow of employees. Relational capital refers to the relationship between the enterprises and the government, customers, business partners, suppliers and other stakeholders.

2.2 Intellectual capital and financial performance

As the source of competitive advantages of enterprises, the value-driven role of intellectual capital has been the focus of academic attention. It has generally reached a consensus on that intellectual capital as a whole could significantly promote organizational performance. As for the effects of the components of intellectual capital on financial performance: with the help of structural equation model, Wei Linying proved that all of the components of intellectual capital significantly promoted the improvement of corporate performance (Wei Linying, 2017); according to modified version of Public's Value Added Intellectual Coefficient, Kanishka Gupta et al. found that human capital, relational capital and structural capital had a significant role in increasing the profitability of the firm (Kanishka Gupta et al, 2020).

Based on the above discussion, this paper proposed Hypothesis 1 to Hypothesis 3:

Human capital (H_1), structural capital (H_2) and relational capital (H_3) could promote financial performance.

2.3 Equity incentive, intellectual capital and financial performance

Contemporary corporate governance model separates ownership from management, both the agency theory and the convergence of interests hypothesis reveal that, if unable to share the operating results, the operators would generally tend to avoid risks and adopt short-sighted behaviors. The disunity of residual value acquisition right and control right is the key reason of agency costs. The executive equity incentive combines the personal interests of managers with the future development of organizations by giving managers certain shares, in order to encourage managers to participate in the operation and management more actively, and be more concerned about the long-term development of the enterprise.

Intellectual capital investment has higher costs and higher return risks, according to the agency theory, management layer has an incentive to reduce or even give up it. Studies have found that executive incentive and equity policy could effectively alleviate the agency problems in intellectual capital investments (Ren Junyi, 2019), equity governance and executive incentive could significantly improve the efficiency of intellectual capital value creation (Fu Chuanrui, 2016). Some scholars have confirmed that executive incentive policies were effective in technology-intensive industries (Li Lianyan, 2017; Marta Buenechea-Elberdin, 2017).

Based on the above discussion, this paper proposed Hypothesis 4 to Hypothesis 6:

In high-tech listed companies, executive equity incentive could enhance the roles of human capital (H_{4a}), structural capital (H_{5a}) and relational capital (H_{6a}) in promoting financial performance.

In non-high-tech listed companies, executive equity incentive could inhibit the roles of human capital (H_{4b}), structural capital (H_{5b}) and relational capital (H_{6b}) in promoting financial performance.

3 Research Design

3.1 Sample selection and data sources

The research data was from the financial statements of China's listed companies from 2013 to 2018. In order to ensure the reliability of the research results, after eliminating ST and ST* companies and sample companies with missing data, 2950 observed values were finally selected, among which there were 2233 observed values in high-tech industries and 717 in non-high-tech industries. The confirmation standards of high-tech companies referred to *The Administrative Measures for the Recognition of High-*

tech Enterprises, which was issued by the ministry of science and technology, the ministry of finance and the state administration of taxation. This paper selected listed companies whose business scope of products or services involves electronic information, biomedicine, aerospace, new materials, new energy and energy conservation, resources and environment, high-tech services and other key industries supported by the state. All sample data were obtained from the CSMAR database and analyzed by the Stata15.1 software.

3.2 Variable selection

3.2.1 Explained variable

Return on total assets (ROA) could reflect the value created by per unit of assets. Compared with return on equity (ROE), ROA has less risks of being manipulated by operators, and is one of the commonly accepted financial performance evaluation indicators.

3.2.2 Explanatory variable

Referring to Value Added Intellectual Capital (VAIC) model developed by Public, human capital, structural capital and relational capital appreciation coefficients were selected as explanatory variables:

Human capital appreciation coefficient (HCE)=VA/PC

Structural capital appreciation coefficient (SCE)=(VA-PC)/VA

Relational capital appreciation coefficient (RCE)=VA/RC

In the formulas, value added (VA) is represented by the sum of personnel costs (PC: "Cash paid to and for employees" in the cash flow statements), profit before tax and interest ("Financial expenses" in the income statements); resource cost (RC) is represented by "selling expenses" in the income statements.

3.2.3 Moderator variable

Executives Equity Incentive (EEI) was represented by the proportion of accumulative shares of equity incentives obtained by senior managers in the total number of shares.

3.2.4 Control variable

In addition to the above explanatory variables, financial performance is also affected by other factors, so the following control variables are selected. ①Company Size (Size): represented by the logarithm of total assets; ②Financial Leverage (Level): represented by asset-liability ratio; ③Equity Concentration Degree (CON): represented by the sum of the shareholding ratios of the top ten shareholders; ④ Proportion of State-owned Shares (SSP): represented by proportion of state-owned shares; ⑤High-tech Industry or Not: dummy variable, high-tech enterprise is 1, otherwise is 0.

The comprehensive information of each variable was shown in Table 1.

Table 1 Variable Names and Definitions

Variable Types	Variable Names	Variable Symbols	Variable Definitions
Explained Variable	Financial Performance	ROA	Net profit after tax/Total assets
Explanatory Variable	Human Capital Appreciation Coefficient	HCE	Value added/Personnel costs
	Structural Capital Appreciation Coefficient	SCE	（Value added-staff cost）/Value added
	Relational Capital Appreciation Coefficient	RCE	Value added/Sales expenses
Moderator Variable	Executives Equity Incentive	EEI	Shares held by Executives/Total capital stock
Control Variable	Company Size	Size	Log of total assets

	Financial Leverage	Level	Asset-liability ratio
	Equity Concentration Degree	CON	The sum of the shareholding ratios of the top ten shareholders
	Proportion of State-owned Shares	SSP	State-owned shares/Total capital stock
	High-tech Industry or Not	T	Dummy variable, high-tech enterprise is 1, otherwise is 0.

3.3 Model building

Based on H_1 to H_6, this paper constructs the following regression model in turn:

Model 1:

$$ROA = \alpha_1 HCE + \alpha_2 Size + \alpha_3 Level + \alpha_4 CON + \alpha_5 SSP + \alpha_6 T + \varepsilon$$

Model 2:

$$ROA = \alpha_1 SCE + \alpha_2 Size + \alpha_3 Level + \alpha_4 CON + \alpha_5 SSP + \alpha_6 T + \varepsilon$$

Model 3:

$$ROA = \alpha_1 RCE + \alpha_2 Size + \alpha_3 Level + \alpha_4 CON + \alpha_5 SSP + \alpha_6 T + \varepsilon$$

Model 4:

$$ROA = \alpha_1 HCE + \alpha_2 EEI + \alpha_3 HCE \times EEI + \alpha_4 Size + \alpha_5 Level + \alpha_6 CON + \alpha_7 SSP + \alpha_8 T + \varepsilon$$

Model 5:

$$ROA = \alpha_1 SCE + \alpha_2 EEI + \alpha_3 SCE \times EEI + \alpha_4 Size + \alpha_5 Level + \alpha_6 CON + \alpha_7 SSP + \alpha_8 T + \varepsilon$$

Model 6:

$$ROA = \alpha_1 RCE + \alpha_2 EEI + \alpha_3 RCE \times EEI + \alpha_4 Size + \alpha_5 Level + \alpha_6 CON + \alpha_7 SSP + \alpha_8 T + \varepsilon$$

4 Empirical Analysis

4.1 Descriptive statistics analysis

Descriptive statistics analysis was conducted based on all the samples, high-tech and non-high-tech industry samples in turn, and the results were shown in Table 2.

Table 2 Descriptive Statistics Analysis Results

Sample Classification	Variable	Sample Size	Mean	Standard Error	Min	Max
All the Samples	ROA	2950	0.057	0.044	-0.468	0.379
	HCE	2950	2.736	2.258	-7.709	37.274
	SCE	2950	0.517	0.392	-16.332	6.521
	RCE	2950	31.633	365.108	-10.156	17251.81
	ICE	2950	34.885	365.475	-16.735	17259.31
	EEI	2950	0.064	0.129	0	0.683
	Size	2950	22.554	1.38	19.218	28.253
	Level	2950	0.399	0.194	0.029	0.917
	CON	2950	57.418	13.754	12.707	96.139
	SSP	2950	3.647	12.095	0	83.68
	T	2950	0.757	0.429	0	1
Samples of High-tech Listed Companies	ROA	2233	0.058	0.044	-0.468	0.379
	HCE	2233	2.563	2.12	-7.709	37.274
	SCE	2233	0.502	0.429	-16.332	6.521
	RCE	2233	32.085	412.19	-10.156	17251.81
	ICE	2233	35.15	412.62	-16.735	17259.31
	EEI	2233	0.073	0.136	0	0.683
	Size	2233	22.317	1.222	19.218	27.064
	Level	2233	0.365	0.176	0.029	0.79
	CON	2233	56.401	13.588	12.707	94.593

	SSP	2233	3.551	11.638	0	77.33
Samples of Non-high-tech Listed Companies	ROA	717	0.052	0.045	-0.041	0.258
	HCE	717	3.275	2.572	0.321	22.872
	SCE	717	0.562	0.234	-2.113	0.956
	RCE	717	30.224	139.3	0.46	1904.701
	ICE	717	34.061	139.294	-1.138	1908.52
	EEI	717	0.039	0.101	0	0.662
	Size	717	23.294	1.572	20.338	28.253
	Level	717	0.504	0.21	0.04	0.917
	CON	717	60.584	13.795	22.296	96.139
	SSP	717	3.945	13.424	0	83.68

Note: *ICE* (Intellectual Capital Appreciation Coefficient)=*HCE+SCE+RCE*

4.1.1 Descriptive statistics analysis of financial performance

The average return on assets for all the samples was 5.7%, high-tech and non-high-tech listed companies were 5.8% and 5.2% respectively, which reflected that financial performance of high-tech companies was better than that of non-high-tech companies.

4.1.2 Descriptive statistics analysis of intellectual capital

On the whole, the average value of ICE was 34.885, which was 35.15 and 34.061 respectively in high-tech and non-high-tech listed companies. It reflected that the intellectual capital appreciation ability of high-tech companies was stronger. Specifically, HCE and SCE in high-tech companies were lower than that in non-high-tech companies, considering the calculation formulas of the indexes, high personnel costs in the high-tech industry may be one of the reasons. Relational capital appreciation efficiency in high-tech industry was better than that in non-high-tech industry. RCE had the largest standard error, indicating that the value-added efficiency of relational capital varied greatly among enterprises.

4.1.3 Descriptive statistics analysis of executives equity incentive

The average shareholding of senior executives of all the samples was 6.4%, which were 7.3% and 3.9% respectively in high-tech and non-high-tech companies. It reflected that the executive equity incentive intensity of high-tech companies was much higher than that of non-high-tech companies, and high-tech companies had a more positive attitude towards the implementation of equity incentive.

4.1.4 Descriptive statistics analysis of equity structure and nature

From the average level, the equity of high-tech companies was more dispersed than that of non-high-tech companies, and the proportion of state-owned shares was also lower.

4.2 Multiple linear regression analysis

4.2.1 Intellectual capital and financial performance

Data of all the samples, high-tech and non-high-tech listed companies were taken into Model 1-Model 3 respectively, for multiple linear regression analysis. The results were shown in Table 3.

Table 3 Multiple Linear Regression Results of Model1-Model 3

Variable	**All the Samples**			**High-tech Listed Companies**			**Non-high-tech Listed Companies**		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA
HCE	0.007***			0.008***			0.005***		
	0			0			-0.001		
SCE		0.027***			0.023***			0.068***	
		-0.002			-0.002			-0.005	
RCE			0			0			0
			0			0			0

Size	0.003***	0.005***	0.006***	0.003***	0.007***	0.008***	0.003**	0.001	0.004***
	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Level	-0.103***	-0.110***	-0.115***	-0.085***	-0.101***	-0.106***	-0.136***	-0.124***	-0.133***
	-0.005	-0.005	-0.005	-0.006	-0.006	-0.006	-0.008	-0.008	-0.009
CON	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.001***	0.001***	0.001***
	0	0	0	0	0	0	0	0	0
SSP	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	0	0	-0.000*
	0	0	0	0	0	0	0	0	0
T	0.001	0	-0.001						
	-0.002	-0.002	-0.002						
_cons	-0.006	-0.049**	-0.063***	-0.005	-0.079**	-0.095**	0.009	0.008	-0.008
	-0.014	-0.015	-0.015	-0.018	-0.018	-0.019	-0.022	-0.022	-0.024
Obs.	2950	2950	2950	2233	2233	2233	717	717	717
R-squared	0.3	0.247	0.193	0.272	0.2	0.15	0.433	0.458	0.34

***** p<0.01, ** p<0.05, * p<0.1**

The regression results of Model 1 and Model 2 revealed that, HCE and SCE were significantly positively correlated with ROA at the 1% level, which revealed that both human capital and structural capital played important roles in enterprise value creation, H_1 and H_2 were supported. Furthermore, HCE of high-tech companies was larger, which reflected that human capital contributed more to value increment in high-tech industry; SCE of non-high-tech companies was larger, which reflected that structural capital contributed more to value increment in non-high-tech industry. Human capital contained in employees is the core and source of intellectual capital. In particular, high-tech enterprises are technology-intensive and rapidly updated, whose value creation is more dependent on employees' knowledge, skills and subjective initiative. However, in non-high-tech enterprises dominated by traditional industries, scientific corporate governance mechanism, standardized organizational structure and good corporate culture contribute more to the value creation.

The regression results of Model 3 revealed that RCE had no significant influence on ROA, that was, the direct effect of relational capital on the performance growth of high-tech or non-high-tech industries has not been found, H_3 has not been supported.

4.2.2 Moderating effects of executive equity incentive on the relationship between intellectual capital and financial performance

Moderator variable EEI and its cross-product terms HCE × EEI、SCE × EEI、RCE × EEI were introduced into Model 1–Model 3 to construct Model 4–Model 6. In order to eliminate the interference of multicollinearity, the cross-product terms were centralized. Data of high-tech and non-high-tech listed companies were taken into Model 4-Model 6 respectively. The regression results were shown in table 4.

Table 4 Multiple Linear Regression Results of Model4-Model6

Variable	**High-tech Listed Companies**			**Non-high-tech Listed Companies**		
	Model 4	Model 5	Model 6	Model 4	Model 5	Model 6
	ROA	ROA	ROA	ROA	ROA	ROA
EEI	-0.026**	-0.150***	0.014*	0.013	0.065**	-0.043***
	-0.011	-0.016	-0.008	-0.023	-0.032	-0.015
RCE	0.007***			0.006***		
	0			-0.001		

HCE × EEI	0.015***			-0.016**		
	-0.003			-0.008		
SCE		0.018***			0.072***	
		-0.002			-0.006	
SCE × EEI		0.320***			-0.179***	
		-0.028			-0.062	
RCE			0			0
			0			0
RCE × EEI			0.001**			0
			-0.001			0
Size	0.003***	0.006***	0.008***	0.002**	0.001	0.003***
	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Level	-0.083***	-0.097***	-0.105***	-0.135***	-0.126***	-0.132***
	-0.006	-0.006	-0.006	-0.008	-0.008	-0.009
CON	0.000***	0.000***	0.000***	0.001***	0.001***	0.001***
	0	0	0	0	0	0
SSP	-0.000***	-0.000***	-0.000***	0	0	-0.000*
	0	0	0	0	0	0
_cons	-0.007	-0.055***	-0.107***	0.011	0.006	0.005
	-0.018	-0.018	-0.019	-0.023	-0.022	-0.025
Obs.	2233	2233	2233	717	717	717
R-squared	0.281	0.246	0.157	0.44	0.466	0.348

***** p<0.01, ** p<0.05, * p<0.1**

The regression results revealed that the executive equity incentive had different moderating effects on the two types of enterprises:

In the high-tech listed companies, HCE×EEI, SCE×EEI, RCE×EEI were all significantly positively correlated with ROA at the 1% level, that was, executive equity incentive could significantly enhance the promotion effect of three components of intellectual capital on financial performance, H_{4a}, H_{5a} and H_{6a} were supported.

In non-high-tech companies, both HCE×EEI and SCE×EEI were significantly negatively correlated with ROA at the 1% level, there was no significant correlation between RCE×EEI and ROA. It revealed that executive equity incentive would weaken the promotion effect of human capital and relational capital on financial performance, H_{4b} and H_{5b} were supported, but H_{6b} were not.

The empirical results showed that in high-tech enterprises, the synergistic effects of executive equity incentive and three components of intellectual capital could promote the growth of financial performance. Equity incentive, as a long-term incentive measure, could effectively stimulate the enthusiasm and responsibility of executive, which was beneficial to leverage employees' strength and potential, organizational structure, mechanism and culture, as well as relational network. In non-high-tech enterprises, equity incentive for executives was not an ideal incentive means, whose linkage with human capital and structural capital could not effectively promote value appreciation, but would result in the shrinkage of financial performance.

The above empirical results also revealed that the more concentrated the equity, the better the financial performance of listed enterprises. However, in high-tech listed enterprises, the higher the proportion of state-owned shares, the more it would inhibit the growth of performance.

4.3 Robustness test

In order to verify the reliability of the conclusions, a robustness test was carried out. The explanatory variable was replaced by return on net equity (ROE), and the same models were used to verify the hypotheses. The empirical results were shown in table 5 and table 6.

Table 5 Robustness Test Results of Model1-Model3

	All the Samples			High-tech Listed Companies			Non-high-tech Listed Companies		
Variable	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	ROE	ROE	ROE	ROE	ROE	ROE	ROE	ROE	ROE

HCE	0.011***			0.012***			0.011***		
	-0.001			-0.001			-0.001		
SCE		0.042***			0.034***			0.132***	
		-0.003			-0.003			-0.009	
RCE			0			0.000*			0
			0			0			0
Size	0.005***	0.009***	0.011***	0.004***	0.010***	0.012***	0.006***	0.004**	0.009***
	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002	-0.002	-0.002
Level	-0.014*	-0.026***	-0.034***	0.012	-0.013	-0.019**	-0.069***	-0.047***	-0.064***
	-0.007	-0.008	-0.008	-0.009	-0.009	-0.009	-0.014	-0.013	-0.015
CON	0.001***	0.001***	0.001***	0.000***	0.001***	0.001***	0.001***	0.001***	0.001***
	0	0	0	0	0	0	0	0	0
SSP	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	0	0	0
	0	0	0	0	0	0	0	0	0
T	0.004	0.001	-0.001						
	-0.003	-0.003	-0.003						
_cons	-0.074***	-0.146***	-0.167***	-0.059**	-0.170***	-0.193***	-0.091**	-0.092**	-0.125***
	-0.023	-0.024	-0.024	-0.028	-0.029	-0.029	-0.038	-0.037	-0.042
Obs.	2950	2950	2950	2233	2233	2233	717	717	717
R-squared	0.186	0.12	0.058	0.178	0.103	0.055	0.249	0.293	0.083

***** p<0.01, ** p<0.05, * p<0.1**

Table 6 Robustness Test Results of Model1 4-Model 6

Variable	**High-tech Listed Companies**			**Non-high-tech Listed Companies**		
	Model 4	Model 5	Model 6	Model 4	Model 5	Model 6
	ROE	ROE	ROE	ROE	ROE	ROE
EEI	-0.026	-0.186***	0.018	-0.017	0.065	-0.060**
	-0.017	-0.026	-0.012	-0.038	-0.054	-0.026
RCE	0.011***			0.011***		
	-0.001			-0.001		
HCE × EEI	0.016***			-0.006		
	-0.005			-0.013		
SCE		0.029***			0.137***	
		-0.003			-0.01	
SCE × EEI		0.396***			-0.183*	
		-0.045			-0.105	
RCE			0.000*			0
			0			0
RCE × EEI			0.002*			0
			-0.001			0
Size	0.005***	0.009***	0.013***	0.006***	0.004*	0.008***
	-0.001	-0.001	-0.001	-0.002	-0.002	-0.002
Level	0.014	-0.007	-0.018*	-0.067***	-0.048***	-0.062***
	-0.009	-0.009	-0.009	-0.014	-0.013	-0.015
CON	0.000***	0.000***	0.001***	0.001***	0.001***	0.001***
	0	0	0	0	0	0
SSP	-0.000***	-0.000***	-0.000***	0	0	0
	0	0	0	0	0	0
_cons	-0.062**	-0.141***	-0.209***	-0.083**	-0.094**	-0.106**
	-0.029	-0.029	-0.03	-0.039	-0.038	-0.043

Obs.	2233	2233	2233	717	717	717
R-squared	0.183	0.135	0.059	0.252	0.297	0.09

***** p<0.01, ** p<0.05, * p<0.1**

5 Conclusions

In the context of China's economic development model transforming from high-speed to high-quality, the driving force of enterprise development has shifted from material capital to intellectual capital, especially for high-tech enterprises with highly intensive knowledge and technology. As a long-term incentive mechanism, executive equity incentive may stimulate the vitality and potential of intellectual capital. Based on the comparative study of high-tech and non-high-tech enterprises, this paper explored the relationship between the three components of intellectual capital and financial performance, as well as the moderating effect of executive equity incentive on the relationship between them.

The findings were as follows :firstly, human capital and structural capital could significantly promote the financial performance of both the high-tech and non-high-tech listed companies; secondly, there was no significant correlation between relational capital and financial performance; thirdly, executive equity incentive could significantly promote the positive impacts of the three components of intellectual capital on financial performance in high-tech listed companies, but could weaken the positive impacts of human capital and structural capital on financial performance in non-high-tech listed companies.

Based on the research results, the following suggestions were made for China's high-tech and non-high-tech enterprises:

Above all, high-tech enterprises should strengthen the investment in human capital. When both human and structural capital had positive effects on financial performance of high-tech enterprises, the contribution of human capital to value increment was greater. High-tech enterprises have a high degree of knowledge and technology intensity, which determines that its dependence on human capital is much higher than that of non-high-tech enterprises. Therefore, the resource allocation decision of high-tech enterprises should be more inclined to human capital, focusing on the introduction and training of talents. It is precisely the knowledge, skills, experiences and abilities inspired from executives, technicians and other employees that are the core driving force for the development and performance growth of high-tech enterprises.

Secondly, non-high-tech enterprises should increase the investment in structural capital. In non-high-tech enterprises, compared with human capital, structural capital contributes more to financial performance appreciation. Most of the non-high-tech enterprises are in traditional basic industries, whose financial performance growth mainly comes from the standardized and mature production process, and tangible assets account for an absolute proportion in the asset composition. Therefore, non-high-tech enterprises should pay more attention to the investment of internal structure capital. Scientific and perfect corporate governance mechanism, institutional norms, organizational structure and corporate culture are the basis for the efficient operation of non-high-tech enterprises.

Finally, high-tech enterprises should take more active measures in executive equity incentive policies, while non-high-tech enterprises should take more conservative measures. The core competitiveness of high-tech enterprises comes from technological innovation inspired by human capital. Technological innovation is characterized by high investment, high risk, long cycle and high added value, which requires managers of high-tech enterprises to have a long-term strategic vision. Executive equity incentive, as a long-term incentive mechanism, ties future development of the enterprise with operator's own interests, which helps to alleviate the "short-sighted" behavior tendency of senior executives and urges them to pay attention to the investment and accumulation of intellectual capital, especially human capital. However, non-high-tech enterprises have relatively mature production process and relatively stable market. Strengthening the policy of executive equity incentive would increase the management's excessive investment and other operational risks, which is not conducive to the steady growth of enterprise's financial performance.

There were still some limitations in this study: Firstly, this paper adopted VAIC model to quantify intellectual capital, which could not fully cover and stereoscopic reflect the intellectual capital status of enterprises. As intellectual capital is characterized by wide coverage, dynamic and uncertainty, and there is still a lack of general intellectual capital disclosure framework at home and abroad, therefore the quantification is somewhat difficult. Considering the availability and difficulty of data collection, VAIC was used to measure intellectual capital. The data were all derived from financial statements of listed companies. The data of labor cost comes from the "cash paid to employees and paid for employees" in the cash flow statement. This data is based on cash basis, while other variables in value appreciation are

based on accrual basis, and there is a problem of inconsistent measurement basis. Secondly, this study was only based on cross-sectional data and did not take into account the effects of hysteresis. The effects of equity incentive and intellectual capital on enterprise performance may not be only in the current period, but may have impacts on future periods. Thirdly, in terms of incentive methods, this paper only considered equity incentive, and the incentive objects were only for senior executives. In actual corporate governance, incentives are diversified, such as cash dividends, stock options, stock appreciation rights, and so on. In practice, the ideal incentive method is to combine various incentive methods and adopt a differentiated incentive mechanism according to the characteristics of different incentive objects.

In view of the above research limitations, further thoughts and prospects are made for future related researches: Firstly, more attention should be paid to the disclosure of intellectual capital information. It is hoped that a comprehensive and unified framework of intellectual capital information disclosure can be established, based on which a more scientific and operational quantitative model of intellectual capital can be constructed. Secondly, it is hoped that time span of the samples can be extended and multi-year panel data can be selected, in order to explore the hysteresis effects. Thirdly, it is hoped that more incentive methods can be taken into consideration and be scientifically quantified, so as to study the influences of various incentive methods and the synergistic effects among them.

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Opportunities and Challenges in Export Marketing in the Case of Ethiopian Vegetables and Fruits Commercial Exporters Practice

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Abstract: The digital Era pushes companies to internationalize their operation in the global market. Exporting has a vital role in economic development of a nation as well as for the development of the specific exporting company. Although, the benefits derived from exporting in an increasingly globalized marketplace are massive, nevertheless for many companies, exporting is forced by many challenges. The purpose of the study was to assess export marketing challenges of Ethiopian vegetable and fruit commercials. The study employed 11 Ethiopian vegetable and fruit commercial exporters. The research applied a mixed research design and analysis techniques specifically concurrent fixed approach. The Ethiopian vegetable and fruit commercial marketing export volume sales, reliability and forced by diverse challenges. The major challenges classified as internal and external barriers. Local investors were highly affected by both the internal and external barriers whereas foreign and joint ventures are affected in some extent with those problems. Less experienced commercials were highly affected by the export problems than more experienced. Management commitment problem, technological advancement problem, lack of logistics system, low awareness of stakeholders, shortage of infrastructure, government bureaucracy, lack of potential markets, and shortage of inputs were identified as problems for the vegetable and fruit export. Therefore, to minimize these problems creating enabling policy environment, fair and competitive air freight cost, the commercials to incorporate challenges in their export marketing strategy, the government to explore new markets, provide technical supports and long-term loans to growers, to create new competitive input suppliers, integration of stakeholders of the sector, and to recruit skilled manpower are forwarded as recommendations.

Keywords: Ethiopia; Export marketing opportunity; Ethiopian fruits and vegetables export; Export Marketing Challenges

1 Introduction

Ethiopia's fruits and vegetables productions and exports play a significant role in the local economy as a means of earning livelihoods for almost five million farmers, making jobs and generating foreign exchange revenues. Also, the fruit and vegetable commercial sub-sector is one of the priority strategic sectors recognized by the government for its potential, private sector investments and exports (Global Agricultural Information Network, 2018). Ethiopia considers fruit and vegetable commercials as being high-value strategic, agricultural export commodities. Production of fruit and vegetable crops in May 2017/18 is estimated at 780,000 metric tons. Export of fresh fruits and vegetables are projected to reach 22,000 metric tons, which represent only 3% of the total productions (Central Statistics Agency (CSA), and Ethiopian Revenue & Customs Authority (ERCA), 2017). However; in this commercial export marketing, the paper has identified major challenges in the global arena. Numerous researches offer indication about the potential in the production and export marketing of Ethiopian fruit and vegetable. Typically researched about the challenges and opportunities relating to the country's comparative

advantages such as, wide range of altitude, suitable climate, abundant labor, vast land and water resources. Even if it continuing earlier, Ethiopia's current vegetable and fruit export is very inadequate as it happening earlier than that of the late comer floriculture industry. Different researchers described that its trend lacks consistency and characterized by a slight fluctuation year on year basis Digafe, T. (2013). There is insufficient in identifying this export marketing related impediments in most of the literatures. The marketing related impediments involved in the sector have not yet been empirically explored. Hence the statement of the problem can be stated as what are the main export marketing related trails.

The general objective of this study is to assess challenges and opportunities of Ethiopian vegetable and fruit export marketing on the case of commercial exporters practices. Rely on this, the research paper has the following main specific objectives, to analyze the status of vegetables and fruits export in Ethiopia, to realize the major factors in the export performance of vegetables and fruits specific to the study area. The research paper is expected to contribute to a great extent to the government administrative offices and stakeholders in the selected study areas for their major role in enhancing the country's performance regarding the export of fruits and vegetables, creating additional information for policy makers, identify crucial areas of involvement, provide information for interested researchers and academicians for further analysis.

2 Literature Review

2.1 Export marketing

Export marketing is the most predominant mechanism by which firms engage with international markets, understanding the drivers of export market performance is a key to explaining firms' globally competitiveness (Morgan, N.A., Katsikeas, C.S. and Vorhies, D.W. 2011). Exporting is a fundamental strategy in ensuring firm's survival or growth, and firms may achieve competitive advantage in international markets with a positive influence on current and future export performance. Many companies recently allocate more attention and resources in order to export their products to foreign markets (Moghaddam, F.M., Abu Bakar, A., Abdul Rasid, S.Z. and Darestani, H. 2011). The marketing of vegetables and fruits is influenced by a number of factors that can be attributed to production, product, and market characteristics identified, these attributes as perishability, price, and product bulkiness. This, therefore, exposed farmers to lose large amount of product in the farm unsold Adugna, G.T. (2016).

2.2 Challenges of Export marketing

Under many new environments of any market system, majority of developing countries predicted to have different dilemmas and challenges in their agricultural sector exports. Most company which are engaged in the production and export of fruits and vegetables are found to be small in size. Thus, due to the small size of these products, exporters with their inadequate entrepreneurial and technical skills, face different challenges from participating in the international field of fruits and vegetables export marketing like inadequacy marketing research knowledge, limited access in producing differentiated products and weak entrepreneurial skills, Badaza E, (2017). Hence, export barriers are defined as challenges that hinder the ability of firm to initiate, develop or maintain export marketing activities of the firm, (Ahmed, Z.U, Julian, C.C, Baalbaki, I. & Hadidian, T.V.2004). Many researchers categorized export marketing problems into internal and external barriers categories. According to Tesfom, G. and Lutz, C. (2006), Liargovas, P.G. and Skandalis, K.S. (2008), Delgado (2006) identified export problems as related, production, marketing, economic and political environment.

According to World Bank (2017) identified the major constraints in Ethiopian high value export products as, high freight cost, insufficient cargo space, transport system, insufficient, existence of illegal

traders, poor packaging systems, lack of skilled manpower, infrastructure facilities, access to bank loan, and lack of comprehensive marketing feasibility.

2.3 Internal problems

The constraints associated with organizational capabilities and company approach to export business, Vohra, K. (2008). These problems are categorized as directly related to the controllable issues within the firm itself. Tesfom and Lutz (2006) classified internal barriers further in to company barriers and product barriers. Company barriers influence their choice of marketing strategy and ability to execute that marketing strategy (Porter (1985), cited in Tesfom and Lutz (2006). Marketing knowledge and information problems are about lack of knowledge of overseas markets, business practices, competition, and lack of management to generate overseas sales. On the other hand, distribution is a major problem area in exporting. Many exporters in developing countries lack of information about marketing channels and fail to establish marketing networks.

Many exporter companies in developing countries cannot operate for lack of adequate working capital, which endanger the entire production operation and adds cost (Kuppusamy, J. and Anantharaman, R.N. (2014).

Export marketing activities depend on the attitudes and characteristics of the managers, thus, human resource barrier is the key problem which holds back the success of the company. A company that takes into account the requirements for international activities in its human resource management practices, particularly for its managerial and professional employees is more likely to do better in its export attempts (Kuppusamy, J. and Anantharaman, R.N. (2014).

According to Tesom and Lutz (2006), put that product characteristics affect the competitive advantage and influence the choice between an offensive and a defensive export strategy. The product barriers that influence the export marketing strategy of the firm could be grouped into quality and technical adaptability. Quality barriers are related with packaging, meeting importers quality standards and establishing the suitable design and image for export markets. There are different quality standards in developing countries. Therefore, fulfilling those standards is mandatory for any exporting company in order to be competitive in the market (Maertens and Swinnen, J. (2009).

2.4 External problems

External barriers are rooted in the external environment and the firm itself has no control over the consequences of such barriers. These barriers are also referred to industrial barriers (Liargovas, P.G. and Skandalis, K.S. (2008), Tesfom and Lutz (2006). Industry barrier is the first category of external problems. The intensity of exporting activities and the nature of export marketing strategies differ considerably across industries. In order to develop a proper export marketing strategy, the differences between market systems, firm sizes and presence of foreign competitors across markets should be taken into account (Liargovas, P.G. and Skandalis, K.S. (2008). Competition barrier is another category of industry barriers. This when the information exists among competitors does not the same in the market. Inadequate information demotivates the firm to go for export and to withstand the existing competition with different exporters around the world (Karelakis, C., Mattas, K. and Chryssochoidis, G. (2016). Macro environment barriers are one of the external barriers. These are factors beyond the firm's control, which further classified in to direct and indirect export barriers. Direct export barriers include tariff and non-tariff barriers, cost of transportation; inadequate diplomatic support lack of export, complex government bureaucracies, infrastructure; and special customs requirements (Maertens, M. and Swinnen, J. (2009). Whereas Indirect export barriers are rooted in the macroeconomic policy of the country,

international trade agreements and foreign exchange rate policy. Therefore, after reeving the literatures and objective of the study, I have designed the following conceptual frame work model.

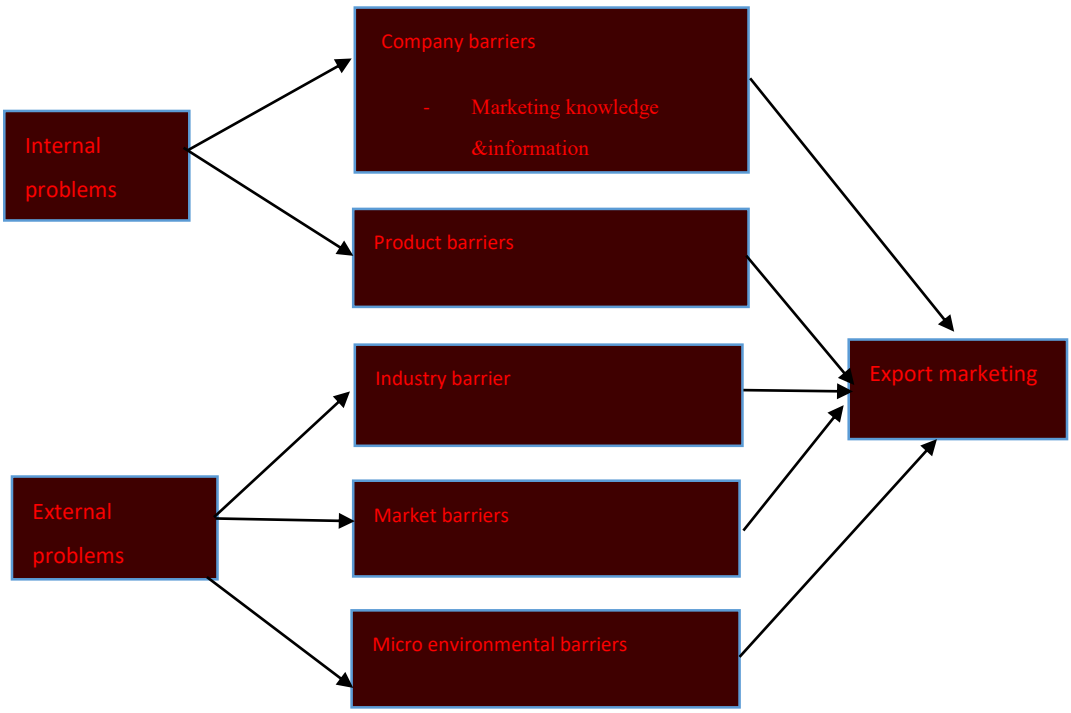

Figure 1 Conceptual Frame Work Model

3 Research Methodology

Descriptive research design was used to analyze demographic and some points on the structured questionnaires, in addition, the export data of the commercials are analyzed quantitatively. Exploratory research design has been employed to analyze the qualitative part of the findings, which include search of literature and interviews. The study employed 11 out of 20 active commercial exporters by doing sampling method which are located in Hawassa, Koka, Meki, Ziway, Debrezeit, Holeta, Sululta, Sendafa and Sebeta. The list of these commercials is obtained from Ethiopian Horticulture Development Agency (EHDA). The data was collected by both primary and secondary data sources. The primary data sources were all commercial exporters of the sector. These data were collected through structured questionnaires and gave to each commercial exporters, general managers, marketing managers and production managers. The data was collected by email due to collaboration of my friends. Then used secondary data, from export volume sales of exporters, articles, journals, reports, were cited for the reviewing related literatures. The questionnaires were developed thorough review of relevant literature for identifying various export challenges. Finally, structured questionnaires prepared on five different categories of challenges and was employed by a five-point Likert scale.

3.1 Methods of data analysis

Both quantitative and qualitative analysis techniques were employed. The data has been analyzed and presented using SPSS 25, Excel spreadsheet, tabulation, charts and graphs. The five-point Likert-scale questionnaires were analyzed by determining the cutoff value of the points and qualitative

technique was provided to analyze the interviews. The Problems with mean score of greater than 3.5 were considered most important in the exporting activities of the firms; mean scores between 2.5 and 3.5 were considered as moderately important and problems with mean score lower than 2.5 were considered as low degree of importance. The output of the interviews held with selected growers and stakeholders has been jot down and briefly discussed in the findings part of the study. The reliability analysis is done using SPSS 25. Cronbach's alpha was used to analyze the reliability of the data. A pilot test on 5 respondents has been considered before the actual data collection begun and a Cronbach alpha value of 0.887 was observed which is above the cutoff value of 0.70. After collecting from all the exporters, a Cronbach's alpha value of 0.849 was observed from 40 item being considered. Therefore, the data is reliable and internally consistent.

4 Presentation and Data Analysis

According to the tables, Exporters with lower than five years of experience are more affected by both the internal and external barriers than that of more experienced growers. The average score of internal barriers by less experienced growers was 3.19 (company barriers = 3.13 and product barriers = 3.26), and by more experienced growers was 2.91 (company barriers = 2.88 and product barriers = 2.95). From table 2, less experienced growers rated external barriers 3.24 (industry barriers = 3.39; export market barriers = 2.78, and macro-environmental barriers = 3.56), whereas more experienced growers rated the external barriers 3.15 (industry barriers = 3.33, export market barriers = 2.70, and macro-environmental barriers = 3.42). In both cases, macro-environmental barriers are rated higher than other categories. However, it was rated as most important barrier by less experienced growers and moderately important by more experienced barriers. The total average of barriers is rated 3.22 by less experienced growers; which is greater than the total average of more experienced growers (3.03). As shown in the below table 3, local investors are highly affected by the listed challenges (total average of barriers = 3.53); whereas foreign investors (3.07) and joint ventures (2.60) are affected moderately. In all the three scenarios, companies are more affected by external barriers (3.20) than that of internal barriers (3.07).

Table 1 Response to the Importance of Exporting Problems

No	Item	N	Mean	Std.Deviation
	Total of average barrier	11	3.13	0.425
1	**Internal barriers**	**11**	**3.07**	**0.576**
1.1	Company barriers	11	3.02	0.786
1.1.1	Marketing knowledge barriers	11	2.81	1.069
1.1.2	Financial barriers	11	3.10	0.925
1.1.3	Human resource barriers	11	3.40	0.788
1.2	Product barriers	11	3.12	0.665
1.2.1	Quality barriers	11	3.55	0.449
1.2.2	Technical adaptation barriers	11	2.91	0.856
2	**External barriers**	**11**	**3.20**	**0.340**
2.1	Industry export barriers	11	3.37	0.670
2.1.1	Industry structure	11	3.19	0.612
2.1.2	Competition	11	3.73	0.910
2.2	Export market barriers	11	2.74	0.316
2.2.1	Customer barriers	11	2.2	0.470
2.2.2	Procedural barriers	11	3.47	0.854
2.3	Macro environmental barriers	11	3.49	0.546
2.3.1	Direct export barriers	11	3.65	0.555
2.3.2	Indirect export barriers	11	3.45	1.099

Source: Own survey data Analysis 2020

Table 2 Exporters Perception Depend on Exporting Experience

Exporting experience in year		Company barrier	Product barrier	Internal barrier(tot.av)	Industry export barrier	Export market barriers	Macro env'tal barriers	External barriers	Average barriers
Below 5 years	Mean	3.13	3.26	3.19	3.39	2.78	3.56	3.24	3.22
	N	6	6	6	6	6	6	6	6
	%	55%	55.0%	55%	55%	55.0%	55.0%	55.0%	55.0%
Above 5 years	Mean	2.88	2.95	2.91	3.33	2.70	3.42	3.15	3.03
	N	5	5	5	5	5	5	5	5
	%	45.0%	45.0%	45%	45%	45%	45.0%	45.0%	45.0%
Total	Mean	3.01	3.12	3.07	3.37	2.74	3.49	3.20	3.13
	N	11	11	11	11	11	11	11	11
	%	100.0%	100%	100%	100%	100%	100%	100%	100

Source： Own survey data analysis 2020

Table 3 company's perception depends on ownership

Ownership		Company barrier	Product barrier	Internal barrier(tot.av)	Industry export barrier	Export market barriers	Macro env'tal barriers	External barriers	Average barriers
Foreign	Mean	2.85	3.04	2.94	3.17	2.76	3.63	3.19	3.07
	N	7	7	7	7	7	7	7	7
	%	65%	65%	65%	65%	65%	650%	65%	650%
Local	Mean	3.92	3.47	3.69	4.00	2.83	3.27	3.37	3.53
	N	4	4	4	4	4	4	4	4
	%	25.0%	25.0%	25%	25%	25%	25.0%	25.0%	25.0%
Joint venture	Mean	1.85	2.78	2.31	3.08	2.43	3.17	2.89	2.60
	N	2	2	2	2	2	2	2	2
	%	10%	10%	10%	10%	10%	10%	10%	10%
Total	Mean	3.01	3.12	3.07	3.37	2.74	3.49	3.20	3.13
	N	11	11	11	11	11	11	11	11
	%	100.0%	100.0%	100.0%	100.0%	100.0 %	100.0 %	100.0%	100.%

Source: Own survey data analysis 2020

5 Results and Findings

Exporters with less experience are more affected by external and internal barriers than more experiences.

The local investors are not fully committed to run the business. They do not put their utmost effort to export their products. Therefore, there is the management commitment problem of commercials.

Local investors are highly affected by external and internal challenges where as foreign investors and joint venture are affected moderately.

Because of Ethiopia is a land lock country, there is no fast rail and sea transport in the country. Many of the products being exported are leafy vegetables and some light-weighted fruits and vegetables through air transport. However, the air transport is expensive to withstand the competition against the nearby suppliers of European market. In addition, shortage of cargo freighters to transport the produces to the destination market.

There are bureaucracy and lack of work efficiency in governmental organizations which are not efficient while delivering their services for the commercials of the export marketing.
The locally owned companies do not have the habit of searching new potential markets, whereby they expect government organization will study for them which means lack of experience.

6 Conclusion

This study has identified export market problems encountered by Ethiopian vegetable and fruit commercial exporters. The study found out that both internal and external barriers are moderately important challenges for the exporters. The exporters are highly affected by macro-environmental barriers which embrace infrastructure, currency fluctuation, and government offices bureaucracy. In the internal barriers, quality barriers were most important to the growers. Financial barriers and human resource were moderately significant, marketing knowledge and technical adaptability were least important to the exporters. Increasing exports is widely regarded as important factor for the development and growth in developing countries. Even though exporting companies play vital role for the economic development of the country, they are constrained by several export marketing problems. With regard to the external barriers, export market barriers are less important barriers to most of the exporters, which include customer and procedural barriers.

Macro-environmental barriers are the most important barriers for Ethiopian vegetable and fruit commercial exporters. Industry barriers are moderately important barriers to the growers. In addition, there are more problems identified include management commitment problem of growers, lack of technological advancement, financial problems, shortage of cargo freighters, shortage of infrastructure, bureaucracy of government organizations, lack of potential markets, inconsistent demand from importers, world economic and political crisis, pandemic problem like Covid 19, and lack of integration between different stakeholders of the sector.

7 Recommendations

Based on the findings of the study, the following recommendations are forwarded:

Primarily, it is significant for the commercial marketers to identify their major challenges and incorporate in their export marketing strategy so as to they will be prepared to trial these challenges and exploit the opportunities.

Most of the growers are being affected by the macro-environmental barriers which needs the direct and indirect involvement of different government organizations such as; the infrastructure, bureaucracy, customs regulations and transparency. Therefore, it is suggested that to create enabling policy environment and improve the service delivery reliability.

Air freight cost is the major cost to deliver the produces to the destination market. Therefore, it is suggested that to practice fair and competitive air freight cost so as to enhance the development of the sector and as well as for the economic development of the country. In addition, the Ethiopian Airline has to increase the cargo freighters to tackle the cargo space problems.

The government has to specially provision nearby owned commercials in the area of market exploration and technical capacity building to enhance their involvement in the international market, since they are facing these problems.

Cooperation of stakeholders and governmental organizations have to work together to support the commercials. If the cooperation exists between them, the development of the sector will be boosted.

Enhance both public and private engagement in fruits and vegetable technology generation, marketing and distribution in order to fully exploit the suitable commercials and meet the export demand in the country.

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Factors Affecting Tax Revenue Collection in Ethiopia

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Abstract: Tax ix a monetary liability levied on individuals or group belongings. Tax is not a deliberate payment or contribution rather an enforced role. Tax levied based on legislative authority and in any kind of tax directives imposed by government. A well-functioning Tax system is a necessary condition for raising revenue sources, powerful, sustained and inclusive economic growth. However, in developing countries especially sub-Saharan countries the revenue system has fundamental weaknesses. The main aim of the paper is to analyze the factors that affect tax revenue collection in Ethiopia. Taxation affected by various problems such as unemployment, inflation, level of citizens' income and foreign direct investment (FDI). The paper employs secondary data that reflects the collections of taxes in Ethiopia and the data contains the consecutive Ten years of the achievement of Ethiopian Ministry of Revenue from 2009 to 2018. The paper linear regression model. In Ethiopian tax collection system, shortage of FDI and other related problems are main problems of the system. Due to tax exemption and subsidy, more research concluded that FDI affects tax revenue, but this paper presents the ultimate benefits of FDI to tax collection.

Keywords: Tax collection; Foreign direct investment; Income tax; Unemployment; Inflation

1 Introduction

Tax is a mandatory contribution to government revenue, collected by the government on individuals and groups based on their business activities or based on transactions of goods and services. Tax is levied by the government of a country upon its habitants for its support or for the purpose of facilitating the service delivery in a country (Aamir et al., 2011). According to Xing & Whalley, (2014). The VAT invoice is the key to the VAT system in China and other countries. However, VAT collection in China has always been facing serious challenges of tax fraud ever since 1994. Without effective supervision of VAT invoices, VAT fraud through counterfeiting, reselling, or stealing VAT invoices, or through invoicing false transactions, can occur. Responding to potential and actual tax fraud, the State Administration of Taxation (SAT) has constructed a nation-wide network to enter, monitor, and manage VAT information and to make sure that most VAT is paid. This network is the Golden Tax Project (GTP) and has been designed and operated in three stages since 1994.3 this project covers the vast majority of agricultural and manufacturing goods transactions in China and includes a large amount of information on the transactions of firms within the country.

Major types of taxes existing in Ethiopia are review; those are divided in to two: namely direct and indirect types of taxes practices in Ethiopia (Tilahun & Yidersal, 2014).

The inefficient tax collection system may have retarded back the coming generation from all rounded development. The main factors to be inefficient will assessed in this research by the supporting documents from tax collection bodies. To give more evidence for this research the researcher used ten years' data (from 2009/20010 to 2017/2018) which originated from Ministry of Revenue. The main duty of the government is not only collect tax bet also assured amount of tax levied by the government is collected fairly, equitably and cost effective. This study will assess the factors that affect Ethiopian tax collection performance in different ways.

2 General overview on Tax

Taxation is the new frontier for those concerned with state building in developing countries. Without the ability to raise revenues effectively, states are limited in the extent to which they can provide security, meet basic needs or foster economic development. Yet the political importance of taxation extends beyond the raising of revenue. We argue in this book that taxation may play the central role in building and sustaining the power of states, and shaping their ties to society (Bräutigam et al., 2008). Taxes divided in to two main categories, direct and indirect. Direct taxes are taxes, which suffered by taxpayers, whereas some others pay indirect taxes to tax collector.

Direct Taxes: Direct taxes are taxes imposed on direct income of any individuals or company, (Federal Democratic Republic of Ethiopia Indirect Tax (FDRE Proclamation, 2002).

Indirect Taxes: Governments impose indirect taxes and collected by taxpayers assigned by law from consumers for the transaction service they get goods or service from market; these taxes are turnover tax, Value Added Tax, excise tax, Customs duty, and Stamp Duty. (FDRE IT Proclamation No. 286/2002). Optimal tax analysis is used based on the tax system which tax authorities had created to determine pre-tax and disposable income (Singh, 2019).

2.1 Empirical evidences on tax revenue in case global studies

According to Haider M., and A.R. Chaudhary, 2013 to check the impact of foreign direct investment on tax revenue, the study uses FDI and GDP per person employed as independent variables and tax revenue as dependent variable.

Evans et al., (2017). Explained that Econometric estimations using panel data show that: First, FDI affects positively and significantly total tax revenue, especially tax on income and profits, but the effect on international trade tax revenue is not significant. Thus, a 10% increase in FDI leads to a 4.78% increase in total tax revenue. Second, total tax revenue and taxes on income and profits, the contribution of FDI allocated to the agricultural sector is less harmful than the contribution of FDI allocated to industrial and mining sectors. According to Boly et al., (2020). The empirical results are twofold. First, we find that cuts in statutory CIT rate increase FDI net inflows to the host country and in the other neighboring countries in the short and long terms. Therefore, powering the tax is an economic policy instrument that can attract more FDI. However, to reduce the negative effects of lower tax revenues, governments can broaden the tax base and strengthen tax collection capacities to finance development needs. In 2014, the average tax-to-GDP ratio in Africa was only about 17.1 percent, which is much lower than the estimated level of about 25 percent required for financing basic development needs (AEO, 2018). Ongo Nkoa, (2014) states that foreign direct investment introduced as a factor of production. The study shows that FDI contributes positively and significantly both to economic growth across the sub-region as well as in individual member states.

2.2 Tax revenue in case of ethiopia

Aamir et al., (2011). The analysis indicated that, share of tax revenue to GDP is very low, which imply that domestic resource mobilization through taxation is at an infant stage in Ethiopia. The output revealed that annual rate of inflation and agriculture share to GDP found to have statistically significant and negative effect on tax revenue.

2.3 Conceptual Framework

This section summarizes the study framework or model as per the study of variables relation. The main variables in the study are; the level inflation, foreign direct investment, citizens' disposable income,

and unemployment. In this study, the variables regarded as independent variables, which influence on the amount of the collected taxes, the dependent variable in Ethiopia.

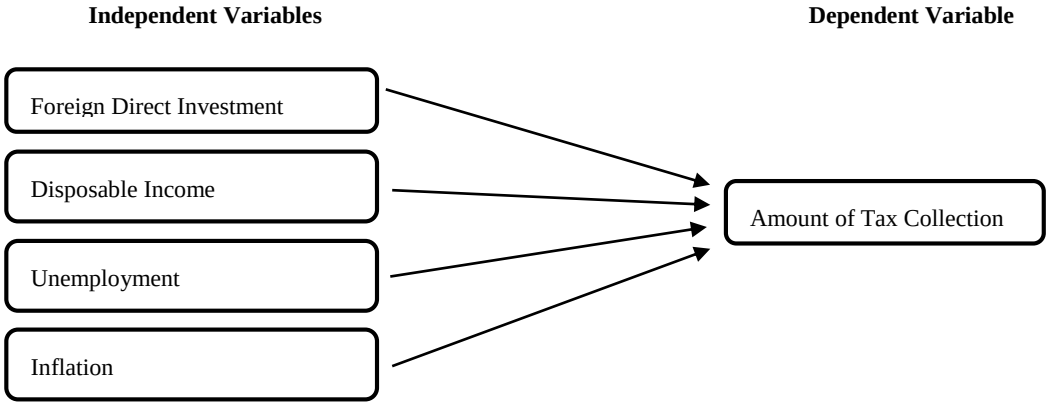

Figure 1 Conceptual Frame Work of Model

3 Research Methodology

This research used both descriptive and explanatory methods. Study of descriptive design seeks to explain the factors affect tax collection in Ethiopia. The main source of data was secondary data from Ethiopian Revenue and Customs Authority the current name is Ethiopian Ministry of Revenue. In this case, yearly data from 2009/10 - 2017/2018 has collected. The yearly data for 10 years period is large enough to show every trends of tax collection performance and can be checked its reliability by different scientific research methods. The specific data collected were for the analysis purpose of tax collected (dependent variable), rate of inflation, unemployment, tax rates, level of income and foreign direct investment (all independent variables). The study employed to measure four continuous independent variables and one continuous dependent variable. In order to analyze the research data, linear regression with multiple variables used to analyze the relationship and the fitness of the model, significance, multi correlation between all variables. The variables were analyzed using SPSS, Stat Tools 8.0 and Minitab 15 English computer programmer software. Interpretation of quantitative data involved organizing and synthesizing information into units, and searched for meaningful patterns and finally got an understanding; analyze the data that will gathered through the available documents and reports.

The study used linear equation model specification with multiple independent and dependent variables. The linear regression equation is;

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 2X3 + \ldots + \beta kXk$$

Where, *Y*= Dependent Variable, *X1, X2, Xk* (Independent Variables), β (Constant).

4 Data Presentation and Discussion

4.1 Descriptive statistics

Descriptive statistics are useful in describing the fundamental characteristics of data. In research study, these statistics may help us to manage the data with large data in a table of summaries. Descriptive statistics explains dependent variable tax revenue and four independent variables called foreign direct investment, disposal income, unemployment and inflation in terms of mean, maximum observation, standard deviation and all the data processed and automated using SPSS, Stat Tools 8.0 and Minitab 15 English computer programmer software.

Table 1 Analysis of Descriptive Statistics

Descriptive Statistics							
	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Amount of Tax Collection	10	23583.26	176102.82	98102.6330	53420.64336	-1.422	1.334
Foreign Direct Investment	10	103981.00	442540.00	259778.6000	136191.98893	-1.792	1.334
Disposable Income	10	70741	145618	97190.90	28603.967	-.988	1.334
Unemployment	10	8.20	18.12	12.8400	3.41089	-.974	1.334
Inflation	10	6.00	13.00	9.4600	2.20313	-.722	1.334
Valid N (list wise)	10						

According to the above descriptive statistics, result the average performance of amount of tax collection in million birr from 2009 to 2018 was 98,102.633; this indicates that the tax collection performance is increasing in best ways, the additional supporting indicator is the mean and the standard deviation has great difference, 98,102.633 and 53,420.64 respectively. The ten years tax collection document shows that the difference between the minimum value 23,583.26 in 2009, and the maximum value 176,102.82 in 2018 the amount of tax collection is increasing.

Foreign direct investment plays an important role for tax revenue collection. As the above descriptive statistics table indicates that from 2009 to 2018 the minimum amount in million is 10,398 and the maximum amount is 44,254. The increment is not more than four times, the mean value, 28608.90 also not nearest to the maximum value and there is a big difference between the mean value 28,608.90 and the standard deviation, 12,891.68. The citizens' disposable income and the number of the people have a pivotal role to increase the transaction of the goods and services, and ultimately can support the amount of tax collection. The minimum amount of the disposable income is 70,741, and the maximum amount is 145,618, but the mean value 97,190.90, and the standard deviation is 28,603.967, there is a great gap between the mean value and the standard deviation. This implies that the purchasing power of the nation is not increased and the amount of expected tax base is not potentially maximize.

Unemployment has indirect impact on the amount of tax collection. If tax collection performance increasing, infrastructure development and industrialization will increase and side by side unemployed citizens can get employment opportunities, and if unemployment is decreasing employment income tax and other related taxes are increasing. According to the above descriptive statistics, the minimum number of unemployment is 8.2 million and the maximum number of unemployment is 18.12 million, even if tax revenue increasing, unemployment is still increasing due to different reasons. The mean value and the standard deviation difference is steadily very high.

The other factor that influence the amount of tax collection is Inflation; it has indirect impact on tax collection performance. The data indicates that the minimum inflation rate is 6% and the maximum amount is 13%. The mean value 9.64 and the standard deviation is 2.2. So, there also a vast gap between the mean value and the standard deviation. This implies that there is imbalance between money supply and money demand that resulted low FDI, and unemployment. Therefore, to create healthy economy the level of inflation should shift to single digit.

Table 2 Correlations between Variables

Correlations						
		Amount of Tax Collection	*Foreign Direct Investment*	*Disposable Income*	*Unemployment*	*Inflation*
Amount of Tax Collection	**Pearson Correlation**	1	.981**	.935**	.972**	.286
	Sig. (2-tailed)		.000	.000	.000	.423
	N		10	10	10	10
Foreign Direct Investment	**Pearson Correlation**		1	.938**	.967**	.360
	Sig. (2-tailed)			.000	.000	.306
	N			10	10	10
Disposable Income	**Pearson Correlation**			1	.958**	.317
	Sig. (2-tailed)				.000	.372
	N				10	10
Unemployment	**Pearson Correlation**				1	.276
	Sig. (2-tailed)					.439
	N					10
Inflation	**Pearson Correlation**					1
	Sig. (2-tailed)					
	N					
**. Correlation is significant at the 0.01 level (2-tailed).						

To identify the relationship between dependent and independent variables, the Pearson correlation analysis result shows that there is a strong relationship between variables. As the table indicates FDI, disposable income and unemployment have strong correlation with amount of tax collection. The correlation between the amount of tax collection and, foreign direct investment, disposable income, and unemployment is almost nearest one, which is .981**, .935**, and .972** respectively. Whereas the correlation between amount of tax collection and inflation has direct or positive relationship at a value of 0.286.

Table 3 Model Summary

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.987[a]	.973	.952	11681.74397	1.688
a. Predictors: (Constant), Inflation, Unemployment, Disposable Income, Foreign Direct Investment					
b. Dependent Variable: Amount of Tax Collection					

4.2 The regression equation

Amount of Tax Collection = - 20881.65307719 - 0.04507835 Disposable Income + 0.28556108 Foreign Direct Investment - 1292.89352195 Inflation + 4782.99115546 Unemployment

Durbin-Watson test explains that autocorrelation between successive observation in the data should be 1.5 <= X <= 2.5. From the above regression output Durbin-Watson, test result indicates that the value is 1.688 that is between 1.5 and 2.5. This test approved that there is a collinearity.

R is the correlation between the predicted values and the observed values of Y. R square is the square of this coefficient and indicates the percentage of variation explained by regression line out of the total variation.

R2 tell us how much variation in the dependent variable is accounted for by the regression model, the adjusted value tells us how much variance in the dependent variable would be accounted for if the model had been derived from the population from which the sample was taken. Specifically, it reflects the goodness of fit of the model to the population taking into account the sample size and the number of predictors used. This data result shows that R is 0.987 (this implies the model is fit), R square is 0.973 (this indicates all independent variables affect the dependent variables by 97.3%).

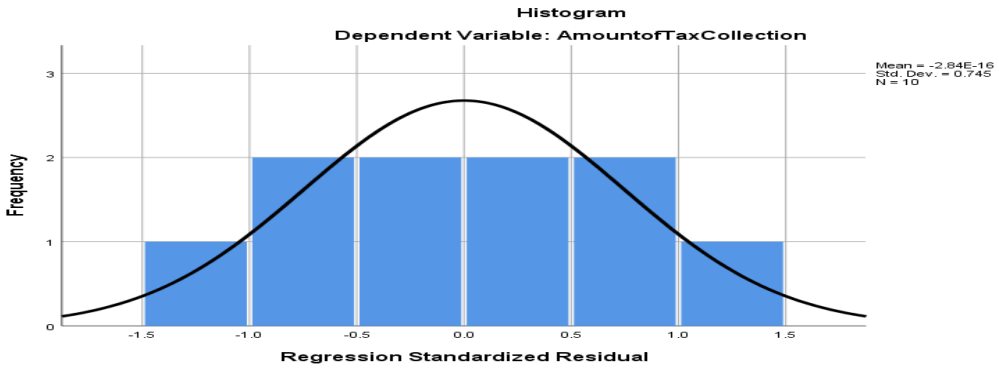

Figure 2 Histogram

From the above histogram test graph the plot of the residuals (all the independent variables) versus predicted value (dependent variable) which are indicated in the pattern, have no problems with the assumption that the residuals are normally distributed at each level of tax collection and constant in various cross levels of the tax revenue. It is possible to conclude that the study of the data is normally distributed.

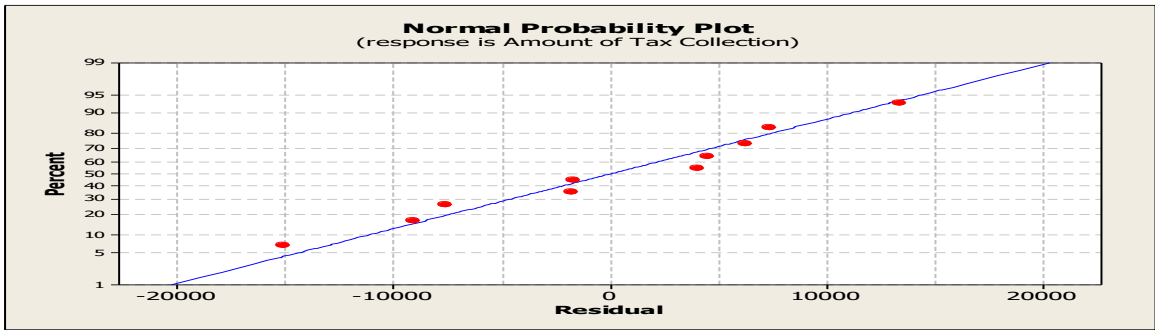

Figure 3 Normal Probability Plot

According to the above Normal Probability Plot the residuals seems like close to the diagonal line, which represents the ideal normal distribution. Therefore, it justifies which is normally distributed. Generally, the study shows that the independent variables have collective and integrated impact on tax revenue collection (dependent variable). The secondary data obtained from Ministry of Revenue is valid and checked by different instruments.

5 Conclusions

Based on the discussion and analysis part of the data the researcher concludes the following points. Tax revenue and foreign direct investment has a positive relationship. When foreign direct investment raises the tax revenue also increases with different revenue sources. On the other hand, to attract foreign direct investment there will be tax incentives, tax holiday, exemptions and other encouragements, but ultimately this reduction has not that much negative impact on tax revenue. To increase FDI, the government should amend other incentives to attract Investment at all levels.

Disposal income (actual personal income) has highly direct or positive relationship with the amount of tax collection in Ethiopia, this is because of increasing of purchasing power, and income of citizens' will increase the market interaction. Hence, the researcher recommend that Ethiopian government should give more focused on economic development continuously that improve disposal income or actual income and life of citizens. When the income of individuals increases the demand for consumption, the value creation will increase. This leads to collect better tax revenue.

The study also revealed that unemployment has indirect relationship with tax revenue. If there is no income tax generated from employee, and no market interaction that will result no tax revenue collection. To maximize employment, the government should give focuses to pro-poor sectors. As a result, marginal job creation, tax collection will increase by the amount of additional employment.

Even though inflation has indirect relationship with tax revenue, the inflated price of goods and service will reduce the purchasing power of money. This implies that production will decrease, at the same time the amount of tax collection will decrease. Therefore, the government should manage the fiscal policy to minimize inflation in single digit.

Foreign direct investment needs further study whether it has positive and negative impact on increment of tax revenue in developing economy; some researchers comment due to subsidy and exemptions it affects tax revenue, and others said it has positive impact. However, in my suggestion it is not compromise to say confidently it has the positive impact to tax. So, using additional tools and documents it needs further research.

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Application of Cost Approximation Method in Land Value Evaluation of Small Towns

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Abstract: There are many methods of land value evaluation, but because of the incomplete development of land market in small towns, many methods can not be carried out. In this paper, case analysis and quantitative analysis are used to discuss the application of cost approximation method in land evaluation of small towns. This paper takes block X of small town as an example, according to the basic situation of the block and the influencing factors of land price, through collecting and analyzing the surrounding cases and local land price data, the evaluation price of the block is calculated by the cost approximation method, and the evaluation method system applicable to small town land is constructed, and the actual price level of block X is obtained.

Keywords: Land value evaluation; Cost approximation method; Small towns; Block X

1 Introduction

With the rapid development of new urbanization in China and with the rapid growth of local real economy driven by the accelerated development of local township enterprises, the price difference between small towns and urban and rural land is becoming more and more huge[1]. Due to the incomplete development of land market in some small towns, there may be some problems in the process of evaluation, such as lack of evaluation cases, unable to collect income information and so on, which leads to the failure of evaluation work. At this time, if we can get the complete cost data of land acquisition management, the cost approximation method is an excellent valuation method.

1.1 Research status abroad

Demetris Demetriou (2016) discussed the process of land valuation conducted by the land valuation commission(LVC) of Cyprus, using advanced spatial analysis techniques, including multiple regression analysis (MRA) and geographically weighted regression(GWR) within GIS geographic scope, and he proposed a new land assessment framework[2]. The main valuation methods used in the United States include market method, income method and cost method.

Ellipa gourtzi (2003) divided the evaluation methods into traditional and advanced methods. The traditional methods include comparison method, cost method, income method, regression method and profit method, while the advanced methods include Ann empirical pricing method, spatial analysis method, fuzzy logic and ARIMA model[3]. Allen H (2017)[4], Tian Xu, Geng Yong and ulgiati Sergio (2016)[5], Pedro L (2016) [6]deeply discussed the specific application of market approach, income approach and cost approach in the United States.

1.2 Domestic research status

In China, Zheng Bin (1999)[7] studied the cost approximation method. He thought that the elements of land price in the cost approximation method were not complete, and discussed the problems of land development costs in the cost approximation method, and put forward their own views and views. Many new methods, such as range asset income measurement and evaluation method and long-term trend measurement method, have been derived from the specific application in various regions.

Yang Yingying (2016)[8] used regression model to analyze the spatial distribution difference and evolution trend of land price in Xi'an, and further explored the influencing factors of land price. Han Juan, Jin Xiaobin, Zhang Zhihong (2017)[1] took the whole country as the research area, collected the land price of the transferred residential buildings, summarized the land price distribution characteristics by regional classification, and deeply analyzed the influencing factors of land price differences.

2 Brief Introduction and Selection of Cost Approximation Method

2.1 Brief introduction of cost approximation method

As an evaluation method to simulate the fair market value, the basic formula of cost approximation method in the national standard of the people's Republic of China "Urban Land Valuation Regulations" (GB / t18508-2001) is expressed as follows:

Land price = land acquisition fee + land development fee + taxes and fees + investment interest + investment profit + land value-added income （1）

In the formula, the land acquisition fee refers to the average fee of the same kind of land in the area where the land is located that needs to be paid in order to acquire a land, including the compensation for land acquisition area price, resettlement subsidy, compensation for young crops and attachments compensation.

The land development fee includes the development fee outside the land to be appraised and the development fee inside the land, generally refers to the fee of "several connections and one leveling" under the normal land development conditions.

Taxes and fees refer to the land acquisition management fees, various development and construction funds, cultivated land reclamation fees, cultivated land occupation taxes, etc. In the process of land acquisition and land development, they are usually based on the provisions of the national and local governments.

The investment interest is calculated according to the scale and land use characteristics of the land to be evaluated, and combines with the actual development situation, then the interest period and interest rate are determined.

Investment profit = (land acquisition fee + relevant taxes and fees + land development fee) × profit rate, which is the return of land investment. The profit rate is determined by referring to the economic system and industry investment characteristics of the area where the land is located.

Land value-added income refers to the value increase due to the change of land use or land development to achieve a certain use condition of construction land. It is the difference between market price and cost price after land development.

2.2 Selection of evaluation methods

A small town is a typical transitional residential area which is neither in the city nor in the countryside, but between the two. Its economy, society and culture are often on the edge of the two, and the scale of industrial agglomeration and population aggregation is small[9]. At present, the present situation of land use in small towns in China is that the efficiency of land use is low, the utilization structure is unreasonable, and the land circulation lacks legal guidance[10].

When selecting the evaluation method for block X, the above problems should be taken into account. In addition, although the location of block X is within the scope of the revision of the benchmark land price in city B, the time of the revision and renewal of the township land level and the urban benchmark land price in District C of city B is June 30, 2012. The interval has been more than six years, the land rent around block X is difficult to collect. The specific indicators of comprehensive development and utilization planning in block X only involve the block ratio of land use, building area density and green space rate, so it is difficult to determine the specific land development mode. Finally, the cost approximation method is selected to evaluate it.

3 Case Analysis of Cost Approximation Method -- Taking Block X as an Example

3.1 Case analysis

Block X is located in District C, city B, province a, China. The planned main land development purpose is industrial use. The transfer type of the right to use is mainly transfer. The area of the right to use the land is 4883.6 square meters. According to the land grade and benchmark land price map (industry) of area C of city B, block X is located in industrial land grade III of area C of city B.

The land ownership of block X belongs to the state. Up to the appraisal date, under the condition of planned utilization, the proposed transfer period is the legal maximum transfer period of industrial land of 50 years.

As for the appraisal date and the expiration date of the contract for determining the land price, block X has not obtained other legal rights such as legal establishment, mortgage and lease.

In fact, the development degree of the planned land for block X is to realize "five connections" (access, power, communication, water supply and drainage) outside the red line and "site leveling" inside the red line.

3.2 Evaluation process

3.2.1 Land acquisition fee and tax

(1)Land acquisition fee

Block X is located in area C of city B. According to the actual situation of the surrounding area and the comprehensive utilization area of block X before requisition, it is considered that block X is cultivated land before requisition.

The main items to be paid are as follows:

① Land compensation fee

According to the current relevant statistical data and comprehensive land price standard and other relevant documents of city B in a province, the area of block X is the level IV planning area of area C of city B of a province. The calculation standard of land acquisition compensation fee for average annual output value of land is 1850 yuan/mu. The standard of compensation for demolition of the annual output value of the unified collective land is determined by taking 8 times of the annual output value of the unified land use, and the standard of the compensation fee for demolition with the appraisal object as the unified land use compensation object is determined as 14 800 yuan/mu (22.2 yuan/m^2).

② Resettlement allowance

According to the "Land Administration Law of the People's Republic of China (effective as of January 1,1999)" and combined with the provincial unified annual output value standard and comprehensive land price documents, the subsidy for the resettlement object of block X in the process of land acquisition assessment is determined as 10 times of the annual output value of the unified evaluation parcel. The standard of land resettlement subsidy for the appraisal object is 18 500 yuan/mu (27.75 yuan/m^2).

③ Compensation for ground attachments and young crops

According to the relevant provisions of the unified annual output value standard of land acquisition and the comprehensive land price of the region, the unified compensation fee for young crops in the whole province is determined according to the average standard of output value of single season cultivated land per mu in the same year, and the average single season cultivated land per mu is 1850 yuan/mu (yuan/m^2).

To sum up, the land acquisition fee of block X is shown in Table 1.

Table 1 Land Acquisition Fee of Block X (unit: yuan/m^2)

Content	Amount
Land compensation fee	1850*0.0015*8=22.20
Resettlement subsidy	1850*0.0015*10=27.75
Compensation for ground attachments and seedlings	1850*0.0015=2.78
Land acquisition fee	22.20+27.75+2.78=52.73

(2)Taxes and fees

①Land occupation tax

According to the "Notice on Printing and Distributing < Standard of Applicable Tax Rate of Cultivated Land Occupation Tax in A Province > (A Finance and taxation [2008] No. 8)", the tax standard of cultivated land occupation of towns in C District of B city is 30 yuan/m^2.

②Land reclamation fee

According to the "Measures for the Collection and Use of Special Funds for Cultivated Land Development in A Province (No. 52 [1999] of A Administration)" , if cultivated land is developed by other methods, the reclamation fee for the right to use the cultivated land shall be twice the total amount of the special fund for the compensation fee of the land use right. The land reclamation fee of block X is one time of the land compensation fee.

③Water conservancy construction fund

According to the relevant provisions of the "Notice of the People's Bank of China of the Ministry of Land and Resources of the Ministry of Finance on Adjusting the Policy of Paid Land Use Fees for

New Construction Land" and "the Administrative Measures for Raising and Using Water Conservancy Construction Funds of A Province (Decree of the People's Government of A Province No. 353, 2012)", the units and individuals using the newly added construction land shall pay 5% of the amount of the paid use fee of the newly added construction land The water conservancy construction fund will be included. The city B of province a is responsible for the collection of the newly increased construction land use fee of grade 9, with the collection standard of 28 yuan/m^2, so the water conservancy construction fund is 1.4 (28 × 5%) yuan/m^2.

④ Unforeseen expenses

According to the rules of the "Notice of The Provincial Price Bureau and Provincial Department of Finance on The Lump Sum Collection of Unforeseeable Fees for Land Expropriation (A Price Real Estate [1996] No. 403)", in the process of land acquisition, if the land use supervision and Administration Department of the people's government decides to adopt the unified land acquisition and contracting method for land acquisition, the land unforeseen fee can be charged according to 2% - 4% of the total land acquisition cost after the assessment and confirmation of the people's government. According to the actual use of the local block X, the rate adopted in this lump sum assessment is 3%, then:

Unforeseen cost = (land compensation fee + resettlement subsidy + compensation fee for seedlings and attachments + farmland reclamation fee) × 3% （2）

Based on the above, the tax of block X is shown in Table 2.

Table 2 Tax of Block X (unit: yuan/m^2)

Content	Amount
Land occupation tax	30.00
Cultivated land reclamation fee	22.20
Unforeseen expenses	28*5%=1.40
Water conservancy Fund	（22.20+27.75+2.76+22.20）*3%=2.25
Tax	30.00+22.20+1.40+2.25=55.85

3.2.2 Land development fee

At present, the appraisal object is a piece of industrial land that can be transferred. The supporting planning and construction of "five links and one leveling" have been basically completed outside the planning red line. The development costs of various infrastructure facilities of the land are clear and can be accounted for item by item. According to the average level of development costs of land infrastructure supporting facilities in B city and the appraisal personnel's development of Land Infrastructure in B city where block X is located, the project has been completed The development cost and price are investigated and analyzed, and further combined with the specific situation of the development cost of the appraisal object, it is determined that the development cost of the land with "five connections and one leveling" of the appraisal object is 40 yuan/m^2.

3.2.3 Investment interest

According to the scope and degree of land development in the development period, the land development cycle is determined as one year. The land acquisition fee and tax payable are assumed to be paid in one time in the development period. The land development fee is invested evenly in the development period of the land. The annual interest rate depends on the one-year bank loan interest rate of 4.35% on the benchmark date of the appraisal cycle. Then the interest formula calculated by simple interest is as follows:

Interest = (land acquisition fee + tax payable) × interest rate + land development fee × 1/2 × interest rate （3）

3.2.4 Investment profit

Considering the average profitability statistics of industrial land investment in recent years, the annual investment return rate is combined with the total return rate of land use and development investment in recent years. The annual investment return rate is 5%, and the formula for calculating investment return is as follows:

Profit = (land acquisition fee + tax payable + land development fee) × profit rate （4）

3.2.5 Land appreciation income

Due to the frequent occurrence of land value-added in the process of industrial land development and use, the income of land value-added of industrial land is generally calculated by 10% - 15% of the land

cost price. According to the general situation of C District in B city of a province, and fully considering the land price of industrial land and its value-added income level and the condition of infrastructure and supporting facilities in the area where the appraisal object is located, the rate of return of land appreciation is generally 5%. Then the calculation formula of land value-added income is as follows:

Land appreciation income = (land acquisition fee + land development fee + tax payable + Interest + profit) × land appreciation income rate （5）

3.2.6 Land price

Land price = land acquisition fee + tax payable + land development fee + Interest + profit + land appreciation income （6）

According to the above statistical data, the land cost price is obtained as shown in Table 3.

Table 3 X block Cost Determination Table (unit: yuan/m^2)

Content	Amount
Land acquisition fee	52.73
Tax	55.85
Land development fee	40.00
Investment interest	（52.73+55.85）*4.35%+40.00*4.35%=5.59
Investment profit	（52.73+55.85+40.00）*5%=7.43
Land value added income	（52.73+55.85+40.00+5.59+7.43）*5%=8.08
Land price	52.73+55.85+40.00+5.59+7.43+8.08=169.67

3.2.7 X block year correction

The type of the land use right of the appraisal object is the transfer of the right to use. The main purpose of this appraisal is to provide the reference for the price of the transferred land for its subject. Therefore, it is not necessary to consider the revision of the transfer period, that is, the year period correction coefficient is 1.

3.2.8 X area factor correction

The regional factors around block X have little influence on the appraisal object, so the correction coefficient of regional factors in this appraisal is taken as 1.

3.2.9 X block area condition correction

The area of block X in area C has no adverse effect on land use. Refer to "Technical Report on Updating The Benchmark Land Price of each Town in area C of city B" in "Table of Correction Coefficient of Land Parcel Area" for Industrial land in area C, see Table 4 for details, so the correction coefficient of land area condition is 1.

Table 4 Revised List of Industrial Land Parcel Area

Index Standard	Inferior	Worse	Commonly	Better	Excellent
Index standard	Too small area has a serious impact on the comprehensive utilization of land	The area is small, which has a certain impact on the comprehensive utilization of land	The area has no adverse effect on the comprehensive utilization of land	The area is beneficial to the comprehensive utilization of land	The area is moderate, which is very beneficial to the comprehensive utilization of land
Correction factor	0.925	0.9625	1	1.0325	1.065

3.2.10 X block shape correction

The overall shape of block X is similar to a trapezoid, which does not affect the development and utilization of block X. refer to the table of land shape correction coefficient of industrial land of towns in Block C of city B in the technical report on updating the benchmark land price of towns in Block C of

city B. see Table 5 for details, so the correction coefficient of block X to the overall shape of the parcel should be taken as 1.

Table 5 Shape Correction Coefficient of Industrial Land Parcel

Index standard	Inferior	Worse	Commonly	Better	Excellent
Index standard description	The overall shape is irregular, which has a serious impact on economic utilization	The overall shape is irregular and unreasonable for economic utilization	It has no adverse effect on the overall economic utilization	The overall economic utilization is reasonable	The overall shape is regular and reasonable for economic utilization
Correction factor	0.925	0.9625	1	1.0325	1.065

The calculation process of the price of block X by the cost approximation method is shown in Table 6.

Table 6 Price Determination of Block X

Land Cost price (yuan/m^2)	Annual correction coefficient	Regional factor correction	Area correction	Shape correction	Land unit price X (yuan/m^2)
169.67	1.00	1.00	1.00	1.00	169.67

4 Conclusion

In this paper, the land value evaluation of block X is taken as an example to analyze the data and select the cost approximation method to evaluate it. The cost approximation method uses the latest land acquisition management cost data of a province to calculate, and comprehensively analyzes various determinants and conditions of the objective market influencing land price, and analyzes and modifies individual factors according to the use and characteristics of the land to be appraised. The result of the land value calculation conforms to the value level of the land for this purpose in the objective market. In addition, due to the characteristics of the small town land market, if we can use a variety of evaluation methods to evaluate, and comprehensively consider the various evaluation results to obtain the evaluation value, it will more truly and objectively to reflect the actual price level of the land to be evaluated.

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The Asset Securitization Financing of Pension Institutions PPP Projects

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Abstract: The new financing mode of asset securitization is introduced to enhance the attention of social investors, to resolve the difficulties of pension institutions PPP project financing, and to improve the operation and management of pension institutions PPP projects. Through the literature research method, on the basis of studying the financing advantages and specific design of asset securitization of PPP projects, this paper constructs the financing process from three aspects: the main body of social investment and development, the design of basic assets, the SPV and the promotion of credit. In addition, common problems in practice are raised suggestions in order to standardize the asset securitization follow-up process, better arouse the capital vitality of all parties, so that quality pension services to benefit more people.

Keywords: Financing mode; Pension institution; PPP; Asset securitization

1 Introduction

Our country ushered in an aging society. By the end of 2019, the population aged 60 years and over in China accounted for 18.1% and 12.6% of the total population, respectively, is far more than 10% and 7% of the internationally recognized population aging. With the surge of the elderly population and the development of social economy, people's demand for specialized and high-quality old-age service has gradually increased. In the traditional sense, the family pension and the community pension with lagging development are not well-known, while the government-led welfare pension institutions have fewer beds, poor service quality, lack of scientific and professional management, and it is difficult to match the needs of contemporary old-age care.

Western countries step into the aging society first, and the development of the pension industry is relatively perfect. There are a lot of experiences worth learning from their different financing modes. The American pension industry has a relatively mature reverse housing mortgage system, which relieves the financial burden of children's pension while invigorating the elderly's real estate. The British pension industry is highly privatized, and enterprises play a leading role. The state pension and occupational pension that people pay in proportion when they are young, as well as the savings or insurance purchased by individuals for pension, all become the sources of pension. Sweden adopts the model of welfare pension service with high tax and takes the state tax as the source of welfare fund. Through scientific investment decisions, the Japanese government has formed a diversified pension model combining medical care, nursing and rehabilitation. While drawing lessons from the development experience of foreign countries, China should give full play to the functions of the market and the government, and build an institutional pension model with Chinese characteristics in line with China's national conditions. In recent years, the for-profit pension institutions have gradually developed, but there are still problems such as late start, slow development, low profit and difficulty in financing. The data show that 40% of the for-profit pension institutions in China have long-term losses, more than half of which can only make ends meet, and less than 9% can make profits, so it is difficult to obtain large funds from banks through traditional loans, and the financing problem has become the biggest obstacle to the operation of the for-

profit pension institutions. In 2013, the State Council's Opinion noted the need to promote the development of pension services and encourage private sector participation. Financial [2014]76 says pension facilities are one of the areas PPP focus on.

PPP (Public-Private Partnership) is a mode of project operation in the area of public infrastructure. Under the PPP mode, the government provides preferential policies and makes full use of the advantages of private enterprise investment and financing resources, specialized operation and management, which can not only break the bottleneck of insufficient funds and reduce the financial pressure of the government, but also effectively reduce the risk of private enterprises developing pension institutions alone. Endowment institutions have stable cash flow and transparent pricing mechanism; setting housing, medical service and property management in one, which is suitable for the PPP mode. Therefore, it is necessary for pension institutions to adopt PPP mode.

A more reasonable investment return distribution mechanism of pension institutions PPP projects can attract social capital to a certain extent, promote the transition of pension services from government to market leading, and fill the gap of some pension needs. However, the application effect of PPP model is not significant, the landing rate is low, the uneven development of different regions limits its promotion in pension institutions, and the development of pension institutions in PPP financing mode is slow or even stagnant. According to the PPP Center of the Ministry of Finance, the number of projects in pension institutions has declined significantly, from 322 in 2017 to 104 by April 2019; Of the 142 new storage projects announced in April 2019, only 1 pension project is in preparation. As can be seen, the for-profit pension institutions will be difficult to continue by providing funds only by PPP projects, and need to build a new financing model to maintain its development.

As PPP projects continue to advance, how to innovate the financing model has become its focus. By integrating assets through the way of asset securitization, the waste of idle assets can be avoided, and the problem of PPP project funds can be effectively alleviated, which is conducive to the continuous operation of pension institutions.

2 Literature Review

Asset securitization is introduced in the course of PPP project operation, which is helpful to the continuous progress of the project work. Pan Kesan (2018) proposed that PPP project can take asset securitization as a key support, theoretically expounded how asset securitization integrates idle assets, and further analyzed the broad prospect of the specific design based on the equity or equity income of the PPP project company [1]. Li Bingyin (2020) identified the inevitable difficult problems in the process of asset securitization of PPP projects. On this basis, he put forward some solutions from six aspects: policy measures, trading mechanism, credit rating, introduction of medium- and long-term investors, reference to the foreign securitization model and talent training, so as to provide the stable development[2]. In recent years, all kinds of pension institutions under the market-oriented system of our country have developed rapidly, but still face many problems. Diao Pengfei (2019) took Shanghai, which has a forward-looking development of institutional pension in China, as an example, carried on the data statistics and analysis to the number of pension institutions in various districts, found that there are problems such as insufficient supply of institution and low participation of social capital, and put forward several solutions, including increasing government subsidies; increasing the attention of social capital to pension undertakings; and innovating financing mechanisms [3]. By analyzing three types of financing: traditional financing models, challenging open market financing models and unsustainable PPP models

current situation, Han Liming (2019) constructed the capital operation mode of asset securitization to make financing arrangements for pension institutions in China [4]. Wu Xia (2018) analyzed the adaptability of the two from the perspective of asset securitization and PPP project, respectively, indicating that pension institutions PPP projects can be refinanced through securitization, which is also an important way for social capital to change from equity to capital form, and explained its operation process separately in the whole life cycle of the project, describing the financing framework of each stage in a drawing way, but only at the theoretical level [5]. These new designs provide reference for the diversified financing of pension institutions.

By combing the existing literature, it is found that the financing method of asset securitization of PPP project is developing and perfecting continuously, which is beneficial to solve the financing problem of pension institutions. Based on the existing research, this paper expounds the implementability of asset securitization financing of pension institutions PPP projects, focuses on the construction of asset securitization financing in the operation stage of pension institutions, and specifies its process.

3 Implementability

Asset securitization is the process by which the initiator sells the underlying assets to a specially set-up company (SPV) and then issues securities by the latter. Base assets are usually assets that can form future stable cash returns, SPV structured design is used to improve the credit rating of these assets.PPP project asset securitization is based on the future cash flow generated by the PPP project.

3.1 Compatibility

3.1.1 Complementary of PPP and Securitization

PPP project has the characteristics of long investment recovery year, and needs a lot of capital investment. PPP asset securitization can transform social funds into listed assets through issuing securities, from equity form to capital form, and recover the invested funds early. The combination of medium- and long-term capital and the construction and management of pension institutions is beneficial to the withdrawal of investment and the realization of income. PPP project asset securitization is beneficial to broaden the financing channels, absorb the main funds of society, and reduce the capital pressure of PPP projects.

Asset securitization is faced with the dilemma of uneven basic assets, the reduction of high-quality and investable basic assets, and the insufficient richness of securitization market. PPP projects under policy constraints have more standardized basic assets, which is conducive to expanding the scope of securitization. The unique risk isolation design of asset securitization can disperse the risk, and the assets with different risk levels are packaged and reorganized, which adapts to the investment preference of all kinds of investors. The securitization of PPP project assets can help to acquire more basic assets, meet the needs of the market while controlling risks, and expand the securitization market.

3.1.2 Financing Advantages of PPP Project Asset Securitization

PPP asset securitization can broaden the financing channels. The compliant basic assets in PPP projects will form the basic asset pool, and by issuing securities, the assets that can only circulate in the primary market will be traded in the secondary market, which will enhance the vitality of the secondary market and effectively improve the liquidity of funds. After the credit rating, asset securitization also improves the credit degree through guarantee and other measures, and reduces the investment and capital risk.

PPP asset securitization can optimize capital structure. Asset securitization products can be

classified into risk and return, and different income distribution. Differentiated products meet the investment needs of different preferences. On the other hand, by setting up a special purpose structure and transferring assets, asset securitization can better protect investors' rights and interests and effectively isolate potential risks.This off-balance-sheet financing model enhances capital liquidity and finances.

3.2 Feasibility

3.2.1 Policy support

In November 2014, the Guiding Opinions of the State Council on Innovation of Investment and Financing Mechanisms in Key Areas to Encourage Social Investment called for the creation of a public-private Partnership (PPP) model to mobilize the power of the private sector. In December 2016, the National Development and Reform Commission and the China Securities Regulatory Commission issued the Notice to promote the implementation of asset securitization in PPP projects related to infrastructure construction. On June 24, 2019, Asset securitization in PPP projects was regulated and guided by the Working Rules issued by Asset Management Association of China.

3.2.2 Market Outlook

Since the second half of 2016, the implementation rate of PPP projects has increased greatly. By the end of March 2017, there had been more than 2,500 public PPP projects with social investors as the winning bidder. The easing of the difficulty in implementation of PPP projects has become a favorable support for the PPP asset securitization market and greatly enhanced the confidence of investors. In 2017, the number of sales in China's asset securitization market exceeded 1 trillion yuan, and the market share exceeded 2 trillion yuan, showing a sustained and stable development trend. It can be seen that the asset securitization market of PPP projects is gradually clear and has a good prospect.

4 Model Construction

4.1 Various proposals

The asset securitization of PPP projects may have different planning and design.

In the construction stage of PPP projects, two designs can be carried out: one is to issue special asset management plans with the beneficial right of the trust of future earnings as the basic asset; secondly, it issues securitization products of credit assets by taking the creditor's rights in finance lease contracts of leasing companies or loans from commercial Banks as the basic assets.

During the operation stage of PPP projects after completion, three designs can be carried out. First, special asset management plans can be issued with charging rights or financial subsidies as the basic assets; Instead, it issues REITs products based on the equity or equity earnings rights of PPP project companies. Thirdly, the credit asset securitization products are issued by taking the creditor's right in the finance lease contract of the leasing company or the loan of the commercial bank as the basic assets. According to the classification of basic assets, the first two belong to the right to collect debt proceeds, while the third belongs to the right to earn equity or equity.

This paper will mainly discuss the financing of asset securitization in the operation stage of PPP project of pension institutions.

4.2 Construction of financing process

4.2.1 Investment Operators Led by Insurance Companies

As urban public infrastructure, pension service institutions are integrated with housing, daily life, medical care, insurance and other functions and involve many fields. In order to integrate resources,

complement advantages and improve the competitiveness of bidding, real estate developers, professional operators and insurance companies jointly participate in the PPP project bidding. The government creates the project company by bidding and gives it the privilege of running the pension service and providing policy subsidies.

As medium - and long-term institutional investors, insurance companies can become the main social capital for project investment and operation. The medium - and long-term capital of an insurance company can be matched with the pension institutions' longer investment return years. In recent years, some insurance companies in China have tried to make direct or indirect investment in the pension industry. For example, Tai kang Life Insurance has approved the establishment of a subsidiary focusing on investment management of pension institutions, and plans to invest 4 billion yuan in four years to build "Tai kang Home", a modern endowment park with complete functions and high-quality services. In addition, a number of other insurance companies, such as United Life, China Life, and so on, have also been planning to build pension institutions.Visible, insurance company is attacking endowment industry with all one's strength.

On the other hand, with the expansion of the insurance company's business, its operation department gradually expanded, professional operation management level has been improved. The insurance company transfers the future economic interests to the project company, but still has the right to operate and manage the project. Tai kang Family of typical project "Tai kang Yue garden" the total construction area of 120000 square meters, with a total of 10 storied building, residential, health care, activity center, and many other places for individuation, including catering, care for the old, entertainment, fitness and other diversified services, supporting facilities, diversified service system of science.

The insurance company will become the first shareholder in the operation stage of the PPP project company as the real estate company transfers its equity.

4.2.2 Selection of Underlying Assets

The first choice of asset securitization is to take the right to earn fees as the underlying asset. As an operational PPP project, the operating cash flow of pension service institutions can be used as the basic asset, while the main income in the project operation stage is the right to collect fees, namely the rent.It also requires that pension institutions have reached a certain period of time, are in good operating condition, and the benefits are relatively easy to exchange.

Taking the operation mode of "Tai kang Yue garden" as an example, the elderly care service is divided into self-care area and nursing area. Self-care area includes deposit, monthly fee and other fees, among which the monthly fee is between 5000 and 7200, and other fees are collected according to the personalized needs of customers. The fund of the nursing area consists of the deposit and the nursing fee,of which the monthly fee is between 16,000 and 46,000, including the room fee, meal fee and property management fee. Under this model, the project company can use the cash flow income such as monthly fees and nursing fees as the underlying assets for the sale of securities.

The other option is based on the shareholding or equity income of the PPP project company. In this way, the shareholders of the project company become the investment subject instead of themselves, which is conducive to the establishment of a benign withdrawal mechanism for social capital. Every year, the project company also needs to distribute dividends to the shareholders such as insurance companies and government departments, so as to make the future equity returns sustainable and stable.

4.2.3 SPV and Credit Enhancement

SPV (Special Purpose Vehicle) is an important platform in the process of asset securitization. An

SPV can be either a company or an independent entity such as a trust, with no actual personnel, but only as a vehicle to isolate the underlying assets and separate them from bankruptcy. Securitization is the process in which the project company sells the underlying assets to the SPV, which then assembles these assets into a large-scale asset portfolio and issues securities based on its earnings.

Asset securitization is conducive to the increase of the credit level of PPP project companies. Through SPV, the underlying assets that can generate income in the future are isolated from the overall assets of the project company and financed only by the credit level of the underlying assets. On the other hand, through credit rating portfolio assets, SPV improves, combines and adjusts the assets that can generate cash flow in the future with different risk levels, such as priority, sub-superior and inferior, so as to issue securities. In other words, a combination of different financing conditions is offered in the financing of a project to meet the needs of investors with various investment risk tendencies, attract social investors, improve the financing rate and reduce the financing cost.

5 Conclusions

In the PPP project operation stage of pension institutions, asset securitization financing was introduced, which attracted social investors such as insurance companies, reduced the financial pressure of pension projects, and brought more elderly people into the service scope. At the same time, the social sector provides professional management and high-quality services, improving the business level of pension institutions. PPP projects of pension institutions, as high-quality basic assets, also enrich the asset securitization market, which is conducive to the expansion of financing channels.

However, the financing of asset securitization in PPP projects of pension institutions in China is still in the initial stage of development, and there are many deficiencies.

5.1 Lower the threshold for social capital entry

In order to expand the sources of funds and better solve the financing problem, it is suggested that relevant regulatory authorities appropriately lower access standards, create a fair and reasonable competition mechanism, and make every effort to guide insurance funds, pension funds, social security funds and other capital into the pension service industry and participate in the investment of pension institutions. Besides, it also gives policy encouragement and encourages investors of mainstream institutions to actively join in, fully arouses the vitality and creativity of all kinds of market subjects, and participates in the construction of pension institutions together.

5.2 Strengthen supervision and improve follow-up management

Many kinds of securities are sold in China's asset securitization market, but there is no supervision. Asset securitization of PPP projects started late and is in the early stage of development. In order to guide its sustainable and healthy development, it should ensure that project information is open and transparent and subject to social and market supervision. Relevant institutions should also strengthen supervision in the process of specific business promotion, set up specialized posts, optimize the construction of information management system, timely monitor and effectively deal with possible risks. For example, real estate development in the name of building pension institutions should be strictly prohibited, and the establishment of irrelevant business activities in the venues of pension services should be strictly prohibited. Take old-age care institutions as the fulcrum to provide old-age care services, and implement every part of the construction and operation of old-age care institutions in place.

5.3 Clarify the provisions on tax treatment

In the process of asset securitization of PPP projects, it is not suitable to generate additional taxes

and fees, and the principle of "tax neutrality" should be adhered to. Managers should also design the transaction structure rationally, avoid double taxation, and minimize the tax burden on the transaction process and the duration of securities.

5.4 Reasonably determine the occupancy fees

The for-profit pension institutions represented by Tai kang Home have the problem of facing high-end groups and charging too much. We should cultivate miniaturized, specialized and chain service institutions for the public, and set reasonable occupancy fees so that more elderly people can enjoy the services. At the same time, efforts will be made to improve the unbalanced situation of the elderly care services, appropriately tilt the elderly care resources, improve the elderly care services in economically difficult areas, and benefit more disabled and semi-disabled elderly.

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Analysis of the Enterprise Value: A Case Study of Cosonic Intelligence Company

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Abstract: Enterprise value evaluation is the process of analyzing and estimating the overall value or equity value of an enterprise. Enterprise value evaluation is needed in M & A, quantification and dynamic management. At present, there are three popular methods: income method, market method and cost method. Based on the discount model of free cash flow in income method and sales percentage method, this paper evaluates the value of a selected listed company —— Cosonic Intelligence Company.
Keywords: Enterprise value evaluation; Free cash flow discount model; Sales percentage method; Listed company

1 Introduction

Enterprise value assessment is the product of a modern market economy, which aims to analyze and measure the fair market value of an enterprise or an operating unit and provide relevant information to help investors and management to improve their decision-making. Enterprise value evaluation method is a means to realize enterprise value evaluation, according to different analysis principles and technical routes can be divided into a variety of different methods. Fisher(1930) the discounted cash flow model, the value of capital is essentially the discounted value of future income.Modigliani and Miller (1961), the capitalization rate of enterprise value evaluation is defined and discussed correctly, and the complete theoretical framework is determined for the income discount method. Ohlson(1991) propose a residual value evaluation model. M.Stern developed a special method to measure the value-added of enterprises in the concept of economic value-added. Wolff and Kocher(2018) introduce a modified DCF model for artificial intelligence and big data[1].Sang-Joon Kim(2019) found that non-resources debt had a different impact on the company's valuation[2]. Ling Hongzhang (2020) puts forward specific requirements and structural design for enterprise value evaluation report[3].Tripathi(2020) develops a new economic order quantity (EOQ) model using discounted cash flow (DCF) approach under multiple suppliers' trade credits with stock-linked demand for failing commodities[4].

The methods of enterprise value evaluation are income method, market method and cost method.

Table 1 Enterprise Value Assessment Methodology

Methodology	Specific assessment models	Theoretical Basis of Evaluation	Premise assumptions
Cost-based costing	Historical Cost Plus Method Liquidation value law	Asset substitution theory	Replacement of enterprise assets
Income law	Discounted cash flow model (FCFF、FCFE) Dividend Discount Model	Internal Value Theory	Enterprise value = the sum of the present value of the enterprise's future income
Market law (comparable company law)	P/E model Price-to-book ratio model Market Sales Rate Model	Effective market theory	Effective capital markets

1.1 Selection of methods

Cost method is not applicable to evaluate the overall value of an enterprise. The valuation effectiveness of market law is based on the degree of market development, but considering that the market economy of our country is not perfect, the stock market is a weak and effective market, and the existence of barriers to the entry and exit of the electro-acoustic industry makes the development of the company extremely uneven and less than the company, so the market law is not used to value the enterprise here[5]. The application premise of the income method is that the enterprise continues to operate, the enterprise growth rate can be reasonably predicted, and the discount rate can be reasonably determined. With the increase of market penetration, the market scale of TWS headphones will continue to increase. Soochow Securities expects to exceed 350 billion yuan by 2023. In the next few years, China's electro-acoustic industry has a great development prospects, the growth rate and discount rate can be combined with relevant information for reasonable prediction, so this paper will choose the income method to evaluate the enterprise value of Cosonic Intelligence Company[6].

The income method includes dividend discount model, equity cash flow model and entity cash flow discount model. Because the dividend discount model is suitable for the relatively stable situation of the company's dividend policy, and the listed company is affected by the internal and external environment of the enterprise, the dividend distribution is volatile. And the equity cash flow model needs to use the equity cost which is greatly affected by the capital structure, and the calculation is complicated. But the weighted capital cost WACC is less affected by the enterprise capital structure, so this paper will choose the entity cash flow discount model to estimate the enterprise value.

1.2 A brief introduction of cosonic intelligence company

The company specializes in the design, development, manufacture and sale of electroacoustic products (including headphones, audio lines, speakers and headphone parts), and is the leading manufacturer of electroacoustic products in China. The company has developed and manufactured a series of electroacoustic products for international famous customers such as Harman、Beats、Pioneer、JVC、Panasonic and Huawei, Lenovo, iFLYTEK and other domestic famous customers.

The company has mastered the design scheme and implementation method of dual diaphragm horn, ring iron, flat diaphragm horn and other characteristic earphone products in the field of sound quality; in the field of wireless transmission, the company has mastered the application method of bluetooth/ WiFi radio frequency, LDS antenna, TWS real wireless stereo and the design scheme of corresponding electroacoustic products; in the field of intelligent electroacoustic, the company has mastered the design scheme and implementation method of a series of key functions, such as active noise reduction, physiological parameter monitoring, digital audio processing, artificial intelligence voice interaction and so on.

The company continuously transforms the core technology into independent intellectual property rights. As of June 30,2019, the company has obtained 22 invention patents ,415 utility models and appearance patents. Many products of the company won the title of "Guangdong high-tech products ". The issuer has become a state-level high-tech enterprise, Guangdong intelligent electro-acoustic engineering technology research center and Guangdong intelligent wearable engineering technology research and development center.

According to 16 October 2019, Shenzhen Stock Exchange issued "on the Cosonic Intelligence Technology Co., Ltd. shares listed on the gem trading notice ": Cosonic Intelligence Technology Co., Ltd. RMB common shares will be listed on the gem of the Institute on October 18,2019. Securities are

referred to as "Cosonic Intelligence ", the securities code is "300793". The total number of common shares in the company is 166, 680, 000 Units, Of which 41, 680, Thousands of shares are traded on the market from the date of listing.

2 Determination of Discount Rate

2.1 Determination of capital cost of debt

According to the corporate financial statements, at the end of 2019, the non-current liabilities of enterprises were only 219900, which was very small compared with 1.196 billion of shareholders' equity.Because the enterprise in the fourth quarter through IPO financing, the original long-term loan of 86 million yuan in full payment.

As a result, we assume that after this IPO, the enterprise is fully funded, maintains good development, and maintains the level of demand for long-term debt at the end of 2019. Because when the weighted average capital cost is finally calculated, the proportion of non-current liabilities is too small, and the equity capital is close to 100%, so the cost of debt capital is not considered.

2.2 Determination of equity capital cost

The cost of equity capital refers to the minimum return on investment required by common stockholders under certain risk conditions. Capital asset pricing model (CAPM) is used to calculate risk return rate and equity capital cost.The formula is: $Ke=Rf+\beta(RM-Rf)$

Determination of risk-free rate of return Rf: the rate of interest on a 10-year Treasury note. Therefore, this paper chooses the yield of 3.58% for the recent 10-year period of Chinese debt published by China People's net.

Market portfolio risk return *Rm* determination: here the geometric average return rate of 9.83% of the index from 2015-01-01 to 2020-01-01 is *Rm*.

Determination of β: the beta value of Cosonic Intelligence Company and smart is 1.7531 found through the Wind database.

$$Ke=3.58\%+1.7531\times(9.83\%-3.58\%)=14.54\%$$

2.2 Determination of weights

Weight refers to the proportion of debt capital and equity capital to total capital respectively[7]. The decision of weights can be determined by book value or market value. Book value is relatively easy to obtain and easy to control. This paper uses the proportion of book value as weight. Here equity capital accounts for 100%, so we think the weighted average capital cost is approximately equal to the equity capital cost 14.54%.It is extremely difficult, in practice, to precisely estimate the term structure of discount rates[8]. But our estimate is both theoretical and likely to be sufficiently accurate for most practical purposes.

3 Projected Cash Flow Estimates for Entities

3.1 Division of forecast time periods

This paper adopts two-stage method to determine the time period of Cosonic Intelligence Company prediction. with 2019 as the base period ,2020 to 2026 as the forecast period, and 2027 and later as the follow-up period. At the same time, sales growth is projected to be 25 per cent in 2020 and 2021, and then decline year by year until the macroeconomic growth rate is 6 per cent.

According to the theory of competition equilibrium, it is impossible for an enterprise to develop at a faster rate than the macroeconomic growth rate forever. The general forecast period is 5-7 years. Here,

we assume that enterprises will maintain the current level of technology and maintain the current R & D investment, will not achieve a major innovation breakthrough situation, and the new crown epidemic, Sino-US trade friction and other macroeconomic factors will continue to affect a longer period of time, so set the forecast period of enterprises for 2020-2026, enterprises will continue to decline from the growth rate of 25% to maintain the same macroeconomic growth rate.

The following figure shows the forecast annual sales growth rate as well as sales revenue, all calculated on the basis of sales revenue of 2.25732 billion yuan in the base period 2019. Of these ,2027 was the first year of the follow-up period.

Table 2 Forecast Unit of Annual Sales Growth Rate per year:10000

Year	2020	2021	2022	2023	2024	2025	2026	2027
Growth in sales	25%	25%	20%	16%	12%	8%	6%	6%
Sales revenue	282165	352707	423248	490968	549884	593875	629507	667278

3.2 Forecasting assumptions of key financial indicators

To forecast assumptions of key financial indicators,we are taking 2019 as the base period, we forecast that key financial indicators remain stable as a percentage of sales income.The following table can be obtained according to the formula:free cash flow = pre-tax operating profit ×(1- T)+ depreciation amortization - increase in operating working capital - capital expenditure.

Table 3 key financial indicators:10000

Year	2019	2020	2021	2022	2023	2024	2025	2026
Sales revenue	225732	282165	352707	423248	490968	549884	593875	629507
Depreciation and amortization	1961	2452	3065	3678	4267	4779	5161	5471
Increase in operating working capital	—	20333	25409	25409	24393	21222	15845	12835
Capital expenditure	—	12033	15029	15642	15752	14771	12622	11514
Pre-tax operating profit	24035	30051	37563	108690	126081	141210	152507	161657
Free cash flow	—	-4371	-5444	55014	71291	88815	106325	118531

The negative free cash flow of enterprises in 2020 and 2021 is mainly due to the fact that under the sales percentage method, the cost of sales in the first two years is 85.03% of sales income, which is too large, so the calculation of free cash flow of enterprises will be negative. But as companies build intelligent production plants and R & D platforms two years ago, production costs will fall, accounting for 70% of sales revenue, and free cash flows will be positive.

3.3 Enterprise entity value

The value of the business entity is equal to the present value of the cash flow of the entity in each forecast period + and the value of the renewal = ￥776853 million

According to the Oriental Wealth Network disclosed that Cosonic Intelligence Company current market value is 6.894 billion yuan, here we calculate the value of enterprise entities is 7.768 billion, and the value of enterprise entities is higher than that of enterprises 12.68%. Because China's securities market is not fully effective, it is more reasonable to evaluate the value of enterprises relative to ± market price of 20%. So we think the stock price fluctuation of Cosonic Intelligence Company is a normal fluctuation around its value.

4 Conclusion

Enterprise value evaluation is of great significance to M & A, dynamic management and other "value investment ". When using the free cash flow discount model to calculate the enterprise value, it is necessary to make a more accurate financial forecast for the enterprise. At the same time, the traditional cash flow discount model does not help investors to clearly understand the value creation ability of enterprises, and does not reflect the "shareholder wealth maximization "[9], but the EVA method that has appeared in recent years takes into account the cost of equity capital and reflects the value creation ability of enterprises. Also, The new-generation information technology industry is one of the core areas of the science and technology board,which is significantly different from traditional enterprises,so we can divides the value of information technology companies into existing asset[10].Therefore, it is necessary to consider carefully which method can be used to evaluate the enterprise value to minimize the error and reflect the real value of the enterprise.

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Influence of Usage and Contractual Binds on Customer Retention in Continually Delivered Services: Evidence from the Physical Fitness Business

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Abstract: Attempts to preserve the bond with customers and to create means to increase firms captured value is a persistent management concern and subject of extensive academic research. From the service-dominant logic perspective, no value is created until the beneficiary of the service, often the customer, uses the products or services of a firm in its particular context. Therefore, the purpose of this paper is to show that there is a direct relationship between member usage and customer retention in continually delivered services. Data were extracted in the context of physical fitness business. The proposed model included price and membership length to evaluate membership renewal. The results show that frequency of use was the most relevant variable related to customer retention. Surprisingly, price and membership length showed no impact on retention. We discuss these findings in the perspective of value creation.
Keywords: Continually delivered services; Customer retention; Customer usage; Repurchase; Fitness Business

1 Introduction

The positive outcomes associated to the engagement in a regular exercise program amass. Individuals and organizations, both public and private, acknowledge that physical activity is a good mean not only to improve health but also, and especially, to avoid diseases and health care costs associated with them (OECD, 2017; WHO, 2014). In the physical fitness business (PFB), such as sports and fitness clubs, organizations derive profits by offering services in a form of a plethora of human movements. Similarly, to the definition proposed by Briggs, Landry and Daugherty (2016), PFB can be defined as continually delivered services (CDS) where customers enter into a membership or contractual relationship with the service provider and services are delivered to the customer repeatedly over the course of time.

One distinguished characteristic of PFB is that, for the customer, the only way to extract value from its membership or affiliation to such organizations, and therefore justify its renewal, is by means of physical exertion. It ́s a value co-creation process where the customer makes the bulk of the work. The nature of the service encounters in PFB allows customer derive value from direct interactions with staff and use of the facilities resources. In this sense, there is a true experiential perception of value-in-use, which characterizes the value co-creation process as defined by Gronross (2011). From the experience approach of value-in-use, there is the possibility that the customer perceives negative value as the customer experience outcome with the service provider can be perceived either positive or negative (Medberg, Gummerus & Tregua, 2016). Negative experiences may diminish the likelihood for a customer remain doing business with a service provider. Past empirically studies have shown and give support to the assumption that high usage levels influence the likelihood of a favorable customer decision towards renewing the contract in service relationships, with recurring customers showing higher usage patterns than defectors (Bonfrer, Knox, Eliashberg & Chiang, 2007). Finally, perceived usefulness and perceived ease of use were also positively related to increased service usage and customer retention in service based contracts (Wangenheim, Wünderlich, & Schumann, 2017).

2 Theory and Hypotheses

2.1 Direct link between usage and customer retention

Many factors can contribute for the maintenance or lapsing from a membership relationship. Bhattacharya (1998) proposes that the length of time one stays member in an organization strengths the ties with the organization and therefore may serve as a proxy for satisfaction or the value derived from the membership. Indeed, the membership length is negatively associated with the cancellation rate, i.e. the longer the customer remains a member the larger the odds for renewing a paid membership (Bhattacharya, 1998).

Besides the length of the membership, the actual usage of the organizational resources available for the patron also influences the decision for continuing the relationship with the service organization. Over time customers make comparisons about what they actually use with what they should have used and

adjust their expectations accordingly. Bolton e Lemon (1999) argue that customers fairness evaluation of the level of economic benefits derived from usage in relation to the level of economic costs (payment) influences their satisfaction and subsequent usage of the service. Therefore, managing customer usage levels becomes a key component in the customer-service provider relationship in the quest for long-term profitability (Bolton & Lemon, 1999). Therein lies one of the most important inferences about the customer behavior in relation to his/her experience of using recurring services and the decision to maintain the bond with the service provider. If the volume of service usage is perceived below of a certain threshold, i.e. what the customer considers fair and appropriate, than the updated expectations about the utility of future usage based on antecedent factors is put in check (Bolton & Lemon, 1999; Bonfrer et al., 2007).

2.2 Customer usage and service repatronage in PFB

Several studies have attempted to relate customer usage to customer retention. As showed previously, there ś a positive correlation between customers usage levels with attitudinal and buying behaviours, i.e. the deeper and broader the usage the higher the likelihood of repeated purchases. In PFB value is co-produced by the customer in the process of using the service provider resources, both tangible and intangible. The ultimate customer outcome is a physical transformation, either external, through morphological changes, or internal, through enhanced functional capabilities, or both. Those outcomes only ought to be obtained through frequent exposure to training stimuli, which requires regular attendance.

Ferrand, Robinson and Valette-Florence (2010) considered frequency of attendance as an important attribute related to overall satisfaction and repurchase intention in health clubs. The authors found that overall satisfaction positively influences frequency of attendance, which in turn had a positive impact on repurchase intention, acting as a mediator variable. The authors argue that regular usage, i.e. frequent visiting, is a form of behavior that may be directly related to other behaviors, such as intention to repurchase. However, the authors point out to lack of research dealing specifically with the impact of frequency on repurchase intention and call for further investigation on this subject. Garay, Sperandei and Palma (2014) studied the impact of individual characteristics and usage (weekly attendance) on membership retention in a health club and found that monthly frequency is positively and strongly related to adherence. Individuals who go to the gym more than eight times in a month have a higher probability (50%) of staying than of abandoning the activities, regardless of age.

The purpose of this study is to provide support for the premise “low usage equals negative value” by examining the relationship between usage behavior (frequency of use) and member retention (membership repurchase) in a health club context. The following hypothesis are proposed:

H_1: Usage is direct and positively related to customer retention.

2.3 Trust

For Berry (1995), trust is perhaps the most powerful relationship marketing tool available to a firm. Barreto, Crescitelli and Figueiredo (2015) maintain that trust is an intention or an attitude of being vulnerable to the actions of another party that occurs when it is concluded that the other party has principles and values, competences or abilities, in addition to expressing a desire to do good on the part of those who trust themselves. Characteristics of the firm, such as consistency, competence, honesty, responsibility and cooperation between the parties, produce a relationship that can be long lasting (de Paula Baptista, da Silva & Goss, 2011), and can even build emotional bonds with customers, in face of the development of trust and commitment between the parties (D'Angelo, Schneider & Lar án, 2006).

The benefits of gaining consumer trust on the part of the firm are notorious, since trust and commitment in the commercial relationship increasing loyalty and word of mouth (Broeckelmann and Groeppel-Klein 2008; O'Cass & Carlson, 2012). After all, it is precisely in the interaction between consumer and service provider that experiences occur, interfering and determining trust (Guardani, Teixeira, Bido & Mazzon, 2013). The unsuccessful experiences lived by customers in their votes of trust,especially when they experience supplier neglect, can negatively impact the desire for a new purchase (Munaier & Las Casas, 2019). Such characteristics of trust, originally attributes of human relations, have been carried over to commercial relations and have been an intense area of research in marketing (e.g. Broeckelmann & Groeppel-Klein, 2008; D'Angelo et al., 2006; Guardani et al., 2013; O'cass & Carlson, 2012; by Paula Baptista et al., 2011).

Moreira & Silva (2015) showed that trust reflects in an augment willingness to behavioral loyalty and repurchase in Portuguese private healthcare services. Thus, it is possible to suppose that a longer business contract allows the company to build up relationships based on trust, increasing the chances of the individual choosing to repurchase their service package at the end of their contract. Finally, Bhattacharya (1998) showed that membership length exerts a significant negative effect on the lapsing

rate and the hazard of lapsing declines, at a diminishing rate, with increasing membership duration. Therefore, we propose:

H_2: Membership length positively influences customer retention.

2.4 Price

Using a price perception scale, Ferrand et al. (2010) showed that perceived price has a negative direct influence in repurchase intentions meaning that the more customers perceived the price to be expensive, the less likely they were to say they intended to renew their membership. Bolton and Lemon (1999) introduced the concept of customer payment equity. Equity is the customer's evaluation of what is "fair," "right," or "deserved" and customers make judgments about payment equity by comparing their current payment and usage levels with normative ("should") expectations. The authors suggest that customer compares his or her current payment with normative expectations, evaluating whether the payment is higher or lower than the customer thinks it should base on their personal assessment of satisfaction.

In line with this assumption we propose that lack of usage deteriorates the price perception of what the customer considers as "fair". Therefore, it is expected that price will have an indirect influence on customer ś repurchase decision. We define hypothesis 3 as follows:

H_3: Price exerts a direct effect on customer retention.

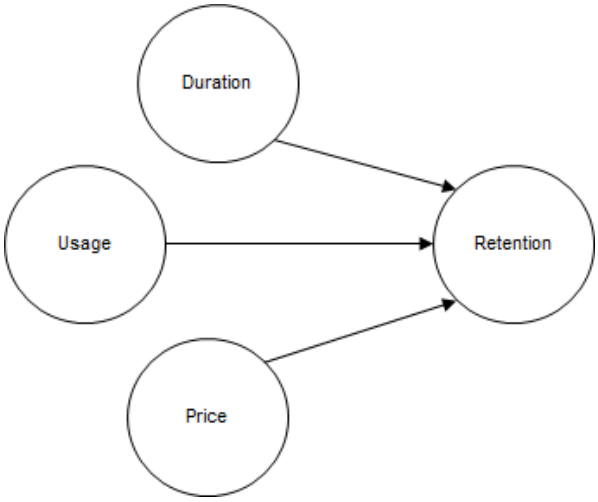

Figure 1 The Conceptual Model

3 Data and Methodology

Frequency data, duration of the last plan purchased and the price paid in these plans of 181 gym clients in the city of Belo Horizonte were treated quantitatively. To better observe the methods used for the multivariate quantitative analysis of this article, a methodological association matrix (Mazzon, 2018) was proposed, as shown in Figure 2.

Figure 2 Methodological Association Matrix

Research Objectives	Hypotheses	Analysis Techniques	Expected search results
Analyze whether the frequency of use of the individual in the last three months positively impacts the renewal status	H_1	Logistic Regression and Unidirectional Anova	It is expected that the results of the techniques used will validate H_1 and differentiate the frequency of use of customers who renewed from those who did not.
Analyze whether the duration of the last package purchased by the individual positively impacts the renewal status	H_2	Logistic Regression	It is expected that the results of the techniques used will validate H_2
Analyze whether the price of the last package purchased by the individual influences the renewal status	H_3	Logistic Regression and Unidirectional Anova	It is expected that the results of the techniques employed will validate H_3 and that there the higher the price the less the renewal probability

Source: Elaborated by the authors from Mazzon (2018)

4 Analysis of Results

4.1 Descriptive statistics

The data of 181 consumers of ongoing services were treated, who, at the time of renewing their service packages, chose or not to maintain their status as customers of the firm. 99 (54.7%) customers opted for continuity, while 82 (45.3%) decided to quit commercial relations. Table 1 shows the VIF and tolerance of the three independent variables observed, which demonstrate that there is no multicollinearity in the chosen variables. For the multivariate analysis proposed in this article, the statistical software IBM SPSS 22 was used.

Table 1 Statistics

Variable	Description	Tolerance	VIF
Frequency	The frequency of use of services by the individual in the last 3 months before renewal	,985	1,016
Last Package	The last monthly plan purchased by the individual, which may vary from 1 to 12 months in duration	,952	1,051
Last Price	The last price paid by the individual to his monthly plan. Nominal installment amounts, ranging from R$ 55 to R$ 529, depending on the service package and duration.	,955	1,047

Through the VIF (Variance Inflation Factor), it was possible to identify that the variables did not present multicollinearity, a problem in the adjustment of the model that could impact the parameter estimation. A VIF less than 10 and a tolerance greater than 0.1 indicate the absence of multicollinearity (Hair Jr, Black, Babin & Anderson, 2014; Vieira, 2012).

4.2 Logistic regression

Since there are three variables to be analyzed regarding the individual's status - frequency of use in the last three months, duration of the last service package and price paid in the last service plan - the Backward (LR) method was chosen, or Reverse Elimination (Likelihood Ratio). The SPSS statistical software returned the analysis of the three variables with two of them in the final model, after 2 steps. The eliminated variable was Last Price (sig = 0.164) in step 2. The variables that entered the model were Frequency (sig = 0.000) and Last Package (sig = 0.013), which means that the final model works correctly. In the Hosmer and Lemeshow test, sig = 0.362 in step 2. Vieira (2012) recalls that this test must have a result greater than 0.05. Therefore, through this test, your result also supports the final model. Finally, it is registered that the R^2 of Nagelkerke, in step 2, was 0.326. And the combination of variables from the validated model (Frequency and Last Package) correctly classifies 74.6% of the status, with the status "Renewed" being more correctly classified (78.8%) than "Not renewed" (69.5%).

4.3 Analysis of the hypotheses

H_1: Usage is direct and positively related to customer retention.

With sig = 0.000 sig = 0.000 and exp. (B) of 3.783 for the Frequency variable, this paper presents a result of important inferences about the consumption behavior in ongoing services and what leads to remain a customer at the time of renewal: the frequency of use of the customer is crucial for their permanence in the contracted services. The odds of belonging to the renewed group are greater as the individual more frequently uses the contracted services (odds ratio = 3.783). A Unidirectional ANOVA was performed to confirm the difference in frequency between the non-renewed and renewed groups. With F (1,179) = 49,099; p = 0.000, it is possible to conclude that there are significant differences between the frequency of use of the individual who quits the services and the individual who renews their contract, validating hypothesis 1.

H1: Membership length positively influences customer retention.

With sig = 0.015 and exp. (B) = 0.679, it is possible to affirm that, contrary to what is hypothesized in this article and, to some extent, intuited by common sense, long-term of a contract, in this case, has an opposite effect to that of retention, since the logistic regression brought an odds ratio value less than 1 (0.679), not validating hypothesis 2.

H2: Price exerts an indirect effect on customer retention

In logistic regression, the last price paid by the individual in their service package had a sig = 0.164, excluding this variable from the final model and demonstrating that there is no statistical impact on the analysis of the client's renewed or non-renewed status. A Unidirectional ANOVA was performed to assess whether there is a significant difference between the prices of the previous plans of those who renewed or not and, with F (1, 179) = 1,135; p = 0.288. It is possible to conclude that, in fact, the price

paid in the previous purchase does not impact the probability of renewal or abandonment of continued services, not validating H3.

5 Conclusions, Limits and Suggestions

The purpose of this article was to analyze the impact of the frequency of use, the duration of the service package and price in the decision to renew the service contract in CDS firms. The contribution to the literature is precisely in the observation of these three consumption variables among themselves. The chosen *locus* was the fitness and wellness market. Thus, the managerial contribution of this article is to provide managers of this segment with data on the frequency of use and the risks, for customer retention purposes, to neglect it.

The proposed hypothesis that service usage in CDS increases the odds of contract renewals was supported. This study analyzed customer attendance on three months prior time of renewal and found that its impact on customer retention is statically significant.

It is important to note that the logistic regression rated the status "Renewed" (78.8%) better than "Not Renewed" (69.5%). One possible explanation is that the customer has developed the habit of exercising frequently, as evidenced in its high usage/attendance, however without establishing strong bonds with the service supplier or due to causes beyond the firms reach, such as relocation or personal relationships with other patrons. In any case the customer may continue to consume physical fitness services but might look for another supplier.

Two hypotheses were not statistically supported. It is not possible to say that buyers of long-term plans are more likely to renew their contracts. This non-validation can, ultimately, also be considered a finding of the present article. And also is not possible to say that price impacts client's decision to renewal or not. Customers will renew or not regardless the price ticket, whether low or high. Thus, it is not necessarily a matter of price. It's a matter of use! It is in the frequency of use that relies the individual tends to renew their package of services. The more they use it, the greater their tendency to renew their contract. For this reason, it is essential that the firm close monitors customers attendance and the actual use of the contracted services.

Firms that sell shorter-term plans find themselves in the need to repeatedly get the vote of trust of their current customers, so that they remain with the firm on a monthly basis. On the other hand, in case of long-term contracts the firm has a broader chance to own the customer mind and heart. One recommended way to do it is encouraging their customers to use the facilities regularly.

Thus, as contributions to the management literature of the CDS, in particular to PFB, this article seeks to point, as a practical application, the need to manage the frequency of use of customers, especially in the last 3 months before the renewal period (for medium and long-term plans). It is fundamental: to manage each customer frequency as if each one had purchased a short-term package. Thus: do not neglect its use! In this research, customers' perceptions of perceived value and perceived quality in the services received were not tested, neither of customers who renewed nor of customers who did not renew their plans, these being not only limitations of this manuscript, but also suggestions for further research.

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Management of Crises of Brazilian Brands on Social Networks – An Analysis under the Light of the Concepts of Transparency and Digital Swarm

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Abstract: Consumer behavior in a digital environment is the central element of this study and represents a relevant theme and a challenge for marketing managers. The starting question of this study is related to concepts such as transparency and digital swarm proposed by the South Korean philosopher Byung-Chul Han. These concepts are relevant to understand the Brazilian context of brands involved in the digital environment. This study uses a qualitative approach for data collection, through the methodology of multiple case studies. For data collection, the netnography method of research and content analysis were used for the evaluation of results. The findings reject the theory proposed by Byung-Chul Han, since Brazilian consumers seem to be avid to engage in storms caused by online crises. In addition, they present enough capability to articulate the promotion of concrete negative effects from the point of view of economic losses, political pressures, and shocks in the stock market segment. For future studies, analyses in other international contexts are suggested to compare and discuss about the exercise of freedom by citizens in a digital environment and its negative impacts on the corporate assets of organizations.

Keywords: Consumer behavior; Brazilian brands; Corporate image crisis; Digital transformation

1 Introduction

The Contemporary society is experiencing a series of new dynamics imposed by technology, which impact on changing online consumer behavior. Facing a new type of customers, more informed, connected, and reactive, companies are challenged to foster a positive relationship with their stakeholders in defense of the organizational reputation. Marketing is one of these tools to enable good customers' experience with the brands, but not always, a positive relationship is established in the field of consumption, which results in a certain dose of tension.

Certain tensions such as reactions to corporate positions/actions, considered morally unacceptable, can result in brand crises on social networks. Once not happy, individuals manifest themselves on the digital environment and opinions reverberate everywhere. Anchored by the network of connections, this dynamic process causes a negative impact on online communities and beyond geographical limits with any reasonable predictability. To Kotler (2017, p. 21), online communities are those who have power, produce noise, and are used to "share stories, good and bad, about their consumption experiences".

The crisis of corporate image on social media is a theme which is growing fast in the international field, but still scarce in Brazilian scientific literature, being restricted to studies in the area of communication and few initiatives in the field of marketing management (Porto, Mendonça, Milan, 2016 ; Hansen, Kunsen, Henning-Thurau, 2018; Teixeira, 2019). So, from the scientific point of view, the present study is justified, considering its contribution to enlighten the discussion about corporate reputation and image management under crises of digital environment in Brazil.

2 Consumer Behaviors in Digital Environment

The digital environment is a dynamic system (with characteristics such as scope, complexity and network format), which encourages transformations in consumption and enhances relationships between geographically dispersed individuals, as it is configured as a territory less entity (Firat, Venkatesh, 1995; Lévy, 1999; Castells, 1999). The behavior of consumers connected in this digital environment is based on their active participation, which means that "the citizen identifies on consumption the password that authorizes him to interfere politically at any time or place" (Beck, 1999, p. 130).

In this sense, Boyd (2010) argued that technologies in network formats enable the amplification, registration and dissemination of information and social actions, which are shared through interaction of the dynamics of word-of-mouth (WOM) with a greater impact on product judgments, formation of attitudes and on the decision-making process (Brown, Broderick, Lee, 2007). These concepts help to understand the strong impact of consumers' opinions and participative role in the digital environment (Souza, 2010).

With the evolution of the internet and the appearance of online relationship platforms, the way of information is consumed has changed as well as the relationship between consumers and brands has provided a huge transformation of human experiences in commodity (Rifkin, 2001). From the marketing point of view, the focus should be the establishment of a long-term relationship, using these technologies since markets opened space for the strategic use of relationship platforms. These new Technologies have also a disruptive effect and can present themselves as a villain or not, but never as a neutral element (Kranzberg, 1985; Rogers, 2019).

In this context, consumers build and elaborate their social reality under the light of these new technologies and their dynamics is reflected in the form of expressions of online feelings (Venkatesh, Karababa, Ger, 2002). When these feelings are negative, crisis of corporate image is configured in the digital environment, which, according to Pefeffer, Zorbach and Carlley (2014), is characterized by a wave of indignation motivated by rejections of a company's act or statement.

Another view on crisis in corporate image is brought by Teixeira (2019), who argued that crisis may be a moment of alertness, of changes and of instability which requires quick decisions to stop them to gain strength and to evolve for a next level. According to Luecke (2017), corporate image crisis has the potential to "cause serious damage to employees, to company's reputation and financial result. As in both cases, most of them, crisis occurs "due to management errors or employee involvement" (Forni, 2013, p. 20).

When it comes to crisis in social networks, repercussions are inevitable and corrode the image of corporations and all entities involved (Parente, 2015). Even during online crisis, companies need to "maintain composure and continue to communicate and interact" (Pefeffer, Zorbach, Carlley, 2014, p. 123).

Understanding that shifts in consumer behavior, the characteristics of the digital environment and the corporate image during crisis, the following paragraphs will focus on discussion of two key concepts for this research: transparency and digital swarm. The theoretical discussion will serve as a basis for analyzing the cases of this study.

2.1 Transparency and digital swarm concepts

According to Han (2017), transparency becomes a reality when there is a lack of negativity. For him, negativity is avoided because it would paralyze communication, since, through the like, "connective communication would appear much faster than with dislike" (Han, 2017, p. 24). Although this construct

can be contested, it establishes the concept of transparency, presented as essential for understanding the logic of consumption in a digital environment.

Transparency, then, may gain ideological contours pointing out to surveillance and control, which may be discussed depending on the degree of democratic freedom of certain nation or the articulation of online countercultural groups (Castells, 2017). The absence of negativity, on the other hand, is also an inconceivable reality in democratic structures and presupposes an evident autocratic logic. Absolute positivity may also sound like an exacerbation of the politically correct or even an unhealthy social situation resulting from the cult of like (Brooker, Brides, Armstrong, 2011; Pondé, 2012).

When transposing the discussion to the dimension of the relationship between customers and brands, it becomes necessary to admit that there are frequent, at least in the Brazilian context, situations in which companies start to account for a bunch of criticisms in social media and there is an expressive engagement of individuals. This is opposed to what Han (2019) has proposed. For him, digital communication operates smoothly, because what are exchanged in the digital environment are almost always positive and enjoyable things.

However, cases of crises of great repercussion on social networks, with an exponential volume of negative comments, deny this argument. If positivity factors always prevail, what will explain social commotions that lead thousands or even millions of people to engage in a joint reaction expressed in negative comments about brands on the internet?

According to Han's theory, contrary comments and reactions may even be understood as acts motivated by negativeness, by something that does not show transparency or by what rescue a negative memory of the fact or content. For Han (2019, p. 15), what causes disgust leading people to reject a certain image occurs through the negativity of the "shock" or "aggression". The potential of the propagation of this wave of dissatisfaction, according to him, is inherent to digital communication itself, which "makes an instantaneous discharge of possible affections" (Han, 2018, p. 15).

Consumer dissatisfaction behavior occurs through exceeding or not exceeding their expectations, regarding the performance of a product or service (Santana, Sobrinho, 2008). So, starting with the collective dimension of individuals' comments in a digital environment, a new concept is open for discussion: The digital swarm. To Han (2018), the digital swarm is formed by the so called new crowd, a bunch of anonymous individuals who, despite connected and sharing similar thoughts, do not seem to find ways to express their collective energies and, therefore, apparently do not generate any expectations of future.

According to Han (2018), because of the ephemerality, they do not develop any political energy, reinforcing the thesis that mass is power, however, it is limited. Despite Han's theory that people in the digital environment are diffused and may not generate any political energy, mass movements of negative comments may hurt companies' image and reputation.

The damage to reputation, although intangible, cannot be disregarded, when the impacts of the mobilization of groups of individuals in the digital environment is being taking into consideration, what seem to be the case of the Brazilian context, where there are situations in which investor's confidence is shaken and capital shares lose market value, or cases in which public policies are reviewed, such as the example of the tobacco industry in Brazil, which has become an international case of combating cigarettes (G1, 2019)[31].

[31] https://g1.globo.com/jornal-nacional/noticia/2019/07/26/oms-reconhece-brasil-como-modelo-de-sucesso-no-combate-ao-fumo.ghtml

This kind of instability, in addition to jeopardizing the image and reputation of the companies, impacts the organizational climate, interferes in the stability of production, and creates rumors capable of affecting corporations' financial statements. Stakeholders have doubts about the organization's integrity and ethics (Teixeira, 2019).

In these cases, as a strategy to recover the organizational image, companies must introduce governance policies, which presuppose a commitment to transparency (in the sense of publicizing information), social and environmental responsibility.

These attributes add value to companies and help them to face unfavorable economic scenarios and regain investor confidence (Ribeiro Neto, Famá, 2002; Kim et al., 2016). In Brazil, the concept of transparency takes other shapes and is anchored by the access to the Information Law (12,527/2011), which is essential for democratic exercise of citizenship (Medeiros, Magalhães, Pereira, 2014).

Han (2017) understands the potential of these social mobilizations in the digital environment, but bets on the concept of ephemerality of the digital swarm and argues that, in a society of transparency, indignations manifested on the internet would be an "affective state, which does not develop any form with the power of action", and the digital swarm is not a mass, "consists of singularized individuals" (Han, 2018, pp. 23- 27). He insists in his arguments, perhaps because the Brazilian reality is not part or object of his studies and analysis. Some cases chosen to illustrate intangible losses which were due to brand crisis in the social medias and part of the digital environment remain there forever due to the property of "searchability". In this case, it is just enough a new crisis for the memory of the old one be rescued through a simple search for keywords or the name of the company (Bueno, 2014; Teixeira, 2019). In scenarios of crises of corporate images, managers start looking for an effective corporate discourse to end the avalanches of indignation. The literature points out that organizations must position themselves immediately (according to the logic of the networks), with objectivity, transparency (their speech must go beyond a mere apology) and dialogue with the consumer in the digital environment (Forni, 2013; Bueno, 2014; Parente, 2015; Park, 2017; Chung et al., 2019).

Parente (2015) gives an example of a crisis that occurred during the Rio 2016 Olympic Games in Brazil, involving a food supply company. During the crisis on social medias, in addition to the publication of an explanation letter, the company responded to all comments on the social platforms, in a personalized and individual way.

Despite his contribution being relativized in some respects, Han (2018) collaborated with this discussion, through his concept of sovereignty, which can be translated by the effectiveness of corporate responses.

3 Methodology

This present study has a qualitative approach, using a multiple case study strategy and has a descriptive nature (ability to characterize a certain phenomenon), involving cases of crises in corporate image of Brazilian companies. The choice of the cases was based on those that "provide insights or that assist in the understanding of other aspects that go beyond the case studied" (Ceni, Rese, 2018, p. 8).

For data collection, the procedure adopted was the netnography, through the selection of reports that mentioned four companies involved in crisis episodes (Vergara, 2005; Kozinets, 2012[32]). Data analysis, on the other hand, was done through content analysis and consists of the following steps: pre-analysis, material exploration, data processing and interpretation (Roesch, 2005; Bardin, 2011).

[32] http://bravdesign.com.br/wp-content/uploads/2012/07/netnografia_portugues.pdf

4 Results and Discussions

The present study involves image crises of two Brazilian companies during the period of June 2018 and September 2019. The wave of negative characteristics of these cases on social networks and the strength of the engagement of Brazilian internet users confirm the strength of the "dislike" and the absence of organizational and governmental controls, regarding individual and collective expression in the digital environment.

The first episode involved the Shopping da Bahia (opened in 1975, in Salvador, the second shopping mall built in the country). This enterprise has more than 500 stores, where more than 3.5 million people circulate per month (Shopping da Bahia, 2019)[33].

On July 11, 2018, Shopping Bahia faced an image crisis when a video in which a security guard opposed to a customer's initiative for paying a meal to a young boy, in a condition of social vulnerability, went "viral". This video was seen and shared on Facebook by millions of people. This case generated social commotion and discussion on social media, with references to terms such as institutional racism, prejudice, preconception, discrimination, and shame. This mobilization with an ideological and moral characteristic goes against Han's proposal (2017, p. 103), in which "the digital network as a mean of transparency is not subject to moral imperatives".

The second case concerned a security guard working for the Extra supermarket in the city of Rio de Janeiro, who killed by suffocation a young man, who supposedly was a drug user. This episode happened in February 2019 (G1, 2019)[34]. The entire act of immobilizing the suspect until his death was filmed and went "viral" on social networks, provoking a national protest movement against the Extra brand, sharing the hashtags #ACarneMaisBarataDoMercado(#Thecheapestmeatinthemarket) and #VidasNegrasImportam (#Black lives matter) (Queiroga, 2019)[35].

Both cases caused attacks on companies' brands and clear repudiation of racism and mobilized protests on social media in a clear awareness of exercise of citizenship. These cases reinforce the gap between the theory proposed by Han (2017) about transparency and the lack of political strength in digital swarms and real cases of management of crises in the images of Brazilian companies.

5 Conclusion

This study suggests that concepts of transparency and digital swarm proposed by the South Korean philosopher Byung-Chul Hando (2020) not appear to be relevant to explain phenomena such as crises in corporate image on digital environment in the Brazilian context. Findings seem to refute such theories, since Brazilian consumers seem to be greedy to participate actively in discussions against companies and brands when episodes cause some kind of social commotions, in particular, when episodes may have concrete effects, resulting in economic and political pressures, financial losses and substantial drops in companies' shares value.

As a suggestion for future studies, discussions such as the exercise of citizens' freedom to express themselves in the digital environment, and the instruments of control and surveillance that may limit the emergence and mobilization of countercultural groups in different countries. For comparative purposes,

[33] https://shoppingdabahia.com.br/sobre-o-shopping/

[34] https://extra.globo.com/casos-de-policia/morte-de-jovem-por-seguranca-gera-protestos-acarnemaisbaratadomercado-23456250.html

[35] https://extra.globo.com/casos-de-policia/morte-de-jovem-por-seguranca-gera-protestos-acarnemaisbaratadomercado-23456250.html

it is also suggested to test, in different economic, political, and cultural contexts, the hypothesis, inspired by the work of Han (2018) that digital swarms do not necessarily result in concrete actions.

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Analysis and Processing of B-station Fragmentation Information Based on Apriori Algorithm

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Abstract: With the rapid development of the internet, the data is growing explosively. Because the information obtained by human beings is scattered, it is an important research topic to extract valuable information from fragmentary information. In this paper, by studying the characteristics of fragmented information, combining the advantages of Hadoop platform and using Apriori algorithm, firstly, the collected fragmented information is processed, and the data is clustered by dividing the level sequence; secondly, the association rules are mined by Apriori algorithm; finally, the popular video ranking in December 2019 is analyzed through station B, and the relationship between heat and benefit of the video are mined. Furthermore, the method of mining the potential value of fragmented information is given by using the Apriori algorithm.
Keywords: Fragmentation information; Hadoop platform; Apriori algorithm; Association rule mining

1 Introduction

In recent years, with the in-depth popularization of big data technology, although the data collection, storage and processing technology is constantly improving and becoming mature, the complex data background and various data types and structures still face many problems and challenges in data analysis and processing. Thus, the analysis and application of big data has become a hot research topic. Beyer M. and Laney D. (2012)[36] explained the importance of Big Data, and put forward the 3V characteristics of volume, velocity and diversity. Since then, many experts and scholars, such as Marr B. (2016)[37], has applied and extended it to 4V and 5V, including the huge amount of big data, the rapid analysis and processing speed, the diversity of data types and sources, the huge value to the business field and the authenticity of hidden knowledge. The wide application background of big data has caused a profound technological revolution not only in the field of scientific research, but also in the fields of commerce, politics, economy, medical treatment and culture. So, better data computing methods and platforms are needed to face the rapidly generated data stream data and give faster real-time response. Wang Jianji et al. (2017) proposed that the validity and authenticity of data depend on the quality of data. Good quality data is of great significance for later extraction of big knowledge and personalized service. High quality data and knowledge can also reflect the value of big data. Effective data management and analysis enable us to make better business decisions, Therefore, how to extract and analyze valuable knowledge from massive fragmented data is of great theoretical and practical significance.

In terms of data volume, Wu Xindong et al. (2016) proposed that the huge amount of big data can no longer be simply processed by existing models and computing platforms. In the face of the data scale of big data, we can't simply rely on parallel computing and hardware improvement to break through the bottleneck of the computing platform. For example, many data sources such as the network, television, newspapers and so on have produced heterogeneous data with different structures. The first challenge is to extract the data information that is really valuable for our future work and prediction from these seemingly disordered data, and select the appropriate filtering mechanism. Facing the overwhelming data resources, what is needed is no longer the whole text, sound or image information. Although the scale and quantity of data are growing, the value of data has not increased proportionally due to the existence of useless data. Considering that the existing screening mechanism has great difficulties for the extraction and analysis of big data, in order to solve this problem, there are higher requirements for data preprocessing and cleaning in the big data environment. For the knowledge processing of big data, it is a key step to obtain high-quality data sets through a stable and efficient data calculation and cleaning platform and data preprocessing process. According to the generation and source of big data, although

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[36] https://www.gartner.com/doc/2057415

[37] http://www.linkedin.com/pulse/20140306073407-64875646-big-data-the-5-vs-everyone-must-know

the expansion of network scale has brought convenience for obtaining information, the problem of data heterogeneity has become increasingly prominent due to the diversity of complex network structure and access to information. For the above reasons, the value of data analysis is much higher than that of simple location and identification. The complex semantic relationship between data and the data with different structures need to find a standardized data representation. The definition of standardized data representation itself has great challenges, which will also involve the transformation of large-scale data sets in the integration process of heterogeneous data. Taking big data analysis in social network as an example, through the improvement of the description form of network structure, heterogeneous autonomous information sources on multiple websites can be integrated, which may include microblogs, comments or uploaded pictures, audio and other information sent by users. At the meantime, the standardized data representation can describe a reasonable network structure and describe the semantic association between data.

From the perspective of data mining, data mining refers to the process of extracting hidden information and knowledge that people do not know in advance but may be useful from massive, incomplete and fuzzy practical application data. Association rule mining is an important mining method in data mining. Apriori algorithm (Zaki, M. J. 2000; Dutt S., Choudhary N., Singh D. 2014; Sun Lina, 2020) is a very classic association rule mining algorithm. Apriori algorithm is divided into two steps: discovering frequent sets; generating association rules according to frequent sets. The first step is the key of the whole algorithm. The lower closure property of frequent sets is the basis of Apriori algorithm, that is, any subset of frequent sets is frequent, while the superset of infrequent sets is infrequent. Apriori algorithm uses width first. It needs to generate candidate itemsets repeatedly, and then scan data to get the support of candidate itemsets. The cost is mainly CPU time and I/O time needed to scan database. People pay more attention to frequent pattern mining. Mohbey K. K. (2018; 2019) summarized the research results of frequent pattern mining, and discussed pattern growth, long pattern, constraint based pattern, interesting pattern, pattern mining in data stream and so on. At present, in the aspect of maximum frequent set mining in China, great progress has been made in the improvement of defects in the process of practical application. However, there are still deficiencies in many aspects, which need continuous improvement and follow-up.

Aiming at the above problems of big data processing and analysis, this paper mainly analyzes and demonstrates the application of Hadoop framework and Apriori algorithm in fragment information processing. Firstly, by collecting, storing and processing the fragmented information of the ranking list of station B, based on the massive data storage model of cloud computing, the massive information data is deployed on Hadoop platform. Secondly, the core algorithm of cloud computing and map reduce are used to process the massive data, and the data is stored in the virtual resource pool. Finally, based on the Apriori algorithm association mining, the video with high popularity and benefit is obtained.

2 Collection, Storage and Processing of Fragmented Information

2.1 Data collection of B-station

Using the web scraper crawler technology provided by Google browser, the data of the popular video ranking of B-station in December 2019 was collected. The main crawling objects are video title, author, release time, video type, main content and thumb up number, etc. The crawler logic is shown in Figure 1.

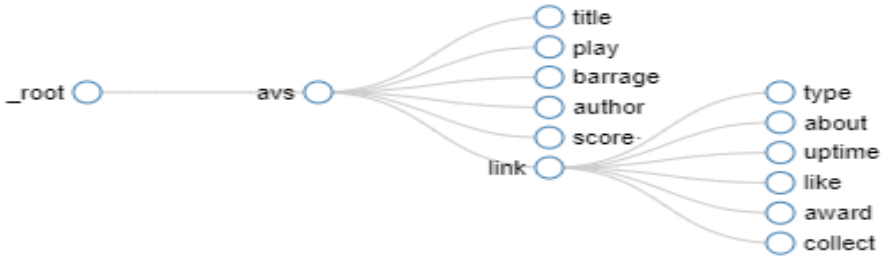

Figure 1 Web Scraper Crawler Logic

2.2 Data storage of B-station

The data obtained from the crawler is uploaded to HDFS by Hadoop technology for storage. After hive cleaning (Ru Bei and Li Hong, 2017), a multi-level partition table can be established according to

the video type, video content, video likes and other elements, and then displayed to the user through MySQL visualization window. Thus, the user can use select statement to query the desired content. Here, hive is a theme- based, stable data warehouse tool built on Hadoop, which is essentially a MapReduce computing framework based on Hadoop (Wang Hongzhi, Li Ning, Wang, Zheng, et al., 2020). Hive converts HiveQL (SQL-like) statements to MapReduce tasks for running, and HiveQL makes it easier to process large amounts of distributed offline data.

2.3 Data processing of B-station

The data in the database is part of the relevant data of the crawler object, which needs to be further processed and filtered. In this paper, we mainly mine and analyze the association rules of the video type, the number of thumbs up, the number of plays and the number of coins.

2.3.1 Abnormal data processing

The data collected by the crawler can be extracted through SQL statements, and the video type, likes, playback volume, coins, etc. can be drawn into a new data sheet and then made into a scatter chart through Excel. The scatter chart show that the data convergence is good and only a few of the data are abnormal. To extract more accurate information, the abnormal data can be deleted and reintegrated. See Figure 2-3 for details.

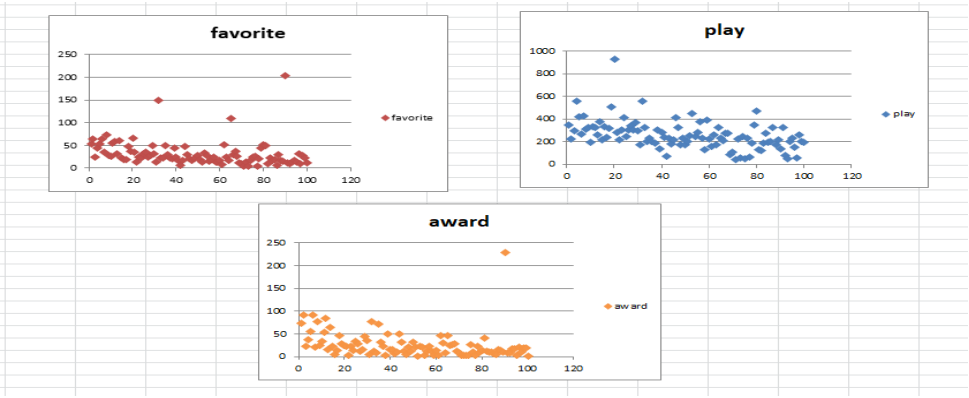

Figure 2 Before Abnormal Data Processing

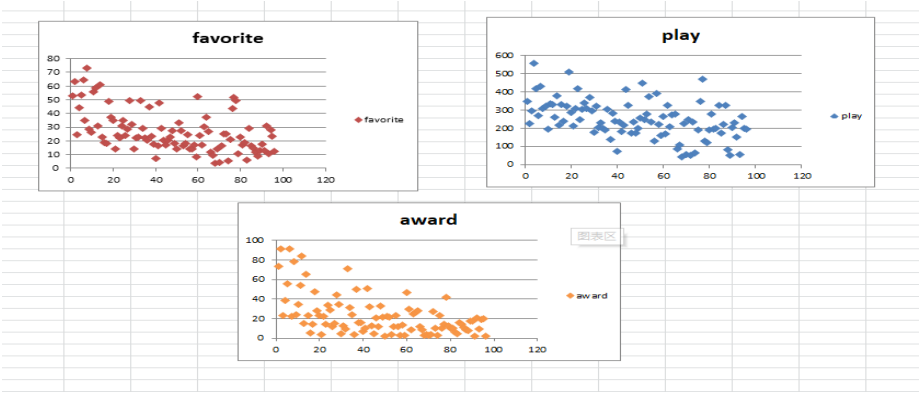

Figure 3 After Abnormal Data Processing

2.3.2 Processing data through SQL statements

As shown in Figure 3, the data can be divided into three grades (B, a, s) according to a certain interval. The number (favorite) is divided into three grades (B, a, s) according to [0,20), [20,40) and [40, positive infinity], the coin (away) is divided into three grades (B, a, s) according to (0, 20), [20, 40), [40, positive infinity), and the play (play) is divided into three grades (B, a, s) according to (0, 200), [200, 400], [400, positive infinity). Since the crawled data are all text data, first of all, the required data should be converted to double type, through SQL statement:

```
alter table Sheet1 modify column favorite double;
alter table Sheet1 modify column play double;
```

alter table Sheet1 modify column award double.

Change the likes, playback, and coin number segments from char type to double type.

After the data is of floating-point type, the level can be divided by dividing the interval, and the level can be added to the corresponding rank field (PR is the number of playback, FR is the number of likes, and AR is the number of coins). The SQL statement is as follows:

```
update Sheet1 set PR='PB' where play<200;
update Sheet1 set PR='PA' where play<400 and play>=200;
update Sheet1 set PR='PS' where play>=400;
update Sheet1 set FR='FB' where favorite<20;
update Sheet1 set FR='FA' where favorite<40 and favorite>=20;
update Sheet1 set FR='FS' where favorite>=40;
update Sheet1 set AR='AB' where award<20;
update Sheet1 set AR='AA' where award<40 and award>=20;
update Sheet1 set AR='AS' where award>=4.
```

The data table after classification is shown in Table 1.

Table 1 Partial Data of Data Table Sheet1

Type	Play	Favorite	Award	PR	FR	AR
Animation	346.3	53	73.4	PA	FS	AS
Science and Technology	226.2	63	91.2	PA	FS	AS
Animation	294.5	25	23.2	PA	FA	AA
Dance	555.9	44	38.3	PS	FS	AA
Game	418.7	53	56	PS	FS	AS
Life	269	65	91.1	PA	FS	AS
Ghost anima	429.9	35	22.1	PS	FA	AA
Animation	309.3	73	78	PA	FS	AS
Life	322.8	29	24.5	PA	FA	AA
Animation	197.8	26	34.6	PB	FA	AA
Animation	335.6	56	53.9	PA	FS	AS
Life	329.1	59	84.3	PA	FS	AS
Science and Technology	260	31	15.3	PA	FA	AB
Animation	379.9	61	65.3	PA	FS	AS
Music	216.1	23	23.7	PA	FA	AA
Life	330.4	19	5.5	PA	FB	AB
Animation	239	18	14.1	PA	FB	AB
Digital	320.1	49	47.2	PA	FS	AS
Life	507.4	37	28.5	PS	FA	AA
Life	929.6	65	25.2	PS	FS	AA
Life	286.2	35	23.1	PA	FA	AA
Life	215.3	14	3.5	PA	FB	AB

3 Mining Association Rules of Ranking Information from B-station

Based on Apriori algorithm (Mondal K. C., Nandy B. D., Baidya A., 2018), extract type, PR, FR and AR from Sheet1 table as item set and import them into transaction database D2. Here, the minimum support is 0.1 and the minimum confidence is 0.8, which is implemented by Python code (Mondal K. C., Nandy B. D., Baidya A., 2018). The specific calculation results are shown in Table 2-6.

Table 2 Partial Data in D2

Type	PR	FR	AR	Type	PR	FR	AR
Science and Technology	PB	FA	AA	Life	PA	FA	AA
Animation	PA	FA	AA	Animation	PB	FA	AA
Dance	PS	FA	AA	Animation	PA	FS	AA
Game	PS	FS	AA	Life	PA	FS	AS
Life	PA	FS	AS	Science and Technology	PA	FA	AB
Ghost anima	PS	FA	AA	Music	PA	FA	AA
Animation	PA	FS	AS	Life	PA	FB	AB

Table 3 Frequent 1-Itemset and Support in D2

Frequent 1-itemset	Support	Frequent 1-itemset	Support
Frozenset({'PA'})	0.5858585858585859	Frozenset({'AB'})	0.5353535353535354
Frozenset({'Animation'})	0.20202020202020202	Frozenset({'FB'})	0.37373737373737376
Frozenset({'AA'})	0.40404040404040403	Frozenset({'PB'})	0.31313131313131315
Frozenset({'FA'})	0.5050505050505051	Frozenset({'FS'})	0.12121212121212122
Frozenset({'PS'})	0.10101010101010101	Frozenset({'Life'})	0.44444444444444444

Table 4 Frequent 2-Itemset and Support in D2

Frequent 2-itemset	Support	Frequent 2-itemset	Support
Frozenset({'PA','AB'})	0.2727272727272727	Frozenset({'Animation','PA'})	0.12121212121212122
Frozenset({'Animation','AA'})	0.10101010101010101	Frozenset({'Life','FB'})	0.1717171717171717
Frozenset({'FA','PA'})	0.30303030303030304	Frozenset({'AB','PA'})	0.32323232323232326
Frozenset({'Life','PB'})	0.11111111111111111	Frozenset({'AA','FA'})	0.3434343434343434
Frozenset({'Animation','FA'})	0.11111111111111111	Frozenset({'FA','AB'})	0.16161616161616163
Frozenset({'PB','AB'})	0.18181818181818182	Frozenset({'AA','PA'})	0.2222222222222222
Frozenset({'AB','FB'})	0.36363636363636365	Frozenset({'Life','FB'})	0.2828282828282828
Frozenset({'AA','Life'})	0.1414141414141414	Frozenset({'PB','AB'})	0.16161616161616163
Frozenset({'FA','PB'})	0.1414141414141414	Frozenset({'Life','FA'})	0.21212121212121213
Frozenset({'PA','FB'})	0.21212121212121213	Frozenset({'AA','PB'})	0.12121212121212122

Table 5 Frequent 3-Itemset and Support in D2

Frequent 3-itemset	Support	Frequent 3-itemset	Support
Frozenset({'AA','FA','PA'})	0.18181818181818182	Frozenset({'Life','AB','PA'})	0.18181818181818182
Frozenset({'Life','PA','FB'})	0.11111111111111111	Frozenset({'AA','Life','FA'})	0.12121212121212122
Frozenset({'PB','AB','FB'})	0.16161616161616163	Frozenset({'AB','PA','FB'})	0.2020202020202020
Frozenset({'Life','FA','PA'})	0.13131313131313133	Frozenset({'Life','AB','FB'})	0.1717171717171717
Frozenset({'AA','FA','PB'})	0.12121212121212122	Frozenset({'FA','AB','PA'})	0.12121212121212122

Table 6 Association Rules in D2

Association rules	Conf	Association rules	Conf
Frozenset({'FB'})=>Frozenset({'AB'})	0.9730	Frozenset({'FA','PB'})=>Frozenset({'AA'})	0.8571
Frozenset({'AA'})=>Frozenset({'FA'})	0.85	Frozenset({'AA','PB'})=>Frozenset({'PB'})	1.0
Frozenset({'AA','PA'})=>Frozenset({'FA'})	0.8182	Frozenset({'AA','Life'})=>Frozenset({'FA'})	0.8571
Frozenset({'PB','FB'})=>Frozenset({'AB'})	1.0	Frozenset({'PA','FB'})=>Frozenset({'AB'})	0.9524
Frozenset({'PB','AB'})=>Frozenset({'FB'})	0.8889	Frozenset({'Life','FB'})=>Frozenset({'AB'})	1.0

Through observation, it can be seen from D2 frequent 1 episode that animation and life videos account for a large proportion in the video ranking in December, and about 10% of the video playback volume and the number of likes reached S-level. From frequent 2 episodes and frequent 3 episodes, it can be concluded that the number of plays and likes of life and animation videos reached A-level, so it can be seen that life and animation videos are more popular among users in December favorite videos. According to the association rules, as long as the likes are up to B-level, there is a 97% chance that the number of coins will reach B-level. When the likes are up to A-level and the amount of playback reaches B-level, then there is an 85.7% chance that the number of coins will reach A-level. When the likes are up to B-level, the number of coins will reach B-level. If the number of coins for the life videos reaches A-level, it has an 85% probability of reaching A-level, which shows that the number of likes in life video is directly proportional to the number of coins.

From analyzing the above data, it can be concluded that in December, the life video is a hot spot, with good heat and good benefits, the user's love for video content greatly affects the video's reward degree. And, the proportion of the impact of the playback volume on the video's heat degree is small, which reflects that the audience's requirements for the quality of video content are high, and less attention is paid to the factors that affect the playback amount of titles, covers, etc. Furthermore, as a up master (video publisher), when making video, we should first focus on the improvement of the quality of video content, pay attention to the viewing experience of users, and then help improve the playback of video from multiple perspectives and methods, so that a video will get a high degree of heat and benefit.

4 Optimize Apriori Algorithm Based on B-Station Ranking Case

Since the Apriori algorithm was proposed, many researchers have made in-depth research on its shortcomings: too many times of transaction database scanning, generating a large number of redundant data, using unique support, etc.

4.1 Apriori optimization algorithm based on fragmentation information

Based on the characteristics of multiple and miscellaneous of fragmented information, combined with the characteristics of the era of big data, the repeated scanning of transaction database is undoubtedly an I/O high consumption operation. How to reduce the number of scans or the amount of scans is the key operation to reduce I/O. Based on the analysis of Apriori algorithm, it can be concluded that Apriori algorithm has the following properties (Zeng Lei, 2016):

Property 1: if an itemset is a frequent itemset, then any non empty subitemset must be a frequent itemset.

Property 2: if an itemset is not frequent, then any of its extension sets are not frequent itemsets.

By this property, the amount of scanning can be reduced and the I/O cost can be reduced based on the partition of transaction database.

According to the nature of the transaction database, a comprehensive scan can be carried out to find out the frequent 1-itemset. Taking frequent 1-itemset as the key, a sub database of transaction data volume is established to store the set of extension items of the frequent 1-itemset. When frequent 2-itemset is required, only scan the frequent 1-itemset database, and the frequent 2-itemset obtained from it is used as the key of its sub database to store the set of extension items of the frequent 2-itemset. And so on, the frequent k-item set database is used to store the frequent k-item set's extension set when the frequent (K+1)-itemset is required. Because the algorithm only needs to scan the transaction database once, and then only needs to scan the sub database, which progressively reduces the number of scans to the transaction database and reduces I/O overhead.

4.2 Defect analysis of Apriori algorithm after optimization

The optimized algorithm reduces the times of I/O to some extent and improves the confidence efficiency, but it has the following disadvantages:

(1) Because frequent itemsets are produced in every sub database, frequent itemsets are produced repeatedly, which improves the redundancy of data;

(2) Due to the frequent establishment of sub databases, there are certain requirements for disk storage space, and the requirements for big data fragmentation information will become greater;

(3) Because the sub databases are scanned and mined by sections, calculation amount is larger than that of the original Apriori algorithm.

5 Conclusions and Prospects

In this paper, through the example of B-station leaderboard, from web scraper data crawler collection, to Hadoop platform HDFS storage, to hive cleaning processing and MySQL display, finally, Apriori algorithm is used to mine association rules of fragmented data in Sheet1. This paper mainly analyzes and demonstrates the application of Hadoop framework and Apriori algorithm in fragmented information, and obtains satisfactory results. However, due to the complexity of fragmented information relationship and the wide range of association rules mining, the research contents and methods of this paper need to be further supplemented and improved.

(1) In the collection of fragmented information, due to the lack of theory and limited hardware equipment, it is impossible to collect scientific fragmented data on a wide range of platforms and in many ways. How to collect fragmented information scientifically and effectively will be a potential research direction;

(2) When clustering the data, because different people have different rating standards, and the convergence of the data is different, the rating method needs to be improved to make it more reasonable and standardized;

(3) When using Apriori algorithm to calculate, due to the uneven convergence of fragmented information data, there is no scientific theoretical support for mining association rules, so it is impossible to reasonably select the minimum support and confidence.

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Research on the Construction, Composition of Elements and Interaction of the Structure System Model of the Digital Cultural Tourism Industry

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Abstract: To improve the intelligent "empowerment" level of cultural tourism industry and cultivate the new economy of digital cultural tourism industry integrating online and offline is an important era proposition to promote the construction of a new modern industrial system and realize the high-quality development of cultural tourism industry. Based on the definition of the connotation and function of digital cultural tourism industry, and on the thinking model of "Internet +", integrating digital technology and platform economy and other resources, this paper constructs the structure system model of the digital cultural tourism industry from four levels, including technical support, facilities and equipment, product type and application platform, and reveals the composition of elements and interaction of the model, in view of the challenges faced by the digital transformation of the cultural tourism industry, this paper proposed some promotion strategies, including speeding up the supply-side reform, strengthening the construction of new infrastructure, increasing policy support, promoting the in-depth integration of "cultural tourism + Internet" and building a digital cultural tourism integration platform, etc. It is intended to provide governments at all levels and some related enterprises with new ideas, new models and new paths for the development of digital cultural tourism industry.

Keywords: Digital cultural tourism; Industrial function; Structural system model; The composition of elements; Interaction

1 Introduction

Since 2000, relevant departments of the state have been actively advocating and promoting the development of the digital culture field and digital tourism field, and have achieved remarkable results in digital museums, digital scenic spots and other fields, laying the foundation for the industrialization of digital cultural tourism. In July 2020, the National Development and Reform Commission and the Ministry of Culture and Tourism and other departments, jointly issued the "Opinions on Supporting the Healthy Development of New Type of Business and New Business Models, Activating the Consumer Market and Promoting the Expansion of Employment". They also explicitly proposed to create new advantages in the digital economy and encourage intelligent upgrading of products and innovation of business models in cultural tourism and other fields. However, the digital cultural tourism industry is a new model of cross-border integration industry with a new type of business. In the specific promotion, how to understand the meaning, function and structural system of the digital cultural tourism industry, how to find out the development orientation and organically connect the cross-border integration relationship, how to find a specific starting point to foster strengths and avoid weaknesses, and how to make up the short board, people need to do some theoretical research to provide guidance and help in practical level urgently. Based on the "Internet" thinking model of interconnection and mutual integration, co construction, sharing and win-win, this article seized the opportunity of a large number of new type of business and new modes of online cultural tourism services that emerged in China during the epidemic

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2019 novel coronavirus period, and has established the structure system model of the digital cultural tourism industry, aims to break the space-time limitation of traditional industries' development according to regional layout and industry division, cultivate a new ecology of digitalization, intelligentialize and intelligence of cultural tourism industry, enhance the new momentum of industrial integration and cross-border development, promote the comprehensive anti-risk capability of the industry, so as to provide decision-making reference for the government and enterprises in promoting development.

Throughout the research on digital cultural tourism industry in academic circles at home and abroad, it is still in its infancy and has begun to attract research attention in China, but there are few research documents directly on digital cultural tourism and digital cultural tourism industry. For example, if you input keywords in CNKI, the search results are as follow: there are 41 articles of "Digital Travel", 29 articles of "Digital Travel Industry", 225 articles of "Digital Tourism" and 4514 articles of "Digital Culture". The search results in WOS are as follow: there are 3 articles of "Digital Travel", 0 articles of "Digital Travel Industry", 142 articles of "Digital Tourism" and 1176 articles of "Digital Culture". The search results in Google Academic are as follow: 10 articles on "Digital Travel", 1 article on "Digital Travel Industry", 204 articles on "Digital Tourism" and 2170 articles on "Digital Culture". In the limited research results, the researchers have focused on some scattered issues such as the concept, technical basis, product supply and demand, and development significance of digital cultural travel. First, in terms of the definition of digital cultural tourism industry, the researchers have a relatively consistent view that digital cultural tourism is the integration and development of digital technology and cultural tourism. Chen Cheng et al. believed that digital cultural tourism is the sum of the phenomena of promoting the integration of cultural tourism with digital technologies such as Internet and communication (Chen Cheng, 2020). Wu Liyun pointed out that digital cultural tourism is a new industrial form formed by the deep integration of digital technology, information and communication technology and cultural tourism industry with the network as the carrier (Wu Liyun, 2020). Secondly, regarding the technical basis of digital cultural tourism industry, researchers undoubtedly focus on information technology. Koo C pointed out that the digital tourism industry is still dominated by information technology and networking technology, and believed that intelligent technology will play an important role in promoting the digital tourism industry in the future (Koo C, 2015). Suyunchaliyeva M, guided by the development trend of integration of information technology and tourism, discussed various new technologies and corresponding facilities and equipment in the industry of culture and tourism, and analyzed in detail the important applications of digital technology, VR, AR, Internet of Things, Internet, artificial intelligence, big data, cloud computing and other technologies on online cultural tourism products and offline immersion experiences(Suyunchaliyeva M, 2020). Third, in terms of the supply and demand of digital cultural tourism products, researchers believe that the growth trend of demand is far greater than that of supply, and insufficient supply is a realistic problem. Shash N.N. pointed out that consumers' demand for digital cultural tourism products is growing rapidly and the forms of demand are diversified (Shash N.N., 2019). Liu Yang et al. believe that the current supply of digital cultural tourism products cannot meet the demand, and it is necessary to further improve the quality and upgrade and enrich the product types (Liu Yang, 2020). Fourth, the development significance of digital cultural tourism industry. Happ É (Happ É, 2018) pointed out that the digitalization of culture and tourism industry can effectively connect supply and demand, cultivate the new type of business of cultural tourism industry, stimulate consumption and promote economic development. Kayumovich K O pointed out that the development of digital cultural tourism will boost the quality change of the economic development of cultural tourism

industry and enhance the competitiveness and innovation of the industry (Kayumovich K O, 2020).

However, the academic research on the key issues such as the function, industrial structure system, industrial factor characteristics and interactive relationship of digital cultural tourism industry has not attracted extensive attention. Relevant research is still in a vacant or weak state, which is far from the current national requirements of vigorously advocating and promoting the development of digital cultural tourism industry, and the academic research is seriously lagging behind the actual needs, and it is urgent to pay more attention to and carry out innovative research.

2 The Meaning and Function of Digital Cultural Tourism Industry

2.1 The meaning of digital cultural tourism industry

Digital cultural tourism industry is a new industry promoted by the country. Academia agrees that it is a new industry that integrates digital technology, culture and tourism. What kind of integration nature does it have as an industry integrated with digital technology is directly related to the logical significance of the construction of the structural system framework of digital cultural tourism industry.

From the definition of the word “industry”, industry is constantly changing with the development of economy and society. The Chinese term "industry" corresponds to the English word "Industry". In the early days, it mainly refers to "industrial engineering". Nowadays, "industry" usually refers to the primary, secondary and tertiary industries of the national economy, or specific industrial sectors such as industrial engineering, agriculture and service industries, as well as more specific industrial sectors such as cultural industries and tourism. Academia generally believes that industry is an aggregation, and the major defining characteristics for judging an industry aggregate is the similarities and differences of production technologies, products or services. For example, Savina T N puts forward that "industry usually refers to the aggregation of all enterprises that produce material products and provide labor services, which is developed around common products, and are characterized by: (1) products or services with similar or closely competitive and substitution relationships with each other; (2) Material production activities with similar production technologies, production processes, production processes and other similar characteristics or service activities of similar economic nature. " (Savina T N, 2018) Yang Gongpu, representing the basic viewpoint of the Chinese industrial economic academic circle, defines industry from two aspects: "At the level of industrial organization, industry refers to 'a collection of enterprises that produce similar or closely substituted products and services'; When examining the situation of the whole industry, industry refers to the collection of enterprises that use the same raw materials, the same process technology or produce products for the same purpose." (Yang Gongpu, 2005) However, "industrial integration" is a new concept with the rapid development and wide application of information technology in the past 30 years. Although the academic circles have not yet reached a unified definition of industrial integration, there is a general consensus: "Industrial integration is a brand-new economic phenomenon gradually spreading from the information industry, during the course, information technology and different industries gradually form a new business formats and new industries through mutual intersection and penetration."(Zhao Yulin, 2019)" The process of industrial integration and expansion is essentially the process of transforming information resources, information technology and information operation platforms into dominant resources, core technologies and basic platforms in the industrial economy. "(Tang Demiao, 2015)

Since the digital cultural tourism industry is a new industry developed by the integration of digital technology and cultural tourism industry, the scope of "integration" includes not only the integration of

all links of supply and demand, which means that the whole process of product design, production, sales and circulation integrates with digitalization, thus forming a new production organization mode. It also includes on-line and off-line integration, with the help of Internet technology that is not limited by any time and space, offline cultural tourism enterprises can expand the digitalized products with time and space restrictions to the infinite time and space on line. It can not only carry out the close contact tourism between people and people, people and things, but also transform it into a contactless experience economy, in particular, the integration of supply and demand interaction with the Internet platform becomes the most critical difference between the digital cultural tourism industry and the traditional cultural tourism industry. Therefore, the essence of integration is industrial structural change.

Of course, when the characteristics of digital technology, such as openness, borderless, interconnection and sharing, are integrated with the characteristics of cultural and tourism industry, such as resource enrichment, driving relevance and huge market, they are not simply superimposed, but cross and integrate to innovate more product forms, stimulate greater market vitality and open up greater development space.

Therefore, in order to define the meaning of digital cultural tourism industry, we should first grasp the essence of "structural" integration and also take into account the basic attributes of the two different industries. That is, the digital cultural tourism industry is a new industry that integrates digital technology and cultural tourism industry. Its industrial structure system is a collection of supply and demand-related economies which is customer demand-oriented, digital technology and digital equipment (facilities) as the basis, digital cultural tourism products as the core, Internet platform as the focus, and open sharing as the key.

There are three meaning in this definition: first, the digital cultural tourism industry is an integrated industry, which develops and changes with the continuous birth of digital technology and the expansion of the depth and breadth of integration; second, the digital cultural tourism industry is a borderless, open and shared large industrial system. A large number of non-cultural tourism enterprises, with the help of big data and the internet, are closely integrated together to form a value cycle system of symbiosis, mutual generation and even regeneration. The resulting economies often form a social coordination platform for extensive cooperation across regions, industries, systems, organizations and levels. Third, the supply and demand sides of the digital cultural tourism industry can have close contact or no contact, while the development of the non-contact economy is not limited by time and space and gains more development space.

2.2 Functions of digital cultural tourism industry

As a new industrial system of cross-border integration, the digital cultural tourism industry has not only the basic functions of promoting employment, expanding consumption and benefiting people's livelihood of the traditional cultural tourism industry, but also the new functions brought about by the empowerment of digital technology.

(1) Resonance function. The integration of digital technology makes the boundaries of traditional cultural tourism industries and enterprises such as travel agencies, hotels, scenic spots, museums, cultural centers, characteristic blocks and shopping spots tend to disappear. Digital cultural tourism industry is no longer just a matter for some enterprises or enterprises in some industries, and enterprises are no longer independent individuals, but a node in an interconnected industrial environment. Each enterprise is no longer limited to its own boundaries. Through the digital platform, it establishes efficient connectivity with other industries and enterprises to form a new industrial ecological circle in which

different enterprises in different industries and fields participate, share, govern and maintain together, and forms a "resonance effect" in the whole society.

(2) Improvement function. With the integration of digital technology, the supply side of the cultural and tourism industry will carry out intelligent upgrading and transformation based on data to drive people and business. With the goal of meeting the growing diversified consumer demand of customized travel and instant interactive services, the online and offline links will be connected, and the feedback linkage loop between the physical world and the digital world will be built, and the optimization and transformation of the supply chain system of the cultural and tourism industry will be driven.

(3) Engine function. With the integration of digital technology, data has increasingly become the core factor of production in the cultural and tourism industry. In the future, enterprises will digitize the whole process from planning and design, manufacturing and development, operation and management to sales services. The whole development and operation process is flexible, transparent and traceable, with improved production efficiency and greatly reduced production costs. As a result, digital technology constructs a new business model in the ecology, forms a stronger innovation vitality, leads a new round of economic cycle, and becomes a new engine for the economic development of cultural and tourism industry.

(4) Virtual function. Relying on digital technology and Internet technology, the digital cultural tourism industry promotes the digitalization of the elements of cultural and tourism industry, establishes a digital supply chain, promotes information sharing such as orders, production capacity and channels, urges core enterprises to establish industrial "data platforms" and creates "virtual" industrial parks and industrial clusters that cross physical boundaries and cooperate online. Different from general industrial parks, there aren’t substance park area and actual boundaries in virtual industrial parks, the enterprises of the virtual park are scattered all over the country, they can directly and efficiently connect with other enterprises under the guidance of government, thus reducing the burden on the development of traditional cultural and tourism industries.

(5) System integration function. The integration of digital technology and cultural and tourism industry has enabled all subsystems in the industry to complete digital upgrading, realizing the digitization of elements, structures, levels and contact information in the system, and realize the networking of relationships between systems. As a result, the connection between the independent systems is strengthened, and the originally independent systems are integrated together to form an overall system that is coordinated with each other and can bring greater benefits into play, so that resources can be fully shared and centralized, efficient and convenient management can be realized.

3 Construction of the Structure System Model of the Digital Cultural Tourism Industry

3.1 Construction basis

In terms of national policy, the "Opinions on Further Stimulating the Consumption Potential of Cultural and Tourism" issued by the General Office of the State Council on August 23, 2019, it is proposed that "we should promote the integration of culture, tourism and modern technology, develop a new generation consumption content with immersive experience in culture and tourism based on 5G, ultra-high definition, augmented reality, virtual reality, artificial intelligence and other technologies, and enrich the content of digital products and products such as wearable devices and smart homes". On August 27, the Ministry of science and technology, the Ministry of culture and tourism of the people's

Republic of China issued the guiding opinions on promoting the deep integration of culture and science and technology, which made it clear that "based on digitalization, networking and intellectualization, the platform and products of content visualization, interactive communication and immersion experience technology application system should be developed, and the new content of" content + platform + terminal "should be constructed Production and communication system ". It can be seen that at the national policy level, digital technology, platform and products are clearly taken as the main elements of the digital cultural tourism industrial structure system.

In academia, Koo C discussed various applications of information technology in tourism and pointed out the supporting role of network communication technology and infrastructure in the digitalizing development of tourism products (Koo C, 2015). Wu Y C pointed out that the design of digital products in the field of cultural and tourism follows the existing process, usually focusing on content, interaction, service and interest level (Wu Y C, 2020). Academician Xiong Youlun proposed that China should adapt to digital technologies such as digital earth, digital watershed and digital city, and vigorously develop and apply digital manufacturing technology and precision and major digital equipment suitable for China's national conditions and national defense construction (Xiong Youlun,2003). Suyunchaliyeva M discussed the functions of various new technologies and corresponding facilities and equipment in the tourism industry, and refined the classification of technologies and equipment in the digital tourism industry (Suyunchaliyeva M, 2020). Mei Jun believes that digitalization cannot be separated from equipment in the field of automation, such as digital facilities and equipment as perception, transmission, control and technology (Mei Jun, 2020). Without automation, digitalization is rootless. In addition, Zhang Jiantao et al. classified the platform construction under the background of big data by discussing the construction of smart tourism application model under big data, and pointed out the dependence of online platforms on tourism products (Zhang Jiantao, 2018). It can be seen that the academic circle also generally recognizes that the digital cultural tourism industry system includes technologies, platforms, products and digital equipment, which is an indispensable and important foundation for the development of digital cultural tourism industrialization.

3.2 Structural model

Based on the policy implications of the national level and the basic consensus reached by the academic circles, this paper builds a structure system model of the digital cultural tourism industry with the technology, equipment，product and platform as the element, which based on the "Internet plus" thinking, integrating digital technology, digital equipment (facilities and equipment), platform economy and traditional tourism industry, etc. (As shown in Figure 1).

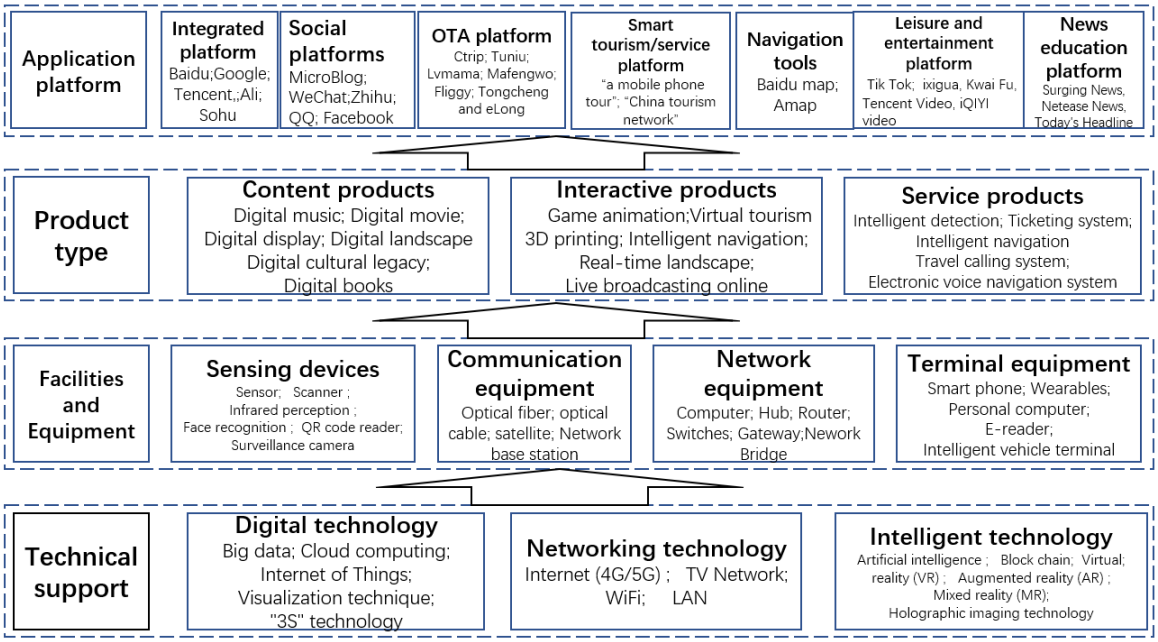

Figure 1 Digital Cultural Tourism Industry Structure System Model

Among them, the basic layer includes two major element systems："technical support" and "facilities and equipment", the core layer is the "product type" system, and the top-level "application platform" system is the contactless consumption platform between supply and demand, which is also the key to the development of digital cultural tourism industry.

The model is an integrated system of "point", "block", "layer", "planes" and "chain". "Point" refers to related enterprises or enterprise groups in a certain industry or field; "Block" means each frame module, which represents a polymer with the same or similar characteristics on a certain technology, equipment, product or platform; "Layer" represents the technical support layer, facilities and equipment layer, product type layer and application platform layer, each layer is a subsystem with very close horizontal correlation. "Planes" is an overall system integrated by four subsystems, and it is a community of digital cultural tourism industry. The development of any level will affect the life cycle of the system. Only through continuous upgrading and optimization can sustainable development be achieved. "Chain" is a channel connecting the internal system and the system with other related systems, namely, Internet, mobile Internet, ubiquitous network and other network systems. It breaks the boundary of traditional cultural and tourism industry and leads digital cultural tourism into a new development environment that goes beyond the boundary, the center and the leader, so as to stimulate more valuable new business models.

Of course, there is a certain substitutable relationship between "points" and "points" and between "blocks" and "blocks". As long as the four "layers" of the model are in good condition, the integrity of the industrial structure system can be ensured and the functions of the digital cultural tourism industry will not be affected. Therefore, the structural model will not cause the collapse of the whole system due to problems in a certain part and it has the functions of self-repair, self-adjustment and self-improvement. In addition, the promotion of a certain "point" in the system will lead to the change of "block" and "layer", thus promoting the linkage promotion of "planes" and "chain".

4 The Composition of Elements and Interaction of the Structure System Model of the Digital Cultural Tourism Industry

4.1 The technical support layer

The lowest layer of the structure system model of the digital cultural tourism industry is the "technical support" layer, which includes digital technology, network technology and intelligent technology. Although the three kinds of technologies are different performances after the integration of digital technology and cultural tourism industry, their functions still have their own emphasis. Digitalization technology emphasizes the collection of data and realizes the informatization of elements, network technology focuses on providing physical carriers for information dissemination, intelligent technology takes the new generation of artificial intelligence as its development orientation, attaches importance to the application of efficient information mining, and takes user experience as its core (Buhalis D, 2019). It can be seen that digital technology, network technology and intelligent technology are supported step by step, and the interactive relationship of support defines the stage links of digital technology integration, as shown in Figure 2.

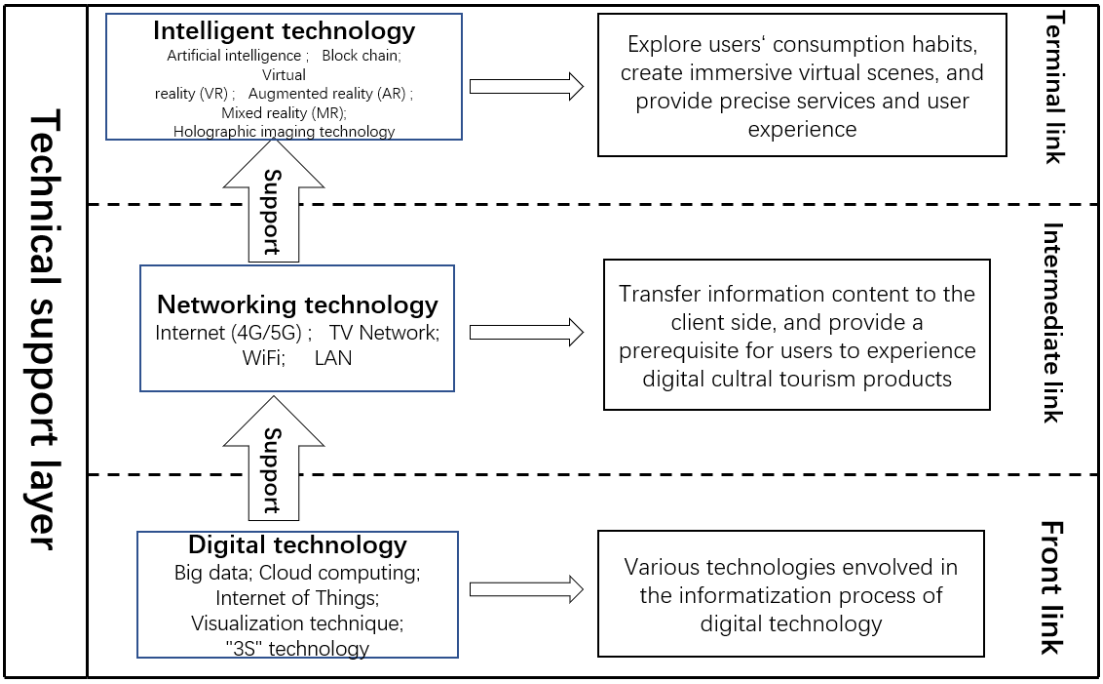

Figure 2 Element Composition and Interactive Relationship of Technical Support Layer

4.2 The facilities and equipment layer

The second layer of the structure system model of the digital cultural tourism industry is the "facilities and equipment" layer, which includes sensing equipment, communication equipment, network equipment and terminal equipment. As the internal driving force of the digital cultural tourism industry, technology cannot be separated from the output of equipment, but the core functions of equipment are still determined by technology, and the relationship between equipment is the relationship between technologies (Tripathy A K, 2018). As a result, corresponding to the relationship between technologies, functions and links of the "technology support" layer, the relationship between the "facilities and equipment" layer can be divided, as shown in Fig. 3. Perception equipment is in the front-end link of the "facilities and equipment" layer and is responsible for the digitization process of cultural and tourism

resources. Communication equipment and network equipment are in the middle link to ensure the transmission of all kinds of data. The terminal equipment is in the terminal link, and the user will directly interact with it.

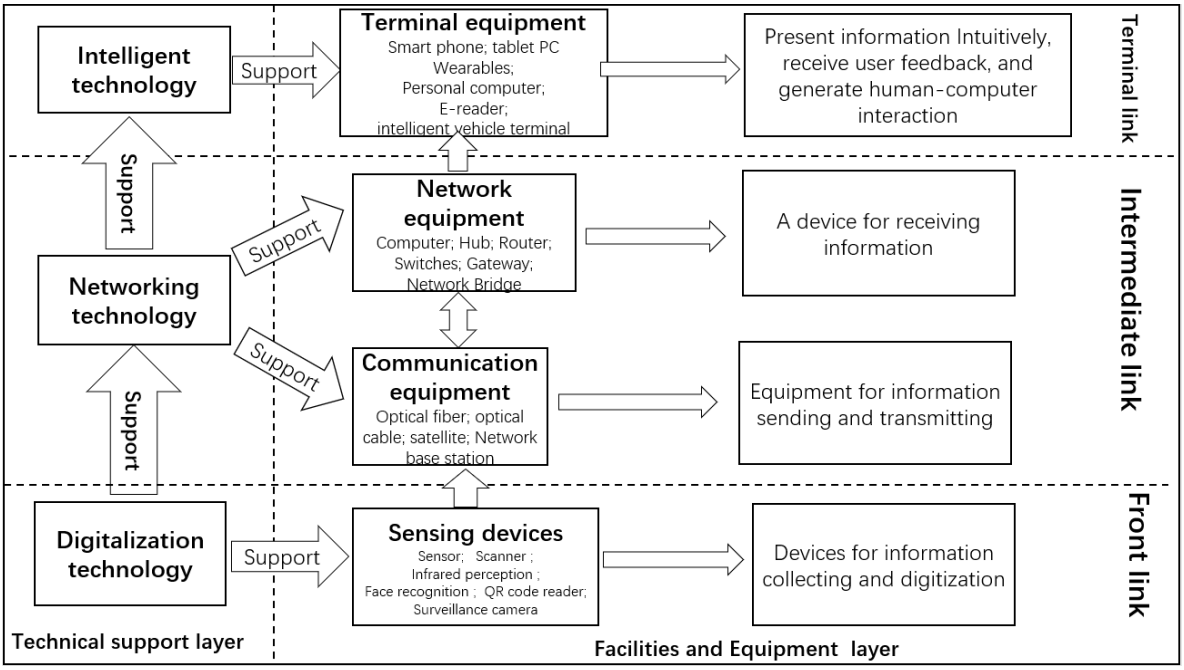

Figure 3 Elements of Facilities and Equipment Layer and Interaction Relationship with Technical Support Layer

4.3 Product type layer

The third layer of the structure system model of the digital cultural tourism industry is the "product type" layer, which, as the core layer of the model, includes content products, interactive products and service products. In the development of digital cultural tourism products, informatization is the foundation, technology integration is the core, content demand is the orientation, and product service is the guarantee (Koo C, 2015). In general, the classification of digital cultural tourism products is determined by the category of technology and the form of demand, and will also change with the change of industrial environment (Zhu Yue, 2017). As a result, the contents of each module in the "facilities and equipment" layer are refined and the relationship among the three is defined, as shown in Fig. 4. Among them, content-based products are mainly manifested in more cultural content creation, which digitizes traditional cultural content and improving its' convenience and experience. Interactive products take human-computer real-time interaction as the core, and create immersive content with timely feedback through terminal equipment to enhance user experience. Service products are aimed at serving users and pay attention to the needs of users in the tourism process. Such products cover online and offline, which is an important driving force to promote the integration development of online and offline of the digital cultural tourism industry and the overall transformation and upgrading of the tourism industry. In general, each of the three types of products has its own distinctive features and unique functions, but the correlation between the three types of products cannot be completely separated, each type of products contains the characteristics of other types of products, showing a path relationship of mutual penetration, correlation and influence. With the continuous development of the digital cultural tourism industry, the three types of products will transform each other and even new product categories will appear.

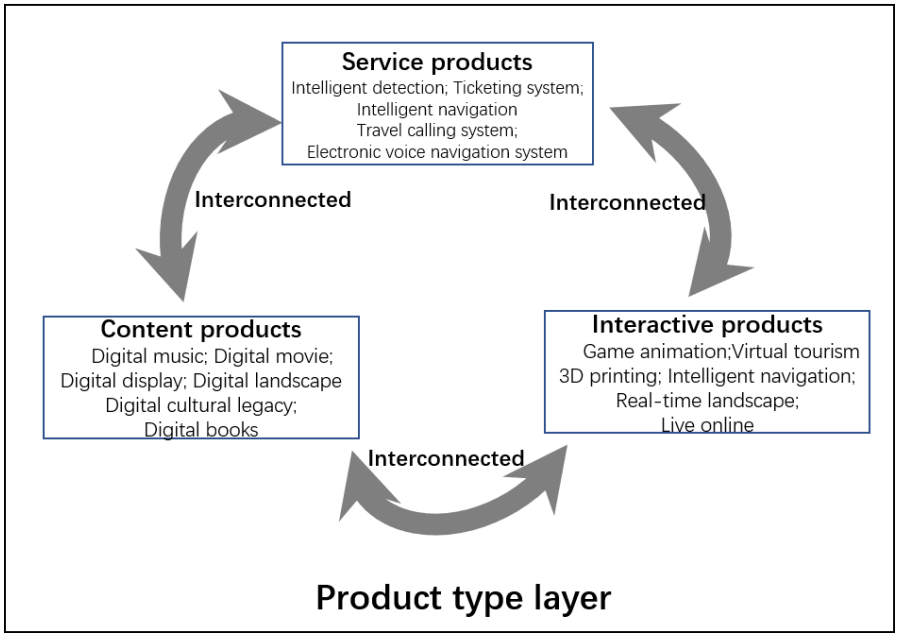

Figure 4 Elements and Interaction of Product Type Layer

4.4 The application platform layer

The top layer of the structure system model of the digital cultural tourism industry is the "application platform" layer, which mainly includes the contents of comprehensive platform, social platform, OTA platform, intelligent tourism/service platform, navigation tools, leisure and entertainment, news and education and other modules. The layer of "product type" mentioned above is a theoretical summary of many products in the digital cultural tourism industry, while the understanding of the development of the digital cultural tourism industry needs to be further advanced to the application layer (Koo C, 2015). Referring to Xie Dan's promotion strategy of tourism resources platform under the background of "Internet plus" and combining with the three types of digital cultural tourism products (Xie Dan, 2019), the corresponding relationship between the "application platform" layer and the "product type" layer is summarized, as shown in Table 1.

Table 1 Correspondence between Application Platform Layer and Product Type Layer

Platform Type	Types of products that can be popularized	Examples
Integrated platform	Content Products, Service Products and Interactive Products	Baidu, Google, Tencent, Ali, Sohu
Social platform	Content Products, Some Service Products and Interactive Products	MicroBlog, WeChat, Zhihu, QQ, Facebook
OTA Platform	Content products and service products	Ctrip; Tuniu; Lvmama; Mafengwo; Fliggy; Tongcheng and eLong
Smart Tourism/Service Platform	Service product、Interactive Products	A mobile phone tour, China Travel Network
Navigation Tools	Service products	Baidu Map, AMap
Leisure and Entertainment	Content products, service products and some interactive products	Tik Tok, ixigua, Kwai Fu, Tencent Video, iQIYI video

News and education	Content Products	Surging News, Netease News, Today's Headline, Learning Power

In addition, each module in the layer of "Application Platform" also has its own connotation: (1) The comprehensive platform is mainly established by large Internet companies, benefiting by the technical foundation of large Internet companies, it can tailor all kinds of digital cultural tourism products with its own characteristics for governments at all levels and each large enterprises, especially suitable for the development and promotion of digital cultural tourism products for local governments and large scenic spots. (2) The social platform mainly makes use of the social attributes of users to publicize and promote digital cultural tourism products, such as sharing users' experiences and pushing scenic spots of enterprises. (3) OTA platform (online travel agency platform) is the earliest online promotion platform for tourism. The platform has the inherent advantages of mature promotion channels and high promotion efficiency. Therefore, digital cultural tourism products still cannot be separated from OTA platform. (4) Smart Tourism/Service Platform is a series of platforms built around smart tourism. Due to the high similarity between digital cultural tourism products and smart tourism products, digital cultural tourism products can use the promotion experience and platform of smart tourism products. (5) Navigation tool platform is a mobile application created by Internet enterprises in combination with GPS and the technology of Beidou Navigation Positioning System. Digital cultural tourism products with geographical attributes can be promoted through such platforms. (6) The leisure and entertainment platform mainly involves entertainment and leisure-related APP. The platform can promote digital cultural tourism products in the form of "entertainment + tourism", and such products and promotion modes are also the development trend of tourism products in the future. (7) News and education platforms mostly refer to the client-side that can provide news content and education content to users. They take content display as the core and can undertake the promotion of content-based digital cultural tourism products.

In general, the "application platform" layer of the structure system model of the digital cultural tourism industry sorts out all kinds of platforms involved in the development of the digital cultural tourism industry from multiple angles and levels. Of course, with the continuous development of various technologies and the deepening of the industrialization of digital cultural tourism, the classification of major platforms will further change (Zhaojie D, 2019).

5 Conclusions

The essence of digital cultural tourism industry is an integrated industry based on the thinking type of "Internet plus", it is a new industrial form formed by the integration of digital technology and traditional cultural tourism industry. Different from the development mode of traditional integrated industries, the integration in the digital cultural tourism industry is not simply the superposition of digital technology and cultural and tourism industry, but the use of digital technology as kinetic energy to drive intelligent upgrading of products and innovation of business models, foster a new industrial ecology dominated by digitalization, and further promote the transformation, upgrading and high-quality development of traditional cultural and tourism industry. As kinetic energy, once digital technology develops, the product form will change, and the operation form of the platform will also change accordingly, thus promoting the overall business model and business efficiency of the industry to change. Therefore, the most typical feature of the structure system of the digital cultural tourism industry is

"change", which changes with the change of technology, technology and equipment, product innovation and Internet platform.

It is worth mentioning that, while embracing digital technology, we need to have the ability to recognize the laws of development and change of the digital industry. It is necessary to realize that interconnection has become the foundation, people can freely cross borders between enterprises and industries, the commercial form with cultural and tourism resources as the core has changed to taking data as the core. The thinking style of Enterprises have changed from "ownership" to "link" and competition logic has changed to symbiotic logic, attention has been paid to user experience and services, and enterprise linkage and cross-border cooperation have been actively formed. Without the ideological preparation that the integration of digital technology into the traditional cultural and tourism industry will bring about major changes, and without a correct grasp of the law of digital integration of the cultural and tourism industry, it is difficult to truly realize industrial transformation and enter high-quality development through digital cultural and tourism.

Therefore, the government should pay more attention to the challenges in the process of integration of cultural and tourism industry and digital technology. (1) The high cost of digital transformation may lead to the weak willingness of tourism enterprises to transform, resulting in the slow digitalization process of the cultural and tourism industry as a whole. (2) The integration of digital technology will increase new risks in production, management and service of enterprises in a short period of time. (3) At present, the limited number of high-quality cultural tourism products makes it impossible for enterprises to create high-quality digital cultural tourism products and effectively increase the consumption frequency of tourists and the income of cultural tourism enterprises. (4) Relevant laws and regulations need to be improved, especially the lack of basic legal systems related to data use and network security, which has become an important restriction factor affecting the penetration of digital technology in the cultural and tourism industry. (5) The policy support for the digital cultural tourism industry still needs to be strengthened, In the top-layer design, there is a lack of strategic planning for the development of the digital cultural tourism industry, and relevant technical standards and industry norms suitable for the development of the digital cultural tourism industry have not yet been formed, and the fiscal, taxation and finance sectors have not given enough support to the development of the digital cultural tourism industry, and the coordinated development mechanism between various departments and various industries has not yet been formed, which also hinders the development of the digitalization process of the cultural and tourism industry.

In addition, the following suggestions are put forward on how the government can promote the development of the digital cultural tourism industry and speed up the digital integration of the cultural tourism industry: all participants of the digital cultural tourism industry should speed up the structural reform on the supply side of cultural tourism products and expand the supply of high-quality digital cultural tourism products; Strengthen the construction of new infrastructure and upgrade the technical foundation for the development of digital culture and tourism industry; the government should strengthen policy support, implement various fiscal and taxation policies, and help enterprises that do have difficulties to solve their capital problems. Promote traditional tourism enterprises to speed up digital construction, strengthen in-depth cooperation with Internet enterprises, and develop related products more in line with the needs of customers.

Acknowledgement

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Immersive Technologies Applied to Computer Programming Teaching: A Systematic Review

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Abstract: One of the first challenges for the students that begin to study the computing field is to learn how to program a computer. Nowadays, digital immersive environments are being used in Education with positive results. This paper presents a systematic literature review about the usage of immersive environments (VR or AR) in the teaching and learning of logic and/or computer programming. This paper presents the bases of scientific papers used to search the literature, the results and an analysis of the papers found.
Keywords: Immersive technologies; Computer programming teaching; Computer program learning

1 Introduction

For every teacher, the act of teaching is a constant challenge. It is common teachers to face with subjects that demands creativity to be clearly explained for the students, in a way that allows the students to complete understand it. In this context, more precisely related to the teaching of technological skills, one of the initial concepts in the Information Technology (IT) field is the programming logic. This subject, together with the learning of programming languages, allows the student to begin having autonomy in this vast knowledge field. By using programming logic and, consequently, programming languages, the student comes to understand how computer programs are created and how to create their own. One may say that to learn programming logic, by algorithm creation and the learning of a programming language, is a fundamental and very important step to any student, which desire to enter the IT field. In addition, some countries have the concerning to develop these skills in students starting from the early school years, as their educational managers understand that this action will generate positive impacts in future, both economically and in the ability of their citizens do adapt to possible changes that may occur (da Silva, 2015).

There are many challenges in teaching and learning computer programming. In a paper that presents and categorize these difficulties, some of these challenges are divided in five categories (Du Boulay's, 1986 as cited in Kinnunen, 2009):

（1）Problem of Orientation: indicates this challenge as the problem of the student to understand how important is to learn computer programming and which are the types of problems that may be solved using this skill.

（2）Notional Machine: indicates this as the challenge of understanding the relation of the hardware and the conceptual machine that a computer represents. It is indicated, for example, that some students may have the wrong understanding about how a variable is stored in memory and that this fact can make it difficult to understand the subject as a whole.

（3）Notation of Formal Languages: indicates that this challenge is related with the understanding the syntax and semantics related to programming languages. It is indicated that it is the most common issue and the one that the students ask for help the most (Garner, Haden, & Robins, 2005 as cited in Kinnunen, 2009). In other paper, it is indicated that following issues about basic syntax, doubts about data flow are also the causes of the asking for help from the students (Robins, Haden & Garner, 2006 as cited in Kinnunen, 2009).

（4）Acquiring Structures: another challenge cited by (Kinnunen, 2009) is the one about the acquisition of structures by the student, being structure, in this context, the abstract solutions for standard problems. Some of these structures are: recursion, vectors, repeat loops, constructors, heritage, polymorphism, advanced data structures, pointers, algorithms, references, libraries, methods, operators overload and dynamic memory allocation.

（5）Pragmatics of Programming: this aspect includes developing, testing and debugging programs.

Other studies indicate that some students have difficult to understand what have to be solved by a program, i.e., what a program is supposed to do; and how to build programs, i.e., sometimes they understand what the program should do, but they can't think of it in form of an algorithm (Garner, Haden, & Robins, 2005 as cited in Kinnunen, 2009).

The paper of Kinnunen (2009) presents that there are several challenges to teach students how to program a computer. In this way, new manners of teaching have to be used, trying to eliminate or, at least, to decrease the challenges described about this subject.

1.1 Immersive technologies

Nowadays, immersive technologies are being used in several fields of the human knowledge. These technologies gives to the user the sensation of immersion and presence and, for that, virtual artifacts are used. Among immersive technologies, the most used are Virtual Reality and Augmented Reality.

The Virtual Reality (VR) may be summed up, as defined by Jerald (2015), as a total digital environment, totally generated by computer, which has a level of interactivity as if it were real. The goal of this kind of environment is to remove the perception of the real world from the user, making him/her to feel only the created world, the virtual world.

The Augmented Reality (AR) approach mixes the real world with digital artifacts. May be summed up as an environment in which the user, feeling himself/herself in the real world, interacts with virtual digital elements in a real physical space, in such way that this virtual element may be seem as something that is real (Tori & Hounsell, 2018).

Both VR and AR are, nowadays, applied to different contexts and knowledge fields. The use of these technologies has stood out in the fields of Medicine, Architecture, Arts, Education, Entertainment, in scientific applications, to assist in the visualization and information control, and others. In all of them, these technologies have allowed results in situations in which were impossible to simulate before (Tori & Hounsell, 2018).

In Education, VR and AR provide immersion and presence to students, increasing their motivation and engagement. In some papers, like (Šašinka et al, 2019), among others, it is presented interesting results about the usage of these kind of technology in the educational context. This type of technology, if applied in educational context of fields like Chemistry, Geography, History and others, allow direct benefits to the students. For example, to watch interactive 3D animations that represent chemistry reactions, to visit virtually specific geographic places or to participate of relevant historical moments, are some of the benefits provided by this technology.

The purpose of this paper is to present a systematic review of the literature about immersive environments being used to teach logic and computer programming. Papers repositories were searched about this subject. The used methodology is described in the next section and the research questions to be answered in this paper are: "how immersive technologies are impacting the teaching and learning of computer programming?" and "what are the benefits and challenges of the use of immersive technologies in this subject?".

The next sections of this paper are organized in the following order: in Section 2 is presented the methodology used to the systematic review and the paper repositories that were searched and the results. In Section 3 the results of the search and a discussion about them are presented, also how they contribute for the teaching and learning of logic and computer programming using immersive environments. And, finally, in Section 4, the conclusions and final considerations about the subject are presented.

2 Methodology

The Systematic Review of the Literature (SRL) is a methodology widely used in the Health field, because it ensures that researchers do a wide search in literature to know what has already been researched about some subject and their results. This avoids the waste of resources and time with questions already addressed, allowing the advance in other studies from the state of the art. In this paper, the SRL was used to present a wide panorama about the use of VR and AR in the teaching and learning of computer programming. The chosen methodology is appropriate to the proposed objective, as it involves an extensive and rigorous search of papers in relevant paper repositories (Tranfield, Denyer & Smart, 2003). Furthermore, it is not subject to the researcher bias, as it has a rigorous and explicit investigation process to answer a well-formulated research question (Ferenhof & Fernandes, 2016; González & Toledo, 2012).

Levy & Ellis (2006) claim that a systematic review of literature is proper to demonstrate if a proposal of a research advances to something new and contributes to build knowledge. They propose three steps to a proper SRL, as presented in Figure 1. The Input (Step 1) is the phase in which it is selected the types of documents and platforms that will be researched and establishes a search protocol for a SRL; in Step 2 – Processing, it is the moment in which all the processing is performed, and; Step 3 – Output, it is the

consolidation and presentation of insights and conclusions.

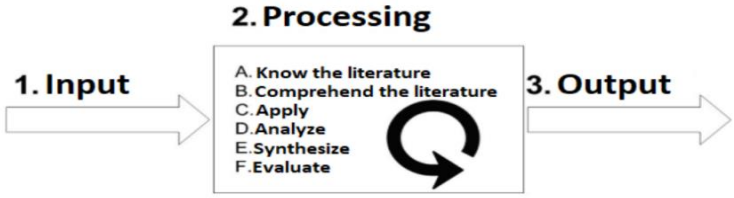

Figure 1 3 Steps for a Literature Systematic Review

Source: Levy & Ellis (2006)

The Step 1, in this work, consisted in establish the research question, the general and specific objectives, as described in the following sequence and presented in Figure 2:

Research Questions (RQ): RQ1 - How immersive technologies are impacting the teaching and learning of computer programming? RQ2 - What are the benefits and challenges of using immersive technology in this subject?

General Objective: to understand the general panorama of the use of VR and AR in the programming teaching.

Specifics Objectives (SO): SO1 - To present a panorama of the use of VR and AR in computer programming teaching and learning (methodologies, results and presented conclusions); SO2 - To raise the benefits and challenges of the usage of immersive technologies in this field; SO3 - To identify what are the subjects in the teaching and learning computer programming field in which VR and AR are the most used.

After these considerations, three bases were selected: the platform Web of Science, the digital library of Institute of Electrical and Electronic Engineers (IEEE), IEEExplore, and the digital repository of Association for Computing Machinery (ACM), ACM Digital Library.

The Web of Science was selected for its notorious world reputation (Conforto, Amaral & Silva, 2011), and, it has in its archives more than 21.000 high quality academic periodicals with peer reviewing published all over the world, more than 205.000 conference proceedings; and more than 104.000 selected books (Web Of Science Group, 2019)[38].

The IEEE is a world-known association dedicated to the advance of innovation and technology and it is the larger technical society of professionals of the world (IEEE, 2019)[39]. For that reason, IEEE's digital library, IEEExplore, was also chosen.

The motivation to choose ACM Digital Library repository was the same, as ACM's purpose is to gather educators, researchers and professionals of computing to inspire the dialog, share resources and discuss the challenges of the area, building the larger society of computing in the world (ACM, 2019)[40].

After the decision about the research question, objectives and repositories, the keywords and Boolean Logical Operators (BLO) were defined based on the subject. The search for the right keywords is a great challenge in SRL and, because of that, the authors opted by using some base papers and two research constructs: computer programming teaching and learning and VR and AR, as depicted in Figure 2, to find the better words and their synonyms and terms. As each base has its own characteristics in its search engine, it was necessary to run tests to know what are the more appropriated set of keywords and BLOs. After the searches, that were done between 13th and 23rd of September of 2019, the total of 379 papers were selected from the chosen repositories. The queries used are presented in Figure 2.

[38] https://clarivate.com/webofsciencegroup/solutions/webofscience-platform

[39] http://www.wwwieee.org

[40] dl.acm.org

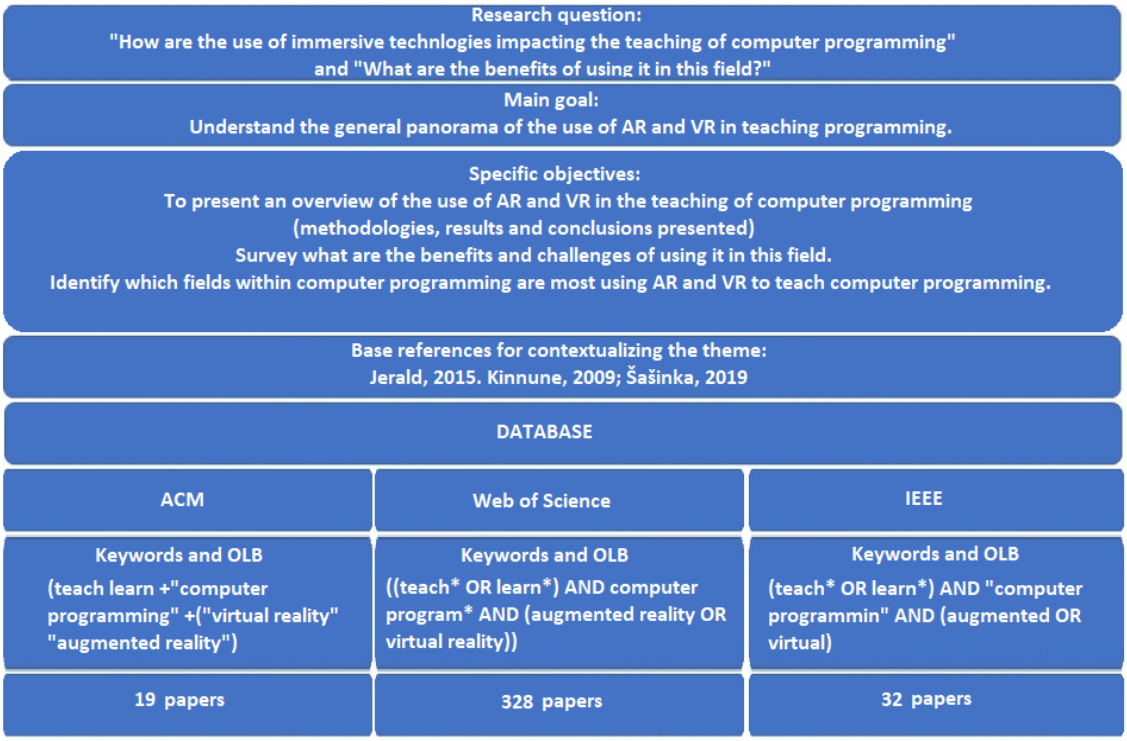

Figure 2 Base Structure of the Research

The Step 2 started with a brief reading of the titles of the papers. But, in the case of Web of Science, it was noticed that the search brought more papers from fields very different from Education, programming, computing, VR and AR. Because of this fact, it was necessary to exclude papers of those fields and also papers that were not scientific papers peer reviewed. After the application of these criteria, 68 papers from the Web of Science were selected to the reading of title and abstract, resulting 119 papers in this stage from all repositories.

After that, all titles and abstracts of all 119 selected papers were read, and the following criteria were defined to exclude some of them: i) papers that do not present studies of VR and/or AR being applied to teaching or learning of computer programming; ii) papers in languages other than English or Portuguese; iii) documents that were not peer reviewed. After this stage, 18 papers were selected for a full reading and analysis. In Table 1 is presented the results of this selection, for all stages, for all repositories.

Table 1 Final Selection of Resulting Papers from Researched Bases.

Repository	Papers from used keywords and BLO	Papers after exclusion of other themes and document types	Papers for analysis after reading the titles and abstracts
ACM Digital Library	19	19	04
IEEE XPlore	32	32	11
Web of Science	328	68	03
Total	379	119	18

Still in Step 2, the papers were submitted to the content analysis technique. According to Vergara (2005), the content analysis aims to understand what is being said about some subject. A central element for content analysis is the construction of analysis categories. In this sense, the initial categories, according to Vergara (2005), are redefined in the analysis process until a final set is obtained. In this paper, three categories were defined:

(1) Applicability to the problem of teaching and learning of computer programming: the papers were analyzed in relation to their contribution into the subject. Five subcategories were defined, the same found in (Kinnunen, 2009) and presented in Section 1 of this paper.
(2) Methodology: the papers were analyzed in relation to their methodology. Four subcategories were defined: i) case study; ii) research/action; iii) experiment; iv) others;
(3) Results: the papers were analyzed in relation to their results, being considered as i) conclusive; ii) a paper that presents the benefits of applying VR or AR in the teaching and learning of computer programming; iii) a paper that presents the challenges of this subject.
All analysis categories, their subcategories and their purposes are presented in Table 2.

Table 2 Categories of Analysis, Their Subcategories and Purpose

Category	Subcategories	Purpose of the paper
1- Applicability to the subject of teaching and learning computer programming	i) Problem of Orientation ii) Notional Machine iii) Notation of Formal Languages iv) Acquiring Structures v) Pragmatics of Programming * All these subcategories are based on (Kinnunen, 2009)	To understand what kind of challenge is being solved with the use of VR and AR in teaching and learning computer programming; the importance of learning computer programming; the challenge of understanding the relationship between the computer (hardware) and the conceptual machine by the student; the learning of the syntax and semantics related to computer programming languages; the abstraction of solutions of standard problems; the difficult to understand what a program should solve; others.
2- Methodology	i) case study ii) research/action iii) experiment iv) others	To define the methodology used and the size of the sample.
3- Results	i) conclusives or not ii) benefits iii) challenges	To identify if the results are conclusive or not. If benefits and challenges were addressed and what they are.

Finally, the information triangulation process was carried out, analyzing convergent and divergent points of the papers. They were also counted by categories and subcategories, authors, year, publishing type (journal or conference proceedings) and knowledge field. According to the objectives of the papers, they can be classified into more than one category.

3 Results

In this section the results (Step 3) related to the search and reading of selected papers are presented, considering the categories and subcategories presented in Table 2.

3.1 Applicability to the problem of teaching and learning computer programming

In Table 3 it is presented the relation between the papers and their subcategories in Category 1, as described in Section 2. For each subcategory, the following were considered: i) Papers that address the importance of computer programming were considered in the subcategory “Problem of Orientation”; ii) Papers that describe systems that present, even superficially, how is the abstract machine a computer represents, were considered in subcategory “Notional machine”; iii) Papers that present approaches in which the student must code, even code snippets, using some programming language, and not only manipulating virtual artifacts, were considered in the subcategory “Notation of formal languages”; iv) Papers that describe systems that present, even if conceptually, structures of programming, whether structures of decision, repetition or even data structures, were considered in the subcategory “Acquiring structures”; v) Papers that present activities that students must chain or order instructions to obtain a certain result, were considered in subcategory “Pragmatics of programming”.

As presented in Table 3, only 4 of the papers were considered entirely within the scope of this paper. An important characteristic to be mentioned here is that it was common to find papers that present computer games (both 2D and 3D) to assist in teaching and learning computer programming. These papers, although interesting, were excluded from the analysis presented here, as immersive technologies were not used by their authors. This is perhaps the biggest reason why, in the end, few papers were selected as suitable for the scope of this paper. It is possible, therefore, to increase the number of papers selected in a future research by relaxing the criteria not consider only immersive technologies.

Table 3 Subcategories of Category 1 Found in the Read Papers.

Cat. 1 - Subcategories (Kinnunen, 2009)	Analyzed papers
Problem of Orientation	(Chandramouli, Zahraee & Winer, 2014)

Notional Machine	(Singh, 2017)
Notation of Formal Languages	(Lückemeyer, 2015), (Chandramouli, Zahraee & Winer, 2014)
Acquiring Structures	(Singh, 2017), (Masso & Grace, 2011), (Lückemeyer, 2015), (Chandramouli, Zahraee & Winer, 2014)
Pragmatics of Programming	(Singh, 2017), (Lückemeyer, 2015)

3.1.1 Description of the papers considered within the scope of the research

In (Singh, 2017) it is described the use of a VR environment for teaching computer programming. Within the environment the user can visualize variables, which are represented by virtual cubes, and the assignment of values to it, as virtual spheres, on top variables, with the value on its surface (subcategory "Notional machine"). As the user progresses, other structures of programming languages are presented, such as repetition loops (subcategory "Acquiring structures" and "Pragmatics of programming"). The paper does not present tests or data about the success or failure of the project from the user perspective.
In (Masso, Grace, 2011) it is presented a game that uses AR to teach the fundamentals of computer programming. Using a digital board, users play virtual cards to solve challenges programming concepts (subcategory "Acquiring structures"). The game was tested by volunteers, that reported to be interested and suggested some improvements.

In (Lückemeyer, 2015) it is presented a VR environment solution shared among students to learn computer programming. The author mentions that the idea originated from the need to engage students and avoid dropout. A 3D environment was created in which students can interact with each other and, using virtual panels, write codes and solve programming exercises (subcategories "Notation of formal languages", "Acquiring structures" and "Pragmatics of programming"). Although it is reported in the paper that any immersion equipment was not used, due to its high cost, the system is fully compatible with these devices. There were no tests or results presented in the article.

The research by Chandramouli, Zahraee & Winer (2014) sought to solve the lack of motivation to learn computer programming. To this purpose, they built a VR framework with interactive and fun instructions. According to the authors, students have difficult to learn the subject and do not feel motivated to face this challenge, since they do not understand the importance of this knowledge for their professional life (the "Problem of Orientation"). However, despite the VR environment helped to explain variables and data types, present actual code ("Structures acquisition" and "Notation of formal languages") and develop critical thinking and problem-solving skills, the paper didn't evaluat the effectiveness.

3.2 Methodology used by the selected papers

The papers were considered: i) case study, ii) research/action, iii) experiment or iv) others. A problem in several papers read was the lack of methodology. Most papers, including those outside the scope of this research, only present the application developed. Some do not have any methodology and/or testing, such as (Singh, 2017), (Chandramouli, Zahraee & Winer, 2014) and (Lückemeyer, 2015). Only Masso & Grace (2011), of the 4 selected, presented test results from interviews with users, without analysis of the answers. In this regard, the papers that were analyzed are more similar to project reports, due the lack of literature review, analysis of data and results. These facts occurred, even though the selected papers were obtained in repositories recognized by the scientific academy. It is believed that these facts are due to lack of research within the scope chosen for this systematic review.

3.3 Results

The papers may be analyzed from 3 perspectives: if the paper is conclusive, presents benefits of the usage of VR or AR in the teaching and learning of computer programming or presents the challenges of this approach. None of the 4 papers are conclusive, since their methodologies were not sufficient to support final considerations (Singh, 2017; Chandramouli, Zahraee & Winer, 2014; Lückemeyer, 2015). Masso & Grace (2011) conducted interviews, but they did not have much rigor for their conclusions. On the challenges, Chandramouli, Zahraee & Winer (2014) generally point out the issue of creating something new, different from the usual, as the 3D scenarios for this purpose. Regarding the benefits, the authors state that the technique allows students to overcome the inhibitions they may have due to complexity involved in learning computer programming, as they are encouraged to explore the subject using practical examples.

3.4 Quantitative results

As the number of papers selected is low, the quantitative analysis is not broad. Regarding the authors of the 4 selected papers, none has participated in more than one paper. Regarding the publication, all

were published in congress proceedings, none in journal. Table 4 presents information about the 4 papers.

Table 4 Overview of the Papers Analyzed Within the Objective of This Study

Authors	Title	Congress/Event/Journal	Field
Masso & Grace, 2011	Shapemaker: A game-based introduction to programming	16th International Conf. on Computer Games (CGAMES)	Games
Lückemeyer, 2015	Virtual blended learning enriched by gamification and social aspects in programming education.	10th International Conference on Computer Science & Education (ICCSE)	Computing and Education
Chandramouli, Zahraee & Winer, 2014	A fun-learning approach to programming: An adaptive VR platform to teach programming to engineering students	IEEE International Conference on Electro/Information Technology	Electronic and IT
Singh, 2017	Using Virtual Reality for Scaffolding Computer Programming Learning computer programming, interactive learning environments, technology-enhanced learning, virtual reality in education	VRST 17 - Proceedings of the 23rd ACM Symposium on Virtual Reality Software and Technology	Virtual Reality

As seen, all events are related to technology and only one has the Education field explicitly in its scope. The years of publication of the 4 papers range from 2011 to 2017, which shows that there is been interest in this matter. Considering all the papers selected, the years vary from 2005 to 2018, which corroborates this deduction. The knowledge fields involved are Engineering and Informatics in Education, which was expected.

4 Conclusion

In this paper, a systematically review of the literature about "use of immersive technologies in the teaching and learning of logic and computer programming" was presented. After the initial search, some papers were selected according to their relevance to the subject. Due to the criteria defined, only 4 papers met the requirements. They were classified within the categories and subcategories and analyzed in relation to their contribution to the subject. It is possible to conclude that, due to the specificity of the subject, it is something scarce in the literature, thus opening research opportunities for the future.
As a future work, a new analysis of papers about the use of immersive environments in all Education field, in order to consider a greater number of articles for analysis is suggested.

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Digital Transformation at the Recruitment and Selection Process: A Study of Semantic Analysis

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Abstract: An era of exponential technological changes marks the current century. The convergence of different processes has changed the way that companies use technology. Thus, the objective of this study is to reveal how companies can achieve digital transformation at the recruitment and selection process through semantic data analysis. The methodological procedures were elaborated in a descriptive exploratory research, through the qualitative method, which consisted of the literature review and documentary analysis. As a result, it was found that technology, by using artificial intelligence, can assist in the analysis of the candidates' responses. Therefore, if a person uses more the pronoun "we", it may indicate that the person is more sociable, according to the analyzed case. In this way, it is concluded that technology can corroborate for a more assertive hiring in the management of Human Resources, and then increase efficiency in recruitment and selection activities. Therefore, the future of work will be marked by advanced technologies.

Keywords: Digital transformation; Recruitment and selection; Semantic data analysis

1 Introduction

Companies immersed in the framework of digital technologies, such as Google and Amazon, have been presenting an exponential growth – not only because they are technology companies, but also due to the fact they present purpose in their essence.

Traditional companies need to be reinvented to keep up with the digital information age. New entrants or agile and innovative companies are emerging, such as startups, in which business models are repeatable and scalable. As startups have been innovating through co-creation or collaboration between people, it is not likely that there will be an independent nucleus from digital environment.

Professor Sunil Gupta (2019) from Harvard University states: "I studied countless digital transformation in companies and learned that leaders who achieve transformative results immerse in the digital environment. That is, they do not treat digital strategy as separate from their overall strategy. Instead, they lead with the mindset from digital environment first, and make sure that their digital strategy reaches all aspects of the company".

For Gupta (2019), almost all large companies make mistakes when launching independent digital units or have units in Silicon Valley hoping that young entrepreneurs will stimulate innovation in the company. In this perspective, Hinings (2018) understands the effects of digital transformation through the combination of several digital innovations, values and beliefs that changes or complements existing rules in organizations.

Therefore, it is necessary to transform the organizational culture and mindset, for the Digital Transformation happens. So, the digital strategy becomes an integral part of the overall business strategy. Gupta (2019) also indicates that "when the excitement about the digital environment spreads through the

company, new initiatives start to emerge everywhere, leading to proliferation". In addition to the usage of the intellectual capital from the internal public or employees, Gupta (2019) recommends an open innovation or crowdsourcing, that will bring skills and ideas from users and specialists that are outside the companies, contributing with brand new ideas to achieve innovation.

In the same way, Henry Chesbrough (2006) brings a reflection on the new approaches that seek for more flexibility in the generation of technological innovations. The open innovation model assumes that companies must use external sources of ideas, in order to add value perceived by the user and increase their competitiveness in the generation of new technologies.

Similarly, Lowik et al. (2016) call this type of practice in organizations as "open innovation", and for that to happen, individuals who create knowledge innovation are required.

Human participation is fundamental in the process of corporate innovation, and combined with other resources or in line with the usage of technological artifacts, the performance for the competitive advantage is potentially greater. There are many technologies today, such as augmented and virtual reality, internet of things, 3D printing, among others, that make up the new era of industry 4.0.

Therefore, this study aims to study artificial intelligence and describe how the Human Resources area can use this technology to obtain more efficiency in recruiting candidates through a semantic data analysis.

2 The Digital Transformation

With the significant changes revealed by the digital environment, managers have been required to reflect on the central essence of their company to achieve digital transformation. It is necessary to think about different ways to achieve innovation in which all people involved reveal their maximum potential for solving problems.

Technological changes require rethinking the business model to create value or experience for the user. In this perspective, Rogers (2016 apud Warner et al. 2019) argues that "the digital transformation is not fundamentally about technology, but about strategy", which means that managers must find ways to identify new business models.

According to Liu et al. (2011 apud Warner et al. 2019), the digital transformation is "like an organizational transformation that integrates digital technologies and business processes in a digital economy".

Similarly, Singh and Hess (2017 apud Warner et al. 2019), suggest that the term digital transformation of an organization goes far beyond functional thinking, and holistically considers that the "range of actions" must be taken to explore opportunities or avoid threats arising from digital technologies.

Therefore, the success of organizations is determined by innovations across the board, meaning that it permeates all areas of the company in a holistically manner.

For Schumpeter (1964, p. 76) "it is a rule that the entrepreneur initiates the economic changes", generating a "circular flow" of new needs with the consumer, replacing old products and services for new ones. Thus, since the middle of the 20th century, business literature has been based on organizations that have been surviving through innovations and promoting competitive advantage (Flatten et al., 2011). In 1988, Bourgeois and Eisenhardt (1988) analyzed the survival of organizations in high-speed changing contexts or organizations inserted in environments of extreme change. It was seen that, just as

organizations must make efforts to maintain themselves due to the impacts of innovations, the labor market or human resources also follow these constant changes, reflecting on their practices.

One of the reasons for these changes, in addition to technological issues, is the constant change in the behavior of generations (Dslessandro, 2018). In this way, the necessity to use innovative Recruitment and Selection methods arises (Shree & Singh, 2019).

Organizations that wish to remain competitive in the market must have employees who meet this expectation, perform activities with mature and non-repetitive routines and focus on the development and implementation of new ideas, approaches or procedures (Shioh e Susanto, 2011).

Gupta (2019) also proposes that companies take the opportunity of technology to reduce costs and increase the efficiency of operations.

In this innovative environment, organizations that aspire to stand out must reconcile technological innovation with psychological profiles compatible with this scenario.

3 Technology Innovation at the Recruitment and Selection Process

For a better organizational developing in recruitment and selection qualified and competent professionals are necessary. But this task requires time and energy from managers.

Attracting talents with profiles that suit this scenario attending companies' expectations is one of the greatest and perhaps the most important challenge for organizations (Kollitz, 2019).

Therefore, technologies can be used for a better selection of candidates in order to compose the workforce (Martinez-Gil, 2014). In the same way of thinking, Dalessandro (2018) says that the use of digital technologies is the future for traditional recruitment and selection.

The individual insertion with the profile that mostly matches the company's position is the success and survival corollary in the innovative environment. Thus, the usage of technology for choosing and hiring new employees is extremely important, understood as a solution that has been deployed in the activities of human resources and, more specifically, at the recruitment and selection department (Martinez-Gil, 2004).

In fact, Dalessandro (2018) concludes that reaching future generations in traditional recruitment will be difficult, since they not only live in this environment full of innovation, but also seek opportunities online.

In this study Dalessandro (2018) states that corporations that use digital technologies for recruiting candidates can reach young people from the millennial generation more effectively, because they are strongly connected with the experiences of digital media.

In this context, Shree and Singh (2019) studied the gamification method for recruitment and selection, which is the usage of game design techniques, mechanics and game thinking to identify internal and external candidates for the organization.

Initiatives using automated solutions make this step in the process more efficient. Globalization has provided viable access to information through the internet, so people in different locations are able to access open job opportunities at companies. This means that the volume of curriculums and analyses to be carried out becomes potentially greater. In this way, Artificial Intelligence technology can assist with this process.

4 Artificial Intelligence

Artificial intelligence is intelligence demonstrated by virtual assistants, like human intelligence that algorithmically designed crosses data to perform functions that require intelligence when performed by people. This technology can improve existing products and services, enable the automation of tasks, and increase efficiency and productivity.

The future will be possibly constituted by the combination of software, data and artificial intelligence. As a result, sectors such as health, financial services, manufacturing and retail must undergo significant transformations, bringing benefits to consumers (Taulli, 2019).

Artificial intelligence has been becoming one of the most powerful strategic tools in today's organizations and in any business area: HR, Marketing, Finance, Logistics, Insurance, and others. Everything indicates that artificial intelligence will shape the future more strongly than any other innovation in this century.

Machine learning is a current application of artificial intelligence based on the idea of designing machines with access to data and let them learn for themselves.

Thus, the selection process of candidates with profiles matching the organization objectives become more extensive and costly, as it may involve a more qualified labor. This is the reason why technological innovation through artificial intelligence can be highly efficient in the recruitment and selection process.

5 Semantic Analysis at the Recruitment and Selection Process

One example of technological innovation that supports recruitment and selection activities is the "e-Recruitment" or electronic recruitment, as called by Martinez-Gil (2014). With this technology, the social networks and/or applications with artificial intelligence can partially replace human action in the recruitment and selection process.

Such intelligent technique has grown significantly in recent years and there are several types of analysis with these resources. One example of it is the linguistic analysis or semantic analysis, the topic being studied in this paper. (Martinez-Gil, 2014).

Semantic analysis is a technological process in which the words are interpreted by similarity, making a semantic analysis of the responses. Martinez-Gil (2014) says that artificial intelligence assigns scores to both parts that are interested: the job position and the candidate, based on the similarity of their meaning. In the case studied in this paper, the company that uses this intelligence reports that the technology is capable to perform a semantic analysis of the responses. "We take a deep observation and try to understand if the person uses long or short sentences, types and quantity of pronouns, and negative or positive words for example. If the person is using more 'me' than 'us' and how it indicates a more sociable pattern.''

This type of system does not compete or replace all management procedures in the recruitment and selection section, but it helps the development of processes, as the technology is accurate and assertive in the analysis of algorithms.

We are also able to affirm that traditional processes may not consider adequate semantic relations, so this is a positive point about using this technology. Also, it is important to say that the isolated usage of this resource is not recommended, as it should always be used as a complement to the traditional analysis processes. Analyze different candidates' profiles that configure the best option for the company and the position opened may require a lot of time and cost.

Artificial Intelligence technology provides intelligence for candidate analysis. Thus, it can be used as a pre-selector to reduce the volume of curriculums, simplify the selection process and maximize efficiency in a quick and intelligent manner.

5.1 A case in Brazil

As an example of the combination between semantic analysis and artificial intelligence, we have a Chinese human resources technology company, that analyzes the candidates' responses to the job position through artificial intelligence. The name of the company will not be revealed in order to keep confidentiality.

The algorithms process the candidate's information and list keywords to accurately identify the person's profile. “We try to put the curriculum at a different point in the process, where it is most useful. And we want to make possible some kind of ‘interview on a large scale’, creating the chance for everyone to be evaluated by a tool that relates the answers to the best performance for the job position”, explains Rutger Laman Trip, director of Seedlink, company that owns the software. Candidates must answer open-ended questions and the virtual assistant interprets the language used by the person.

“Our technology makes a semantic analysis of the answers. We take a deep observation and try to understand if the person uses long or short sentences, types and quantity of pronouns, and negative or positive words for example. If the person is using more ‘me’ than ‘us’ and how it indicates a more sociable pattern. This is the tip of the iceberg of the correlations that the program is able to make,” he said. “We look at the competence by the language that is being used by the candidates, and not their background, age, skin color or field of study”, comments the director. The virtual assistant or artificial intelligence makes a four-level-deeper interpretation. (EXAME, 2020)[41].

6 Final Considerations

The 21st century is marked by technologies that started to change the world, causing individual transformations and breaks in business paradigms. In this study, it was revealed how companies can achieve digital transformation at a process of recruiting and selecting candidates for the job positions through semantic data analysis.

Artificial Intelligence or virtual assistant interprets and correlates candidates' keywords by similarity, making a semantic analysis of the responses and, in the end, indicates the candidate's profile.

We analyzed a case of a company in China that uses this intelligence. Thus, if the person uses long or short sentences, many pronouns, more negative or positive words, and more ‘me’ or ‘we’, it is possible to detect if the person is more or less sociable.

The usage of technology at the selection process of candidates is a solution that has been deployed in human resources activities. When the company hires the employees in a correct manner, the retaining of talent happens, and superior results are achieved.

Thus, it is concluded that technology, through Artificial Intelligence, can assist in the analysis of candidates' responses and corroborates for more assertive hiring in Human Resources management. And in this way, offers some job position that resonates with the candidate.

In addition, the study addressed the concept of co-creation and open innovation, in which companies can reinvent themselves by the usage of intellectual capital from employees or external public, achieving innovation quickly.

[41] https://exame.com/carreira/entrevista-antes-curriculo-depois-esta-empresa-quer-mudar-o-recrutamento

And finally, it was verified in the World Economic Forum[42] studies a report showing that the future of work will have significant changes and will be marked by advanced technologies, such as: augmented and virtual reality, internet of things, 3D printing, nanotechnology, biotechnology, Big Data, drones, droids, bitcoin or digital currency and Artificial Intelligence, which was the object of study in this paper. According to the article created by MIT News (2020)[43], in US, four types of industries are responsible for 70% of robots, which are automakers (38%), electronics (15%), plastic and chemical industries (10%) and metal manufacturers (7%). The advanced robotics in the USA replaces an average of 3.3 workers. This increase in the usage of robots in the workplace also reduced wages by about 0.4%, which has significant social implications. However, MIT News presents another study, now in France[44], in which it reveals that companies using robotics in industry tend to add more workers to their organization, and this is due to the result of automation that led to a growth and a better market share – so these companies became more productive and profitable. The study reveals that companies that do not invest in technology lose space to their competitors.

Thus, the Artificial Intelligence technology, which is the purpose of this study, by using semantic data analysis, revealed to be a considerable resource for digital transformation at the recruitment and selection process.

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Use of Data Analytics Tools for Increased Efficiency in the Internal Audit Project Portfolio

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Abstract: The constant evolution and dependence of technologies on corporate business activities and processes brought an increase in electronic transactions in company processes and, consequently, a need for transformation in the project portfolio of the Internal Audit area. Based on these needs, technological tools such as Data Analytics appear as technical support options for audit project managers to extract, model, improve and optimize the analysis and scope of the data. The purpose of this report was to present how the implementation of technological Data Analytics tools contribute positively to increasing the efficiency of the internal audit project portfolios. The results showed that the implementation of this type of technology during internal audit projects and processes could reduce the intensity of the work, expand its reach in the results and increase the efficiency of production in time and cover the cycles of audited processes. The use of Data Analytics has positive advantages for the AI project portfolio and for the future of the area, such as better project planning, greater resource management, more comprehensive scope definition, agility in the execution of audit work, traceability and record of analyzes performed and performance increase.

Keywords: Internal Audit; Project portfolio; Project management; Data Analytics; Data analysis

1 Introduction

Among the definitions found in the literature, project portfolio management, from the English Project Portfolio Management (PPM), may be defined as a series of models, procedures and processes that aim to manage a set of projects in a systemic way (Carvalho & Rabechini Jr., 2008). In addition, the Project Management Institute defines that the PPM has the function of structuring and coordinating the components of the project portfolio, in order to achieve the organization's goals and strategies (Garfein, 2009).

Inserted in the Internal Audit (AI) companies, the PPM has the role of performing the shared management of financial and human resources in search of increased performance (Rabechini et al., 2005). The objective is to understand the consolidation of projects, to better manage shared resources and obtain better performance results in the quality of projects (Carvalho, Lopes & Marzagão, 2013). Regarding management practices, the purpose of PPM is to work with several projects with common results objectives in a single portfolio, (Hill & Jones, 1992). In companies in this segment, the projects aim to develop an objective assessment plan, using a systemic and disciplined approach to assess and, in future projects, improve the effectiveness of risk management processes. The ultimate objective of these premises is to add value and improve the operations of companies (Oliveira, 2018).

The traditional approach to managing AI projects is based on consulting data, facts and records of projects carried out in the past, which may become insufficient for the current scenario, marked by greater access to information and technologies (Silva & Almeida Jr, 2014). According to the report presented by Pricewaterhousecoopers (2019)[45], the lack of use of technologies to access data to support AI projects can contribute to companies in this segment being outdated in their organizational processes. To remain competitive, the report argues that these companies need to keep up with the digital pace of business, knowledge, and skills to provide advice and strategic assurance through their projects. Otherwise, they may suffer from negative impacts such as slowness in the execution of projects, with the low periodicity

[45] https://www.pwc.com/us/en/services/risk-assurance/library/internal-audit-transformation-study.html

of the business process review cycle and the limitation of analyzes of corporate transactions by samples, which become factors of concern and must be the scope of project portfolios.
Given these needs, Data Analytics (DA) tools emerge as technical support options for project managers in AI companies to model, improve and optimize data analysis and scope. The DA techniques approach the extraction, mining, statistics, and research of the data using software. Through its use in project activities, it is possible to identify changes and deviations from procedures, to generate an accurate and detective standard of analysis in business transactions through its schedules and scripts (commands or instructions automatic), in addition to contributing to the reaction and treatment of project activities (Russom, 2011).

In this way, the constant evolution and dependence of technologies on corporate business activities and processes brought an increase in electronic transactions in AI companies and, consequently, a need for transformation in the project portfolio. To remain competitive, AI companies with project portfolios need to innovate, which can be a challenging task, where 56% of companies in this AI segment in Brazil will seek transformation in their project portfolios over the next 5 years (Deloitte, 2018)[46]. Given this changing scenario and marked by factors of concern, such as slowness in the execution of audit projects, low periodicity of the business process review cycle and limitation of analyzes of corporate transactions by samples, this technical report aims to answer the following question: How can technological tools contribute to the efficiency of the Internal Audit project portfolios?

In this context, the present technical report aims to present a case of implementing a continuous audit project through the application of DA software in a leading company in the segment of paper and personal care products in Brazil and Latin America. The project had the participation of CAE (Chief Audit Executive) from the internal audit director, responsible for the project portfolio, and the local coordination of the area, responsible for the configuration and development of the DA tool under the supervision of the Systems Audit Manager. The company had 34 business processes mapped that convert into audit projects, and has a team of 3 local auditors, as a result, the company suffered from negative delays in the execution of audit projects, low periodicity of review of business processes and limitation in the analysis of corporate transactions by samples. In short, negative impacts on time and availability of operational resources to meet all expected demand.

The purpose of this report was to present how the implementation of technological Data Analytics tools increases the efficiency of the internal audit project portfolios. This technical report is organized into seven sections, including this introduction. In the following, a brief review of the literature on Management of AI and Data Analytics Project Portfolios will be presented to support the Management of Internal Audit Project Portfolios. Then, methodological aspects will be addressed. Then, the results and final considerations will be presented. This technical report was prepared in accordance with the protocol for preparing technical production reports proposed by Biancolino et al., (2012).

2 Theoretical Reference

In this section, the concepts of Project Portfolio and their relationship with AI are presented, as well as the possible solutions for Data Analytics software for AI projects as a contribution to optimize their results.

2.1 Internal audit project portfolio management

PPM is highlighted as a set of projects, programs and other work grouped to facilitate its management, making it more efficient and allowing the company, or an area, to achieve its goals (Carvalho & Rabechini Jr., 2008). Focused on the organization and not on the project, an organization or area strategy was initiated in the late 1990s with an emphasis on project alignment and on the effective allocation of available resources. (Rabechini et al., 2005). In 2009, the Project Management Institute released a PPM guide proposing a model for its management (Garfein, 2009).

PPM techniques consider that the company's resources are limited and that projects must align with organizational objectives (Castro & Carvalho, 2010). Unlike a project or program, portfolios are not temporal. They exist as a set of planned initiatives, in line with the strategic objective of the area. Project proposals become part of a portfolio when they are identified, selected and approved (Garfein, 2009).
CAE in the AI area is responsible for creating initiatives to improve efficiency in its portfolio and activity plans. At this point, projects are established that align with the company's strategy (Cooper & Edgett, 2010), grouping them into portfolios and programs in order to balance the use of resources and maximize the generation of value for the area and the organization (Martinsuo, 2013) and (Silva & Almeida Jr, 2014). The choice and selection of projects in an audit portfolio, must be done carefully so that they are

[46]https://www2.deloitte.com/content/dam/Deloitte/br/Documents/technology-media-telecommunications/ICT-insights-report-eng.pdf

aligned with the strategy of the organization it belongs to. By effectively managing the project portfolio with a focus on improving and efficiency of results, CAE will maintain the right balance of projects. Cooper, they claim that strong portfolios contain high-value projects with few trivial and low-value projects, and that the best performing companies are the ones where projects are prioritized correctly and where there is a right balance between available resources and the number of projects.

However, with limited resources and a traditional approach, internal audit projects can become insufficient, and negatively impact the results of the portfolio, as they demand more execution time and can lead to slowness in the closing of audit projects. Consequently, impact on the periodicity of the business process review cycle and limitation in the analysis of corporate transactions by samples. (Chan & Vasarhelyi, 2018). This scenario can generate occurrences of project re-planning, result in alteration of resources in activities and projects, which can aggravate the management of critical projects. (Castro & Carvalho, 2010).

Given the complexity and technological advances of corporate transactions, managers in the AI area have increasingly resorted to technology projects to support processes and operations and increase their efficiency (Silva & Almeida Jr, 2014). The objective is to offer an analytical approach to the data that the organization has, in support of its projects, in order to optimize time and resources. The studies point to DA software as the main tools used, which allow to maintain a continuous audit of the processes, maximizing the projects of its portfolio. According Deloitte, (2018), in the last two years in Brazil the use of DA in the areas of Internal Audit has doubled from 16% to 32%.

2.2 The use of data analytics to support internal audit portfolio management

Corporate information systems, along with the latest business application technologies in the digital and internet age, have led to a profound change in the AI project portfolios and their tools (Costa & Inácio, 2012)[47]. The technological tools, ERP (Enterprise Resource Planning), Data Analytics, Machine Learning and Artificial Intelligence have become a support for project management and its portfolios (Chan & Vasarhelyi, 2018). Such tools emerged as resources capable of using technology to integrate all the organizational functions of a company, such as: human resources, finance, production, sales and distribution, in a single set through software modules (Madani, 2009).

In the view of Chan & Vasarhelyi, (2018), DA is characterized by the applied use of data through software in order to analyze systematic reasoning as a support in a decision-making process. This tool is configured with data modeling and analysis techniques based on statistics, data mining and research used for analytical procedures, and can be applied in various business operations and departments. (Russom, 2011). The use of DA is directly aimed at improving analytical performance, which can be demonstrated through indicators related to the fundamental domains of an area or project (The Institute of Internal Auditors - IIA, 2018)[48].

These technological resources support the AI project portfolios to organize and optimize their results in projects and increasing their efficiency in time and use of resources, currently there are several applications available on the market. Amaral; Marques & Inácio (2019) mention in the context of analysis and data extraction for AI, software such as Interactive Data Extraction and Analysis (IDEA) and Audit Command Language (ACL) that are Data Analytics tools. The purpose of this software is to make it possible to access and analyze a large amount of data in several projects, in a timely manner, in order to provide an effective measurement for the projects and support their portfolio (Alles & Gray, 2016).

The implementation of DA in the AI project portfolio can increase the performance of audit processes in time and increase their efficiency, extension and monitoring of analytical and substantive tests (KPMG, 2019)[49]. Adopting tools of this size is ideal due to the ability to work with the large amount of data and the frequency of monitoring the tests needed in the projects in your portfolio. Second Vasarhelyi et al., (2012), automation in audit projects provides benefits such as improved efficiency and reduced workforce, consequently an increase in the quality of projects, implementation of uniform procedures, increased audit independence in relation to the management of the organization's information systems, and more consistency of audit procedures.

3 Technical Production Method

The research method of this study considered an empirical analysis, through Action Research with qualitative character proposed by (Thiollent, 1996) and (Tripp, 2005). According to Bauer and Gaskell (2017), the qualitative approach is not concerned with the representation of numbers, statistics, but aims to deepen the understanding of the phenomena it studies, such as the actions of individuals, groups or

[47] https://ria.ua.pt/bitstream/10773/13337/1/57a.pdf
[48] https://global.theiia.org/about/about-the-iia/Public%20Documents/2018-Annual-Report-Final.pdf
[49] https://assets.kpmg/content/dam/kpmg/sg/pdf/2019/09/agile-internal-audit.pdf

organizations in their environment or context.
The study was conducted at a leading company in the industrial paper and personal care sector in Brazil and Latin America. The choice of the analysis unit was intentional, since the organization presents the conditions for evaluating the practices and structure of projects from the perspective of implementing technological tools for DA. The data collection was based on primary data, obtained through professionals, as well as secondary data extracted from the analysis of internal company documents.
The purpose of this report was to present how the implementation of technological Data Analytics tools positively contribute to increasing the efficiency of the internal audit project portfolios. For information, the author participated in all project alignment meetings, served as a consultant for the development of technical scripts for the proposed DA software, training, implementation and post-implementation monitoring of the project with the Internal Audit Board.

Regarding the documents, electronic documentation was analyzed containing the scope and schedule of the projects, in addition to internal documents available in an online tool in the internal audit area. For Martins & Theóphilo, (2009), documentary research uses primary sources of the most varied types of documents, allowing to obtain information and evidence of materials that have not been used for any analysis work, or that can be reexamined.

4 Project Context

The characterization of the organization and the analyzed project where this technical report was made will be presented below.

4.1 Organization characterization

This technical report was made at a leading company in the paper and personal care segment in Brazil and Latin America. In Brazil, it has about 2,000 employees distributed in 5 paper production and conversion plants in the national territory. It is part of a Chilean Group that has operations in 8 countries with revenues of 22.8 billion per year, according to the 2019 position.
In relation to the national audit area, it has a team of 03 auditors responsible for the annual plan to audit two branches that includes: 05 plants, 34 business processes and 517 mapped control activities.

4.2 Characterization of the analyzed project

The project lasted 6 months and started in January 2018 and ended in June 2018. It covered the company's information technology (IT) areas, the local internal audit area and the corporate team. The interaction between the project areas was supervised by the IA Directorate, who managed the stages of the project and allocated the necessary resources as needed. The scope of the project was the implementation of a Data Analytics tool called ACL Analytics in conjunction with applications that interface with the company's ERP system and server access to perform activities.
The purpose of automating its procedures contributed efficiently to the performance of audit processes, increased efficiency in the time of execution of work, extension and monitoring of analytical and substantive tests, in addition to promoting an analysis range of 100% of business transactions. Through the positive impacts of project automation and optimization, these results generated, consequently, support to CAE for the management of AI's project portfolio.

A platform was developed with the aim of providing a DA solution with automated analyzes, pre-designed and modeled to perform audit tests based on data behavior patterns. The project portfolio strategy was to cover the main business risks in key company processes, creating a standard among the projects, with automated verification which can be performed at any time and time, which generates the possibility to audit processes in cycles smaller and wider range.

This strategy allowed AI to keep its performance in line with its objective, and to solve the negative impacts that the company suffered, such as slowness in the execution of audit projects, low periodicity of the business process review cycle and limitation of analyzes of corporate transactions by sampling the occurrences. The adoption of the DA tool contributed to the area's portfolio, solving the time limitations and reach of operational resources to meet the expected demand, in addition to increasing the efficiency of the projects.

5 Type of Intervention and Mechanisms Adopted

The IA area noted in its annual plan that the lack of a DA tool and the operational limitation to address all projects within a year, occurred on a rotating basis, preventing the achievement of better results. This limitation was given to the framework of available resources and analysis tools in the area, basically the use of ERP and Excel system reports, which directly impacted the time of the audits, leading teams and auditors to take more time in the process information extraction and base relationships. Consequently, greater demands for layout adjustments, parameter verification, as well as inherent factors

such as staff turnover and limited knowledge of new resources.

Another important observation to consider was the objective pursued in AI's project portfolio, to increase its efficiency by expanding the capacity to reach a greater number of transactions in the business areas, which was not feasible with the limitation of the basic analysis tools that did not support such a configuration. Another aggravating factor was the procedures for sampling and selection of identified events or facts, due to the size of the volume of data generated in systemic transactions. This perception was identified in the project portfolio, since the audit tests mostly represented few automated analyzes, with scopes aimed at document analysis with too much need for face-to-face analysis, and which negatively did not cover the necessary evaluation, to mitigate the risks and objectives of business processes.

5.1 Project planning and DA tool selection

The software and applications used in the project were contracted from a national company operating in the audit solutions market. Although the Data Analytics (DA) solution becomes one of the great helpers and facilitates day-to-day tasks, automating audit routines and projects, its implementation requires planning and a strategic approach. Regarding practical application, with a focus on obtaining greater benefits from its resources and optimizing its results, the company's AI area has adopted technological tools with the ability to extract, model and verify data with connectors that allow direct access to the database. data from the company's systems.

Additionally, AI resorted to the development of scripts in the adopted tools. Scripts are automatic commands or instructions to perform an operation. This transformed and altered the audit approach, making it continuous, bringing greater capacity for analysis and reducing the time spent on testing. This factor, contributed to the allocation and distribution of resources in other projects in a dynamic way, thus expanding the coverage of revised processes.

In planning, it was determined by CAE that the Systems Audit Manager would be the overall project leader. Regarding the position, his responsibility was to ensure that the implementation of the tool in the projects was developed correctly and completed successfully. The role of a project manager with technical capacity according to the nature of the project is fundamental to the result of this type of initiative and directly impacts the area's portfolio. The project leader had the local AI coordinator as the project's business consultant. Furthermore, the team of systems auditors was allocated to develop the parameters of the scripts. The defined structure allowed CAE to manage the portfolio, so that the right projects were executed to achieve the objectives, during the development and implementation of DA occurring.

5.2 Mapping of business process and objective controls

Tool licenses were obtained and connectors for data extraction were applied to all machines in the team. CAE in the management of the project portfolio, distributed the strategic objectives among the different planned projects. The IA coordinator planned the mapping of the processes, identifying their controls and related risks. He assigned each operational auditor to collect information on business processes and their respective parameters in the company's ERP system.

At this stage, to contribute to the implementation of DA tools, four important concepts were emphasized. The first is which business process would be reviewed and according to which business rules were related to these, third is the source of data extraction and finally focus on the iteration of the project scripts to be defined, as shown in Figure 1. It was important to communicate directly with the partners in the process currently, to understand and map the business rules and exposure to risks. This interaction helped the project team to adapt quickly to unpredictable situations, and to promptly act on changes in the requirements of the development project.

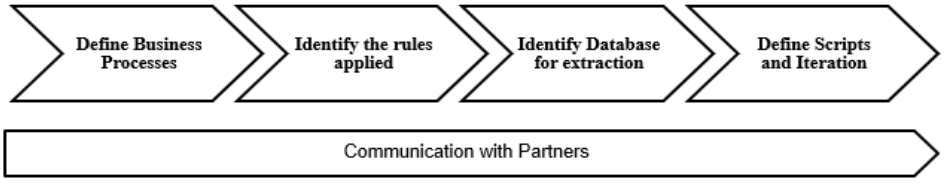

Figure 1 Mapping of Business Process and Objective Controls

The Coordinator and the operational auditors identified the areas and business processes to apply the extractions. They highlighted the corresponding systemic transactions, and as a requirement determined where the business rules were applied, to support the development of the verification scripts. In general, this step was clearly aimed at identifying the data sources of the business processes, the rules applied and defining which audit procedures should be developed to form the monitoring and tests that could be automated. This mapping was elaborated and consolidated in a matrix with a description of the

controls, risks, and transactions of the system, considering recurrences of execution and parameterizations.

5.3 Extraction, data modeling and analysis tests.

The identification of the transactions and tables of all the project's processes through DA allowed the modeling of the data, allowing the generation of information bases with the extracted data, consequently the evaluation of its transactions and the presented balances. Techniques for estimating, classifying, associating, and relating systemic tables were applied, generating information and behavior patterns within the tool itself, reaching 100% of the records, eliminating the use of sampling. The purpose of data modeling is to train analytical models and algorithms to discriminate or estimate transaction data considered abnormal or exception.

In the evaluation of the test programs, the design was prepared by the IA coordinator together with the project manager and the systems AI team. The analysis was based on business rules. The systems audit team generated verification scripts that compared the rules with the actions of the system users, considering company policies. The purpose was to identify transactions with deviations from procedures, to evaluate the settings of the internal controls and to verify transaction details. A test validation phase was applied to each script, to certify the exception reports generated in the DA, to confirm that the exception really was information free from material errors, omissions, or fraud. The Figure 2 shows the dynamics of DA intervention.

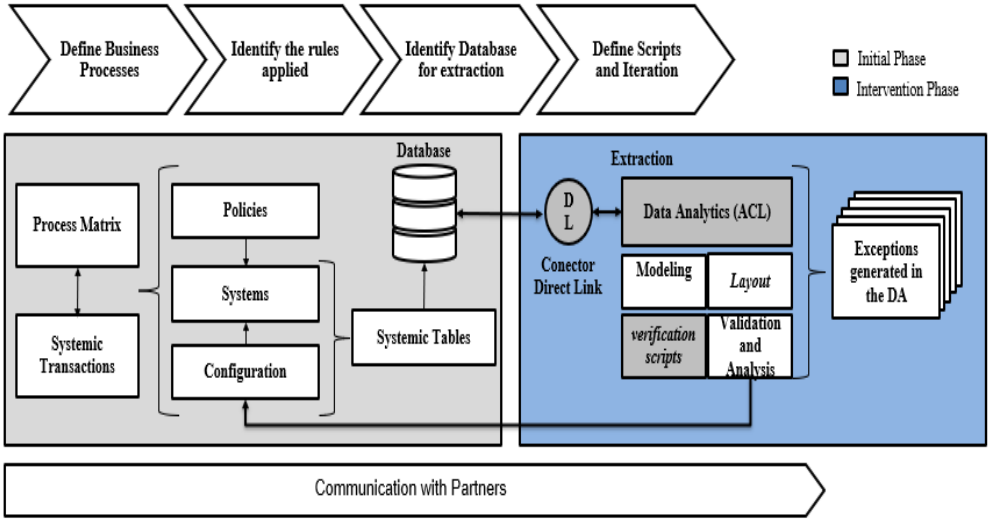

Figure 2 Extraction, Data Modeling and Analysis Tests via Scripts

The tool brought greater dexterity to the audit projects, which identified transactions involving deviations from internal control and breaking of the defined rules quickly, signaling in masse exceptions verified and reported in real time. Full coverage of the transaction base, in appropriate time, allowing to revisit processes more frequently and optimizing the performance of operational resources.

The results were observed, as the projects for each business process were completed. The perception of the objectives achieved confirmed that the DA tools can transform the audit approach and contribute positively to the project portfolio in the area. It optimizes the execution time of projects, reaches 100% of business transactions, contributes to the performance of the audit team and allows to revisit processes more frequently. We found that the automation of analytical tests for the company's main processes and risks enhances the use of DA in AI's project portfolios.

6 Results and Analysis

The results showed benefits for the project portfolio of internal audit through the implementation of DA tools. As stated by Castro & Carvalho, (2010) although the portfolio management activities are concentrated at the tactical level, which aims to achieve the strategic objectives and goals determined in the project, the strong relationship between the strategic level and the other levels was a fundamental factor in the result of the implementation of the DA. Having the objectives and goals clearly defined by CAE at the beginning of the project, was a guide for all the development carried out. This relationship has extended positively to meetings at the operational level, where projects are carried out.

The initiative to adopt an DA tool had the support and commitment of all those involved in the AI, the planning of the processes to be reviewed and the responsibilities well distributed, resulted in a continuous

alignment of the executions at all levels of the project. This synergy benefited the conclusions and closings of each delivery of the implementation of the tools and optimized the execution of the projects, a real balance as commented by Cooper & Edgett (2010), which strengthens portfolio management with a focus on correct projects that add value.

The defined project structure and allocation of resources were key to the effective progress of the project, both in the implementation of the DA and in the development of the Analysis Scripts. The scripts, in fact, became a differential for the audit, based on the results, and on the premises of the collection of primary data obtained, the automation of analytical tests impacted the main macro business processes and their risks, a total of 14 audited cycles : Purchases of Services and Materials, Accounts Payable, Accounts Receivable, Inventory Management of Materials and Finished Products, Accounting, Fixed Asset Management, Investment Projects, Corporate Sales and Sales, Production and Cost, Marketing and Distribution and Freight. The project resulted in 45 scripts configured with validation of business rules and analytical summaries to support the audit,

The use of DA for the analysis of the audit, with the verification scripts, represented a gain in time in the execution of the audits of 44%, in comparison to the scenario before the implementation of the tool for the same process. Considering the amount of systemic analytical tests adopted in the projects, there was a considerable increase of 80%. Not to mention the increase in the sample size, which now considers 100% of the records in the audited period.

These results show the efficiency and effectiveness of DA tools in the AI portfolios, demonstrate that the implementation of technology during audit projects and processes can reduce the intensity of the work (Elliott, 1998) and increase production efficiency in time and coverage of audited processes (Menon & Williams, 2001). The trend points out that more and more in the coming years, the use of these tools will be continuous in the routine of the area and of the AI portfolios.

7 Conclusions

The purpose of this report was to present how the implementation of DA technological tools contributes to the increase of efficiency in the AI project portfolios. Based on the results and the existing technical literature, it sought to answer the following research question: “How can technological tools contribute to the efficiency of the Internal Audit project portfolios?”

The study revealed the positive impacts of adopting automation and data modeling tools in AI projects. The use of the tool presented advantages for the AI project portfolio and for the future of the area, such as better project planning, greater resource management, more comprehensive scope definition, agility in the execution of audit work, traceability and registration of analyzes performed and increased team performance. It was possible to verify the advance in the performance of the hours used in projects, in the identification of deviations and opportunities for improvement identified, in the use of resources per project, in the amount of work performed according to the audit plan, consequently a higher level of quality of the reports, optimizing the results substantially.

Clearly, it has been confirmed that the use of DA contributes to standardize data collection and systemic formalization of the company's internal control policies, which benefits AI's project portfolios. Furthermore, it confirms in its essence that it is a means to overcome the limitation exposed in the introduction of this report, when considering the entire population of business transactions in the audit tests and with increasing efficiency in the identification of deviations or possible errors. In periodic audits, a non-conformity that was not detected in the sample selected by the auditor could propagate its effects, causing damage to the processes. Thus, the audit process gained speed, for the systematic analysis of the cause and taking corrective or preventive action. The use of these practices, following the implementation phases shown in Figure 3, it made it possible to comply with the area's objective and strategies, which assessed high-risk business processes and assessed its control environment, ensuring compliance with the company's business rules.

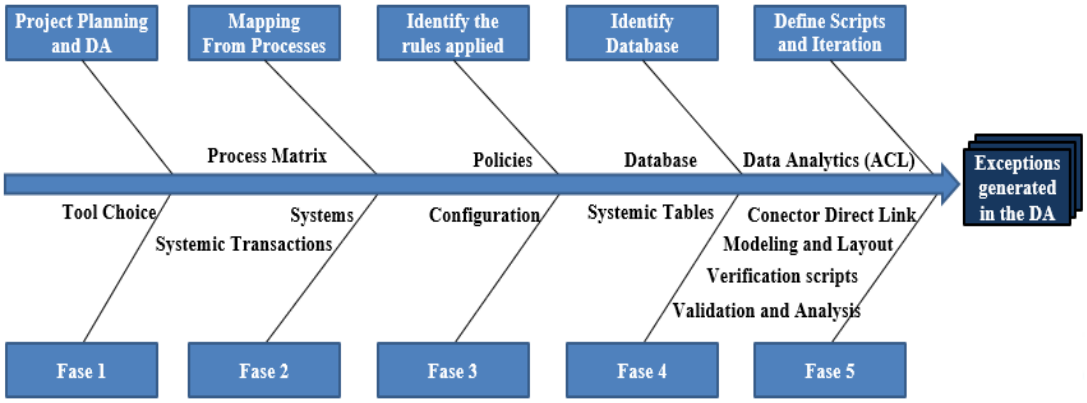

Figure 3 Concepts and Application Phase

It is worth mentioning that the study was limited to analyzing a project in a company of a specific segment, therefore the results observed here may be different when adopted in a scenario of portfolios or companies from other segments. As a suggestion for future studies, it would be important to analyze other variables that could impact or influence projects. Some of the limitations of this study are the absence of proof of the benefits in terms of the costs of adopting audit tools and the implications of developing internal audit scripts, which can be considered in future research.

Thus, recommendations for future studies may consider: Analyzing the degree of use of DA in the areas of auditing in companies in the same segment; The implications for the use of the DA tool incorporated in the ERP systems that can cover the business audit risks; Analyze the current level of knowledge of DA and Verification Scripts by internal auditors and the development of technical skills for their use.

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Stakeholders and the Impact that Exercise on Digital Transformation Projects

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Abstract: The purpose of this technical report was to observe the relationship of internal and external stakeholders during the execution of a digital transformation project in a leading vehicle rental company in Brazil. The report was prepared using the qualitative research approach, using consultation of the project's primary data, document analysis and participant observation. The results signal the importance of the correct mapping of stakeholders and how it affects the bonds of trust between the various parties involved, a factor capable of influencing the trajectory of the project. This study was limited to having analyzed only one project. As future studies, the impact of stakeholder influence on digital transformation programs and portfolios and how the time factor is affected in this organizational arrangement could be studied.

Keywords: Stakeholder management; Digital transformation; Customer service

1 Introduction

The Stakeholders are composed of customers, organizations, sponsors, executors and the public inherent to the project. Regarding the relationship with the projects, Stakeholders are important opinion makers and are considered, in many cases, those responsible for providing and mediating an adequate environment for the project's objectives to be achieved (Drouin et al., 2017; Eskerod, 2019). Stakeholders can be divided into internal and external, where external ones are characterized by customers, government sectors or suppliers. Internal stakeholders are considered the organization's human resources, which add value to projects through their skills and competences (Kutomi & Piscopo, 2013; Obradovic et al., 2016).

In terms of business competitiveness and sustainability, Customer Service (SAC) can be considered a department within organizations with different dimensions to be explored (Peppers et al., 1999). To understand the relationship between the services provided by SAC, mainly in companies, a survey conducted by the Aspect Consumer Experience Survey in 2018, pointed out that 69% of customers see SAC services as the true test of how these organizations are valuing their relationship with their employees. customers (Aspect, 2018)[50]. Another survey, carried out in 2013 by Accenture, points out that 75% of customers are “extremely frustrated” when it is necessary to return the calls already dialed to a certain company to solve their problem through human service (Accenture, 2019)[51].

Consumer adherence to new services through the use of the internet, ease of access to information, the use of increasingly innovative technologies and the increasingly fierce competition from companies in search of new customers, become barriers to be disrupted by customer service companies (Julio Moretti, 2019). In this context, the adoption of technology and automated processes in the services provided by the SAC of a company, can contribute to the increase of operational performance. Automated services with access to the internet become key parts to boost SAC services. According to Julio Moretti (2019), 91% of companies that maintain the highest levels of consumer satisfaction in brand recognition,

[50]https://www.aspect.com/globalassets/files/ebooks/2018_Aspect_Consumer_Experience_Index_Results.pdf

[51]https://www.accenture.com/br-pt/company-news-release-orgnizations-wasting-billions-loyalty-programs

use in their SACs, solutions based on Artificial Intelligence, such as chatbots, to increase the satisfaction of their consumers. According to the author, the customer satisfaction rate of companies that do not use such technologies is only 42% satisfaction.

Thus, where on the one hand are the stakeholders, considered opinion makers and capable of influencing the results of the projects, and on the other hand, companies in the SAC segment with the need to transform their manual processes into digital ones, this technical report intends answer the following question: what is the influence of stakeholders on digital transformation projects in customer service companies? The starting point for the elaboration of this technical report was the collection of information from a digital transformation project in a vehicle rental company and leader in vehicle outsourcing in Brazil. The project had the participation of internal and external stakeholders, in addition to the digital transformation software development team for customer service. The company performed an average of 800,000 telephone calls / year from customers, which were performed by human agents from the SAC department. As a result, the company suffered negative impacts such as high operating costs, low customer satisfaction in relation to service, a high number of unsuccessful phone calls and the limitation of human service during business hours.

The purpose of this report was to observe the relationship of internal and external stakeholders during the project execution process, highlighting the relationship and impacts on the project's results. This technical report is organized into five sections, including this introduction. Next, a brief review of the literature on stakeholders, automated systems and Artificial Intelligence will be presented. Subsequently, methodological aspects will be addressed. In the sequence, the results and the final considerations are presented.

2 Theoretical Reference

In this section, the concepts about stakeholders and the relationship with the results of the projects and about possible software solutions based on Artificial Intelligence are presented in summary form.

2.1 Stakeholders and the relationship with the results of the projects

Stakeholders are defined as relevant parts of a project, characterized by people or groups interested in the results and that eventually, through their influence, can affect the results of the project (Oliveira & Rabechini, 2019; Eskerod, 2019). The basic idea of stakeholder theory is that an organization has relationships with many constituent groups and that it can engender and maintain the support of these groups, considering and balancing its relevant interests (Freeman, 2010; Jones & Wicks, 1999).

In terms of their identification, Kutomi and Piscopo (2013) classify stakeholders as internal or external. The project manager is the best-known actor in the group of internal stakeholders. In addition to the manager, the sponsor, the technical team, the functional and the support manager are also part of this group. External stakeholders, on the other hand, depend on the scope of the project but, as an example, suppliers and government sectors can be included in this group (Rabechini Junior & Carvalho, 2003), and can be appointed as primary, secondary and tertiary stakeholders.

Oliveira and Rabechini (2019) define that the primary stakeholders are formed by the organization itself, responsible for the execution of the project, by the sponsors and the main suppliers. Secondary stakeholders, in the view of the authors, are formed by customers and actors, who have less impact on the project, such as suppliers and support areas, while tertiary stakeholders are composed of NGOs, media, competitors, among others.

Therefore, the understanding is that stakeholders, both internal and external, can significantly influence both the processes and the results of various organizational processes. According to Oliveira and Rabechini (2019), expectations and interests are factors that can influence the projects. For Eskerod and Larsen (2018), the influence can occur using financial resources, knowledge, approvals involved in the project's life cycle and compliance.

Different stakeholders have different powers and interests within the projects (Kutomi & Piscopo, 2013), so it is important to map the stakeholders and relate the variables: levels of interest and power, in order to identify the most appropriate PMI strategy (2017). According to Kutomi and Piscopo (2013), stakeholders with low interest in the project and low power over the project or organization, the recommended strategy is to monitor. Those with a high level of interest and low power need to be informed regularly. Stakeholders with a low level of interest and high power need to be satisfied. Finally, those with a high level of high interest and high power, need to be kept close to the project and carefully managed.

In this way, the different expectations of stakeholders during the execution of a project, need to be managed. Ensuring synergy between internal and external stakeholders in relation to their respective interests and tolerances, can become an essential factor for increasing the performance of projects (Oliveira & Rabechini, 2019).

2.2 Solutions based on artificial intelligence

Artificial Intelligence (AI), is a branch of computer science responsible for the study of techniques that result in artificial mechanisms related to human cognition (Weber, 1999). AI, using computational techniques, may be formulated by mathematical models with the objective of obtaining knowledge through experience, divided into sub-areas, such as neural networks, machine learning, genetic algorithms and natural language (Magaña Martínez & Fernandez-Rodriguez, 2015).

The subarea of natural language processing is focused on the interpretation and processing of texts (Julio Moretti, 2019). Among the most common use of this subarea are translation programs, and chatbots, categorized as computer programs made for interacting with people, using natural language through simulations of a human being (Junior & Carvalho, 2018). According to Junior and Carvalho (2018), the main function of a chatbot is to automate everyday functions with a focus on functions that have a high degree of repetitive human interaction (Junior & Carvalho, 2018), performing the function with the same precision and assertiveness and much more economically (Kongthon et al., 2009).

Chatbots allow customers to obtain self-service, avoiding possible queues, waiting for service agents or e-mail responses. In this way, it is possible to obtain a reduction in operating costs, training time and increase the productivity of human agents (Kongthon et al., 2009).

3 Technical Production Method

This technical report initially followed an article by Biancolino et al. (2012) for the elaboration of technical production reports. The procedures were selected to meet the objectives of this report, which are mainly aligned with the qualitative approach. Thus, the data collection process used consultation of primary project data, document analysis and participant observation. As Valladares (2007) describes, participant observation considers the researcher-researched interaction. Thus, the information collected depends on the researcher's behavior during the collection phase and on the relationships, he develops with the studied group.

Therefore, the data were obtained during the realization of the project, and for the observation process the main aspects related to the project were registered and that would allow to reach the research objective. It is worth remembering that the objective of the report was to observe the relationship of internal and external Stakeholders during the project management execution process, highlighting the impact on the project's results.

The survey was carried out between September 2019 and March 2020. Regarding the documents, electronic spreadsheets, documentation of the scope and schedule of the project were analyzed, in addition to internal documents in text and email editors. The choice of these documents and the analysis process continued to be guided by the research objective. Corroborating these procedures, Martins and Theóphilo (2009) affirm that the documentary research uses primary sources of the most varied types of documents, allowing to obtain information and evidence of materials that were not used for any analysis work, or that can be reexamined.

Still regarding the observation process, the researcher participated in all project alignment meetings, in the development of the proposed software, in the training, implementation and post-implementation monitoring of the project with the stakeholders. After all the data collected, the analysis process was carried out, where the information was analyzed looking for a pattern of behavior that demonstrated a meaning that could help achieve the research objective, that is, a direction of meaning that demonstrated redundancy in the information. (Da Silva, Russo, & de Oliveira, 2018).

4 Project Context

The characterization of the organization and the analyzed project where this technical report was made will be presented below.

4.1 Organization characterization

The organization where this technical report was made is a leading vehicle outsourcing company in Brazil, with a fleet of 85 thousand vehicles available to corporate customers and 208 physical stores spread across the national territory. The company has a staff of 3,200 employees and a projected organizational structure, with revenues of 4.6 billion Brazilian Reais in 2019 (almost 1 Bi US$).

Describing the customer base, the company has approximately 3 million customers, including individuals and companies, in the vehicle rental service. This volume generates an average of 65 thousand customer support calls per month made by the Customer Service team.

4.2 Characterization of the analyzed project

The analyzed project had as a central element of scope, the creation of a digital service platform for customer service through chatbots. The objective of the project was to implement digital channels for

customer service, to make service more efficient, reduce operating costs, allow the automation of processes, and provide self-service to users. The project lasted approximately 6 months and started on 09/20/2019 and ended on 03/01/2020. Its scope permeated between the areas of SAC, Vehicle Reservation Center (CR), Fleet Service Center (CAF), Used Vehicle Service Center (SN) and the software development team.

The project, as mentioned, was composed of internal and external stakeholders. The interns, on the part of the business area, were constituted by the project managers from the areas of SAC, CR, CAF, SN and for the area of Information Technology, participated the Senior Manager of Technology and Innovation, three specialists in development of software and also the support team for legacy systems. In relation to external stakeholders, the Account Manager of the company Apple Inc. located in Ireland, responsible for monitoring the implementation of the chatbot on the Apple Business Chat channel, and the Account Manager of the BSP (business solution provider), supplier of the construction platform, participated in the project. conversational flows and communication with external channels, located in Brazil, responsible for carrying out the communication interface between the team of specialists of the car rental company and the internal team of BSP and contributing to the best practices in the construction of chatbots.

The scope of the project aimed at the development of a chatbots platform for digital service to the company's customers. The chatbots platform for digital service, was formed by a module for integration of legacy systems and connection to the BSP chatbots platform, which provided connections to WhatsApp, Apple Business Chat, Facebook Messenger, and Web Chat channels.

The platform was developed with the objective of providing a digital self-service solution to customers, through automated processes and providing derivation for the human service of the company's customer service areas. The areas involved have historically suffered from low customer satisfaction in relation to the human service provided, which presented operational difficulties in training new attendants, in addition to the limitation of service during business hours. Such negative factors, in addition to the company's digital transformation strategy, were the motivators for carrying out the project.

5 Type of Intervention and Mechanisms Adopted

The business organization portrayed here had an opportunity for improvement in the customer service sector of the SAC, CR and CAF operations, due to the fact that the vast majority of calls are made through telephone calls and e-mail. This operating model had some shortcomings: (i) the limitation of extending the service hours without increasing the number of agents, (ii) the training of new agents and (iii) the difficulty in standardizing service in operations. Such deficiencies were often noticed by the company's customers, an object of study that demonstrated their dissatisfaction with the services provided through low quality of service assessments.

Within the strategic goals of the company, were the improvement of customer evaluation and digital transformation, with the objective of providing the company with greater competitiveness and reduction of operating costs. To implement the strategy, managers from the SAC, CR and CAF areas were elected as internal project stakeholders, in addition to creating a team focused on innovation for the technical implementation of the project. External stakeholders were composed of the company hired to provide a platform that had the ability to connect to the main digital communication channels used in the country, including WhatsApp, Facebook Messager, Apple Bussines Chat (ABC) and Web Chat.

Still in the composition of external stakeholders, due to the size of the company and the relevance of the project numbers, Apple, the company responsible for the ABC channel, requested that an Account Manager participate in the project, to ensure that this channel's chatbot would be in compliance with company guidelines and that best practices were applied. In return, Apple's stakeholder would make its contribution to the project by providing its expertise in chatbot deployment projects, user experience and conversational interfaces.

5.1 Phase 1

The project lasted approximately 6 months and was carried out using the agile methodologies approach. In the initial phase of the project, internal stakeholders were introduced to the chatbot technology that would be used in the project and explained which processes would be implemented for the new digital service channels.

The stakeholder of the Apple Company requested the details of the processes so that it could approve the creation of the brand within the ABC channel. The innovation team was responsible for receiving the details of the processes, compiling this information in template spreadsheets provided by Apple and submitting them for approval by those responsible for the project.

5.2 Phase 2

In the second phase, the development of the digital platform was initiated, in which it was realized that the process of consulting fines for late appointments, indicated by the SAC Manager as the most significant process in volume, did not have the same importance when analyzed through of the service metrics collected by the innovation team. This scenario triggered a series of mistrust in the development team regarding the quality of the information received from the internal stakeholder responsible for the SAC operation.

In contrast, the requirements received from the stakeholder in the CAF operation were solid and reliable. However, due to lack of confidence in the schedule in relation to the delivery time, the same stakeholder asked the innovation team to exclude systemic integrations from the project, thus resulting in 100% of the operation's customers being served by human agents. Parallel to this scenario, Apple's stakeholder maintained daily communication with the innovation team, with the purpose of better understanding the project's business processes and service quality indicators, previously defined in phase one.

In view of the actions of internal and external stakeholders, a mapping of the project's communication processes was carried out. For the new communication model, two variables were considered: (i) the level of interest and (ii) hierarchy relationship of the stakeholders in the project. The new mapping containing the communication strategies was presented and disseminated to all involved. The objective was to employ the new model in the process of validating the scope requirements for all those involved in the development of the digital platform.

The Coordinator and the operational auditors identified the areas and business processes to apply the extractions. They highlighted the corresponding systemic transactions, and as a requirement determined where the business rules were applied, to support the development of the verification scripts. In general, this step was clearly aimed at identifying the data sources of the business processes, the rules applied and defining which audit procedures should be developed to form the monitoring and tests that could be automated. This mapping was elaborated and consolidated in a matrix with a description of the controls, risks, and transactions of the system, considering recurrences of execution and parameterizations.

5.3 Phase 3

In the third phase, the chatbot already had a Minimum Viable Product (MVP). According to Junk (2000), an MVP corresponds to a product construction architecture with gradual and continuous evolution, allowing the dynamic balance between cost, schedule, resources and quality in software development projects. In this way, internal stakeholders were asked to list the attendants who would carry out the MVP homologation phase through service on the new digital channels.

As part of the digital transformation strategy, a training schedule was prepared for users of the new digital platform and, subsequently, the execution of a pilot test in a controlled environment of the company. Internal stakeholders behaved in a controversial manner to what was previously planned. The CAF operation manager promptly sent the training schedule for the entire operation, while the SAC operation manager delayed delivery of the schedule, thus resulting in training delays.

At this stage, both the innovation team and Apple's stakeholder became better acquainted with the project's processes and requirements and, consequently, increased the level of confidence of the CAF Operation Manager. With the increase in confidence, it was possible to demonstrate that the implementation of digital automations was feasible within the current schedule, obtaining possible operational gains for all the company's operations. It is important to note that the gain of confidence occurred through metrics, which were identified by the knowledge in digital transformation projects of the senior manager of the innovation team, during the controlled tests and which were properly reported to stakeholders and defined in phase one of the project.

5.4 Phase 4

In the fourth phase, the stage of completion of the project, a greater engagement was noted between the external stakeholder, the innovation team and the CAF operation manager. This engagement among stakeholders, made possible small changes in scope, which aimed to adjust the processes that were requested by customers on digital channels, and that had not been foreseen in the project planning time and that were analyzed and, if possible, developed without impacting the deadline for delivery.

In this phase, there was an increase in the level of reliability between Apple's stakeholder and internal stakeholders. The result was the release of components in the chatbot recently launched by the company, in order to validate its usability in the project. Such technological components were implemented in the new digital platform as a tool to collect customer satisfaction (NPS), which was requested by the CAF manager.

At this stage, the indicators were notable for the areas participating in the project and this awoke in

the SAC manager the importance of having a closer role in the project, because as a result of her absence, in many situations she was unaware of the processes that were already implemented and in tests controlled in the chatbot. At the end of this phase, the project was implemented, and its metrics were monitored weekly by stakeholders to ensure that the objectives would be achieved. Table 1 shows the summary of each phase of the project.

Table 1 Stakeholder Actions and Results at Each Stage

Phase	Stakeholders's Actions		
	Internal stakeholders	**External stakeholders**	**Results**
1	Mapping of processes at the macro level;	Present from the platform; Present work plan;	Definition of scope and deadlines;
2	Detail the processes to be migrated; Validate necessary integrations; Create conversational flow for digital channels;	Approve the conversational flow; Ensure channel compliance; Guide on best practices for development;	Loss of trust among stakeholders due to inaccuracy of information;
3	Adequacy of processes; Monitor controlled test;	Suggest the use of channel resources according to the metrics collected;	Role alignment and confidence building through efficient communication
4	Monitor process metrics in the area; Identify improvements in the implemented processes; Identify new processes;	Track channel metrics; Validate integration with BSP; Collect feedback on work methodology; Suggest next steps;	Synergy between stakeholders, influencing the process in a positive way, with adaptations of stakeholder contribution to other project areas;

Stakeholder management evolved during the execution of the project. As shown in Table 1, we can identify that during the execution of phase 2, the imprecision of the information evidenced the failure in the mapping, causing an impact in the following phases. We can notice that the intervention carried out at this stage, positively impacted the behavior of stakeholders and the way they started to impact the project. This analysis is more fully detailed in the next chapter.

6 Results and Analysis

In the project design phase, there was a failure in the mapping of stakeholders. In the initial phases of the project, it was possible to notice that the internal stakeholders made decisions without basing metrics, to meet their interests, which could compromise the success of the project. This action reflects what was presented by Oliveira and Rabechini (2019).

In view of this situation, the senior manager of the innovation team, who in this project played the role of project manager, carried out a new mapping of the stakeholders, considering the variables of power and level of interest, according to the model proposed by PMI (2017)[52]. The new mapping was made available to internal stakeholders through a face-to-face meeting attended by the senior manager and the innovation team. External stakeholders were notified of the change by a video conference meeting. The contents of both meetings were recorded in minutes and sent to everyone by e-mail.

During the second phase, it can be noted that the distancing of the project by the SAC Manager (internal stakeholder), impacted the project in the execution of activities due to the change in priorities in software development. It can also be noted the impact on the project's management and operational results due to the choice of prioritized processes, in addition to reducing the levels of trust among stakeholders (Rabechini Junior & Carvalho, 2003).

The use of agile methodology induced the project's stakeholders to communicate more intensely. Due to the geographic distance from external stakeholders, meetings were held via virtual chat or e-mail exchange, while for internal stakeholders, face-to-face meetings were held at the company's headquarters. The way communication is established, according to Eskerod and Larsen (2018) and Oliveira and Rabechini (2019), can bring benefits to the project team, such as increased confidence, gaining empathy

[52] https://www.pmi.org/pmbok-guide-standards/foundational/pmbok

and greater involvement in the search for solutions of possible problems contributing to the objectives of the project are achieved.

In the third phase, the stakeholder mapping problem was solved, and more effective communication was observed within the project, the CAF and Apple stakeholders started to play a more active role in the project. The part of the scope that referred to the SAC team, which had been impacted by the distance from the stakeholder, as it did not have the necessary experience and skills for the project, was redesigned based on the metrics collected and the new results were reported weekly to the stakeholder who was satisfied with the results and not with the execution of the project itself.

The monitoring of process metrics was essential to identify the low involvement in the project of one of the stakeholders. According to (Oliveira & Rabechini, 2019), stakeholder involvement is one of the factors that contribute to the success of the project. The study by Rabechini Junior & Carvalho, (2003) states that it is important to consider the skills of the parties involved in the project. In this report it is possible to note positive and negative examples of the impact of stakeholder influences on the project results.

The ability to communicate clearly and objectively can be highlighted as a positive factor in the relationship between stakeholders, resulting in the monitoring of the execution of project activities. On the other hand, there was a negative impact of the lack of competence in the metrics analysis process, previously established in the project planning phase. This scenario contributed to the decrease in the level of trust between the project's stakeholders.

After the intervention of the senior manager, an improvement in communication between project members can be noted, generating greater engagement among stakeholders. From this, the contributions of stakeholders became more positive, not only for the project, providing that their interests within the project were achieved without friction with the other stakeholders, as described by Eskerod and Larsen (2018).

7 Conclusions

The results demonstrate the importance of correct stakeholder mapping and how it affects the trust relationship between them in the project and what it can affect the way they influence the project. In order to answer the question raised in this technical report about the influence of internal and external stakeholders in digital transformation projects, it was necessary to analyze the stages of the project and seek a basis in the existing specialized literature. In the project in question, several areas of the company were involved and, in this way, several stakeholders were mapped. Each of the stakeholders had capacities, interests and expectations in relation to the project, with that it was possible to observe and answer the question that guided the case study, the relationship of internal and external stakeholders in the project execution process and the impact on results.

In projects where there are several stakeholders, it is necessary to adopt different strategies (Kutomi & Piscopo, 2013). When relating power and interest level variables, it is possible to identify the best strategy to be chosen to deal with the stakeholder (PMI, 2008). Through the analysis of the history of stakeholders and control of their actions in the project, it was possible to review their respective roles (Oliveira & Rabechini, 2019), calibrate the variables of power and level of interest and create a management matrix, classifying each interested party in a more assertive manner; it was possible to adopt more effective relationship strategies.

The use of solid metrics to support suggestions for changes collaborated to create trusting relationships between stakeholders, which contributed to the existence of more spaces for analysis and small scope adjustments, which had not been considered in planning time. Thus, it may be observed that the mapping and classification of stakeholders in the project are fundamental to understand what impacts each one can have on the project. It was also evident that communication between stakeholders can increase the relationship of trust between them and provide flexibility in the influences they exert on digital transformation projects.

This study contributes to the practice so that other digital transformation projects can identify and carry out the correct mapping of the stakeholders, so that the influence they exert on the projects does not negatively impact the project and does not interfere with the level of trust of relationships within the project environment. The present study was limited to analyzing a project in a company with a specific follow-up; therefore, the results observed here might be different when adopted in portfolios scenarios or in companies from other sectors. As future studies, the impact of the influence of stakeholders on digital transformation programs or portfolios and how the time factor may impact the relationship between stakeholders and their influence on projects could be studied.

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Abstract: The current world has some central factors that lead us to constant innovations in all human activity fields and the way we communicate is no exception to this rule. Decades of globalization, the disruptive technological emergence and the recent COVID 19 acute epidemic crisis are examples of this situation; as a matter of fact this is leading toward a Tipping Point where the so called Digital Era and the ICT Revolution have come globally and with full strength in our daily life. Thus, an opportunity for academic research emerged so that the Global and Remote Communication theme could be explored, with the objective to understand, in basic terms, what the variables would be to interfere in an increasingly frequent and necessary way of our day to day interaction. Within that context, this exploratory and descriptive analysis was developed, aimed at the academic public in Brazil, composed by professors and university students, there included undergraduate, master, MSc and PhD through a set of 28 guiding questions that dealt to digital communication tools, communication barriers, individual behaviors and enterprise internal culture and proceedings. The results of our research allowed us to reach some interesting findings that qualified the Global and Remote Communication and, we hope, will be helpful for new defined studies in the future, with several and different approaches.

Keywords: Digital communication; Globalization; Smart society; Industry 4.0; Remote work

1 Introduction

Long distance electronic communication started with the ancient telegraph and never stopped. Between the accelerated globalization throughout the last 50 years and the recently mentioned trend of deglobalization, the emerged Covid-19 pandemic and conservative movements of the last 10 years, we faced an accelerated need for people to connect, regarding to both personal and professional needs; all this with the support of the Digital Era and the ICT Revolution (Jorgenson & Vu, 2016) . That was the way people found in order to maintain their personal and professional points of contact active and for companies to keep developing their business activities in a global perspective but with local performance, named Glocal by Hamish McRae in his forecast for the year of 2020, which we live (McRae, 1996).

In a natural way, the disruptive technologies emergent, telecommunications evolvement and massive use of the Internet around the world turned that task to be performed quicker than it had been in the past. A question left in this scenario regards to how much people is really adapted and if there are gaps that must be observed and implemented over time, so that this globalized and remote communication trend consolidates as a natural work tool, considered safe and necessary for any human activity and, in particular, for the business environment. The current scenario includes changes in the modern world society, called Society 5.0, which is the technology and innovation defined as “Smart Society”, in which physical space and cyberspace are strongly integrated (Salgues, 2018). It is important to remind that the technology usage is directly responsible for business and management success; otherwise, the connection between Management and Human Development indicators need to be highlighted, once they mean results that have direct impact on the whole society and its creation. The appropriation of disruptive technology and government actions are the way to achieve that the new generation become included and ready for the Digital Age (Guevara *et al.*, 2019).

In the Fourth Industrial Revolution, as called by World Economic Forum (WEF, 2019)[53], we are observing new frontiers, in which the main subject is that “what makes this revolution fundamentally different from the previous ones is the fusion of these technologies and the interaction between physical, digital and biological domains” (Schwab, 2016). The Internet and wireless communication are the decisive technologies of the Information Age, providing ubiquitous capacity of multimodal and interactive communication, transcending spaces. The use of mobile devices everywhere allows that humankind is now almost entirely connected, albeit with great levels of inequality in the bandwidth as well as in the efficiency and price of the service. The Internet and digital communication tool ensure the production, distribution, and use of digitized information in all formats (Castells, 2013). We have to learn how to use correctly and fully the capacity of the new developments, considering “that their full effects

[53] http://www3.weforum.org/docs/WEF_Top_10_Emerging_Technologies_2019_Report.pdf

won't be realized until waves of complementary innovations are developed and implemented" (Brynjolfsson, E.; Rock, D.; Syverson, C., 2017).

The Industry 4.0, term created in 2011 at the Hannover fair, show us how the smart factories will revolutionize the organization of value chains and at MIT, we could observe concerns about its application when it was mentioned: "the effect of these digital technologies will manifest itself, with full force through automation and unprecedented things" (Brynjolfsson, McAfee, 2014). We can see in the table 1 the main technologies regarding the Industry 4.0 and Digital Age, which affect Global Communication.

Table 1 Main Technologies of the 4.0 Industrial Revolution

Technologies	Features	Reference
Artificial Intelligence	Machine Learning, Advanced Algorithmics, Avatars, Chatbots and Automatic Decisions	Brynjolfsson, at. al, 2017 Kaplan, 2016
Advanced Mobility Wide World	SmartPhones, 4G/5G, QRC, NFC	Delloite, 2017[54]
Internet	WWW, http, Tcp/Ip, Browser	Witkowski, K, 2016
Internet of Things - IoT [2]	Monitoring of Digital and Physical information, Wireless Sensors, RFID, Beacons and BLE- Bluetooth Low Energy	Greengard, 2015 Kevin Ashton, 2009[55]
Big Data	Data Science, Analytics, Structured and No Structured Data	Thomas Davenport, 2014
Ubiquitous Computing	Global Access and Storage	Schwab, 2016 Castells, 2013

Source: Adapted by authors from references.

This paper then deals with the following question: "Are the academic and business communities ready to perform global and remote communications in a day-to-day manner?"

2 Theoretical References

When performing remote work, involving the most diverse communication technologies and cultures, the specter of possibilities for being creative and negotiate can be reduced. The globalization processes, rapid urbanization and advancement of technology are inexorable trends (McRae, 1996) and multinational companies seek to reproduce a hybrid culture, reflecting the international organizational culture and the local national culture (Hofstede, 1985), showing that the maintenance of a corporate culture is critical.

However, business requirements remain rigid and the need to obtain effective results is still present. We question ourselves, therefore, about how professionals guide themselves and what the attributes should be in order to well develop their job and to assure high standard deliveries, being productive and maintaining employability, even when doing their work remotely and, often, interacting with partners, suppliers and companies, from other states or countries, when it is not possible to work in person. After all, these stakeholders will form virtual teams, or "knowledge workers", spread out geographically and temporally but brought together with a single objective, in time and space, depending on the facilities offered by the information and communication technologies (Powel; Piccoli; Ives, 2004),

Looking to business environment, to hold adaptability and resilience are a must; also to develop requirements, this understood as a set of qualifications that enables a professional to solve a job or a particular situation with superior performance (Fischer et al., 2013). This performance must be anchored on the human potential, in which versatility, multifunctional and cooperation capacities gain relevance (Gramigna, 2007). These two concepts are related to our study, since nothing is more specific than working remotely and then adapting and cooperating.

In this context, when referring to the use of technology, this concept may be expanded and called digital competence, which would be a capacity for safe and critical use of information technology for work, leisure and communication (Halász; Michel, 2011). It could also be stressed that in the connected world and cybersecurity this has never been more important.

Additionally, it is necessary to consider another set of factors that interfere in the remote communication processes. To communicate means to share meanings, contents, that are meaningful for both sender and receiver as a basic principle so that communication is properly established; without sharing, there is no communication (Rani, 2016). Even in face-to-face work, however, the effectiveness

[54] https://www2.deloitte.com/br/pt/pages/manufacturing/articles/futuro-da-mobilidade.html
[55] https://www.rfidjournal.com/articles/view?4986

of communication is negatively influenced by barriers, conditions that stand in favor of the loss of effectiveness or even the absence of communication; when communication between remote working groups is observed, whether they are of the same nationality or not, such barriers are accentuated (Stocker et al, 2015). Attitudinal (due to perceptions of status and power or misunderstanding that leadership and power are the same), Behavioral (like generalization, bias, stereotypes), Cultural (where empathy imposes itself as a tool to overcome social, educational and regional differences), Language (such as not speaking a second language or even a lack of ability with the native language), Ethnocentrism (typical of those who consider their ethnic group, or nationality, socially superior to others) and Environmental (whether physical or technological) may represent barriers for communication to be established (Rani, 2016; Roman et al, 2015). Particularly when considering remote communication via the Internet, Environmental barriers gain increased expression.

Considering this approach, we chose to work on four aspects, which were succinct and briefly researched, which are:The most common technological tools for remote communication;The barriers that could influence communication processes;Behavioral factors understood as important to achieve good communication level；Internal companies' culture that allows remote work to perform good performance.

3 Methodology

This is an exploratory study that seeks to contribute to the discussion of variables important to remote communication. For this purpose, we have defined a basic questionnaire to be applied for a specific group and based on the defined segments, with the following questions, as shown in Table 2.

Table 2 Questionnaire with 5 Groups and 28 Basic Questions

Groups	Description
G1) Social Questions	Q1) Age; Q2) Education; Q3) Position
	Q4) Education Area (Exact Sciences/Humanities);
	Q5) About frequent use of remote work
	Q6) About frequent participation in global meetings
G2) Digital Tools	Q7) I usually use e-mails (WRITE) for communication
	Q8) I usually use voice conferencing (VOICE) for communication
	Q9) I usually use video conferencing (IMAGE) for communication
	Q10) I usually use instant messages (WHATSAPP, TWITTER, etc.) for communication
	Q11) I prefer personal contact and conventional telephone use (VOICE)
G3) Global and Remote Communication Barriers	Q12) I understand that language is a communication barrier
	Q13) I believe that Local Culture (state or country) is a communication barrier
	Q14) The lack of pre-defined procedures is a communication barrier
	Q15) Group meetings over 10 people are communication barriers
	Q16) I understand that lack of communication is a communication barrier
	Q17) I understand that most people are reactive when using digital tools
G4) Personal Attitudes and Behaviors	Q18) I prepare for a remote meeting (study the subject, have proposals, etc.)
	Q19) I can be objective and summarize what I need to say in a remote meeting
	Q20) I can negotiate, deal with new ideas and conflicts in remote meetings
	Q21) Considering that empathy is "the way we understand how the other person thinks and what are their motivations", I consider myself an empathic person
	Q22) Considering that knowing how to listen is "having a real interest, asking and listening to other people attentively", I consider myself a person who knows how to listen
G5) In the company or main organization with which I work	Q23) There is an established culture for remote work
	Q24) There are constant feedbacks, both as a team and individually
	Q25) Is it possible to develop complex projects through remote contacts
	Q26) It is possible to negotiate, deal with new ideas and deal with conflicts remotely
	Q27) We summarize our remote meetings and track their results
	Q28) We are committed to the commitments made at remote meetings

Studies on global and remote communication involve searching and researching potential users who use digital tools and practice remote work to stay active, even in the scenario in which we find ourselves. Therefore, we seek to approach a plural environment that could provide the most varied work profiles. With this objective, the questionnaire presented was applied to universities in the cities of São Paulo and Campinas, both in the state of São Paulo, in Brazil. We concentrated this distribution on masters, post-graduate and undergraduate courses, in this order of priority, for both teachers and students. This allowed us to work with a public that holds some important characteristics, from our point of view: different types of work, equalization between exact and humanity areas, heterogeneous functions in private and public companies as well as in the academy, besides the possibility of experiencing the remote working format.

We seek to distribute at least 1500 questionnaires, aiming at a return from 10% to 20%. At the end, 1680 questionnaires were distributed, with a return of 209 respondents, 159 of them were complete answers, which are the ones evaluated and work on the analysis of results.

Naturally, an eventual limitation of this research is the fact that it was distributed in universities in the city of São Paulo and Campinas. Its scope could be national and international or even in private companies. However, we consider the fact that the metropolitan regions of São Paulo and Campinas have more than 15 million inhabitants and holds several multinational companies' headquarters in Brazil. São Paulo is also the largest and most important financial and services center of the country, responsible for about 40% of the national GDP, with more than 20 public and private universities. On the other hand, Campinas is also a large city, with some of the most important Brazilian important universities and has been elected, by the Urban Systems in 2019[56], as "the most Connected and Smart City in Brazil". In this way, the most participants work for national and multinational companies and the academy members belonging to the researched groups also have traffic at events, congresses and transnational research groups. Thus, it was considered that the sample can be considered representative for an initial exploratory study, which focuses on a discovery that could support new studies, with other directions, in the future.
Thus, the first group of questions, Group 1, sought to qualify the respondents so that we could assess the profile that was described in the previous paragraphs. The questions in groups 2 to 5, asked for answers on the Likert scale, in which 5 means "I totally agree", 4 "I agree", 3 "No formed opinion", 2 "I disagree" and 1 "I totally disagree".

4 Results and Discussion

The qualification view of Group 1 - Social Questions, has a final view of the interviewees' profile, shown in Figure 1, considering the valid number of 159 respondents. In this profile characterization, we had the following indications, for the choice of respondents:

Age: 1) 20- years; 2) 21-30 years; 3) 31-40 years; 4) 41-50 years; 5) 51+ years

Education: 1) Graduate; 3) Post-Graduates; 5) MSc / PhD

Role / Position: 1) Liberal Professional; 2) Advisor/Technician; 3) Professor/Researcher; 4) Executive/Manager; 5) Other

Area of Expertise: 1) Exact Sciences; 2) Humanities

The frequency of remote work: 1) Never; 3) Occasionally; 5) Always

Global meetings attendance: 1) Never; 3) Occasionally; 5) Always

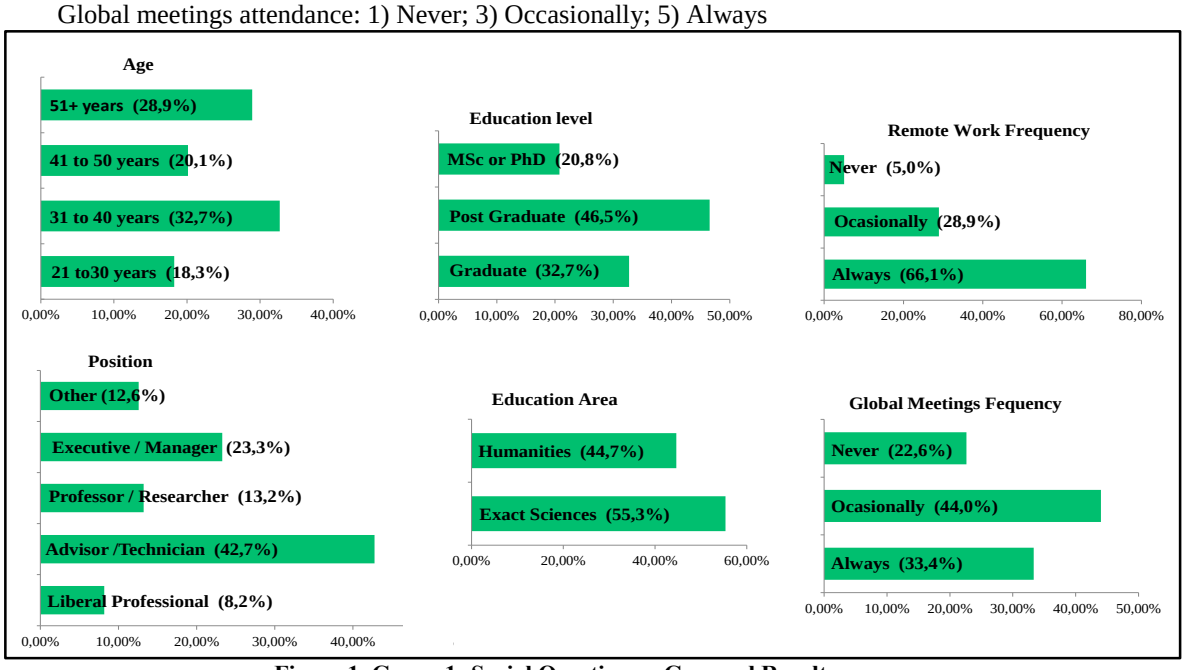

Figure 1 Group 1: Social Questions – Grouped Results.

There is no difference regarding age, education level, professionally developed functions and area of expertise. 94.97% of respondents stated the frequent, or at least occasional, usage of remote work, while 77.40% take part in global meetings, either frequently or sporadically. These numbers allow us to

[56] https://www.urbansystems.com.br/rankingconnectedsmartcities

affirm that, for the purpose of this research, we have a representative sample.
It is worth commenting on what could be considered common sense, which is the fact that older people would have problems with the use of remote work, in which we had a high level of 94.97% (frequent and sporadic use). We count 50.90% of respondents between 21 and 40 years old and 49.10% over 41 years old, without dispersion in the final value and with an equivalent number of respondents. Naturally, we have to consider that the level of education is quite high, considering the fact that university levels usually don´t exceed 50% of the population.

Regarding the functions of Executive/Manager/Researcher/Teacher, we have an amount of 36.50%, while Consultants/Technicians represent 42.70%, a similar condition. The set of Liberal Professionals/Other Occupations indicates 20.80%, approximately half of the other groups. It should also be remembered that the practice areas are balanced, with 55.40% for the exact areas and 44.60% for the humanities.

In order to evaluate the other results, we stated a classification concept which consider appropriate so that global and remote communication could occur satisfactorily. We classify as "Compliant" any and all answers with indications of 5 and 4. Indications of 1, 2 and 3 were considered as "Non-Compliant". In other words, in our study, the people considered able to make an effective communication would be those who indicated the classification equal to or higher than 4. Group questions overviews are shown in Frames 1 to 4.

In these contexts, it is important to highlight that four profile characteristics were used: age, education, function and area of expertise. For each of them, two values were indicated, one representing the answer option that had the highest "Compliance" value (5 and 4) and the other representing the lowest "Compliance" value (also 5 and 4). These two values establish a range in which all answers "Compliant" are found, giving us an idea about the convergence between the answers found. The stricter the range, the more convergent the responses obtained. Evidently, the sparser the range, the more divergent the responses are, which may allow new investigation on what are the causes for this dispersion.

Table 3 Group 2: Digital Tools – Grouped Results

Question	% General Compliance	AGE		EDUCATION LEVEL		POSITION		EDUCATION AREA	
		> % Compliance	< % Compliance	> % Compliance	< % Compliance	> % Compliance	< % Compliance	> % Compliance	< % Compliance
	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total
Q7	99,37%	21 to 50 years 100,0%	51+ years 97,83%	Graduate+Pos 100,0%	MSc or PhD 96,97%	All (- Professor) 100,0%	Professor/Res. 95,24%	Humanities 100,0%	Exact Sciences 98,86%
	158/159	113/113	45/46	126/126	32/33	139/139	20/21	71/71	87/88
Q8	85,53%	31 to 40 years 90,38%	51+ years 76,08%	MSc or PhD 87,87%	Graduate 84,62%	Executive/Man. 94,6%	Other 60,0%	Exact Sciences 90,91%	Humanities 78,87%
	136/159	47/52	35/46	29/32	44/52	35/37	12/20	80/88	56/71
Q9	96,23%	31 to 40 years 98,08%	21 to 30 years 93,10%	Post Graduate 97,30%	MSc or PhD 93,94%	Advisor/Tec 98,53%	Liberal Prof 92,31%	Humanities 98,59%	Exact Sciences 94,32%
	153/159	51/52	27/29	72/74	31/33	67/68	12/13	70/71	83/88
Q10	86,16%	41 to 50 years 93,75%	31 to 40 years 82,69%	Post Graduate 90,54%	Graduate 78,85%	Executive/Man. 94,6%	Other 75,0%	Humanities 87,32%	Exact Sciences 85,22%
	137/159	30/32	43/52	67/74	41/52	35/37	15/20	62/71	75/88
Q11	49,05%	21 to 30 years 58,62%	51+ years 43,48%	Graduate 51,92%	MSc or PhD 45,46%	Professor/Res. 66,67%	Executive/Man. 35,13%	Humanities 56,34%	Exact Sciences 43,19%
	78/159	17/29	20/46	27/52	15/33	14/21	13/37	40/71	38/88

The use of digital tools is addressed here. It is noticed that almost all respondents use both email (Q7: 99.37%) and Instant Messaging - IM applications (Q9: 96.23%). Those are tools, one very old and supplied for home and professional environments, the other one very recent, easy to use and worldwide disseminated. All of them are probably addictive for communication, without which the individual could be considered a digital illiterate. Both available on any mobile platforms, used around the world, which facilitates their use. It can be checked that the range of "Compliance" values is quite narrow, within each profile, with a maximum of 5% dispersion, both in the case of email and IM. If all profiles were considered as a single indicator, we would still have high convergence between the responses obtained, with convergence between 100% and 95% in the case of email and between 99% and 92% in the case of IM. We will make these comparisons over the remaining questions.

Regarding the use of Voice-Conferences (Q8: 85.53%) and Video-Conferences (Q10: 86.16%), high

utilization rate was declared, perhaps due to the fact that the survey was answered at the height of the epidemic COVD-19. During this period, both tools had their most widespread use and allowed instant interaction between participants. It is also noticed that executives/managers, in addition to the age group of 31 to 50 years, showed "Compliance" above 90%. The need for more advanced tools for negotiation, presentation of presentations and decision making may have influenced the increase in its application. One can remember, for example, the frank expansion in the use of applications like Zoom, all over the world. It would be interesting to see how much of that adoption will continue over the next two years, when the impact of the epidemic has dissipated.

Q11, regarding personal interaction, showed a median "Compliance" index of 49.05%. Despite the high rates of the previous questions, it can be inferred that digital tools may not cover all interactions between people. This indication suggests that a reasonable dose of humanization in contacts may be necessary and that, perhaps, it cannot be replaced, not even in the technological evolution scenario in which we find ourselves. The convergence bands between the various profiles studied are close, between 58% and 43%. The only exception is the range between Professors / Researchers (66.67%) and Executives / Managers (35.13%), in which we have more than 31 percentage points of distance, showing a very varied behavior among the respondents. In this case, one can explore the fact that the function group has several job possibilities, including self-employed professionals (8.2% of respondents), consultants / technicians (42.7%), Teachers / Researchers (13.2%), executives / managers (23.3% of respondents) and Other Occupations (12.6%). With this indication, new approaches may be developed in the future.

Table 4 Group 3: Communication Barriers – Grouped Results.

Question	% General Compliance	AGE		EDUCATION LEVEL		POSITION		EDUCATION AREA	
		> % Compliance	< % Compliance	> % Compliance	< % Compliance	> % Compliance	< % Compliance	> % Compliance	< % Compliance
	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total
Q12	84,27%	31 to 40 years 88,46%	21 to 30 years 75,86%	Post Graduate 87,84%	Graduate 78,85%	Executive/Man. 91,89%	Liberal Prof 69,23%	Exact Sciences 86,36%	Humanities 81,69%
	134/159	46/52	22/29	65/74	41/52	34/37	9/13	76/88	58/71
Q13	49,05%	31 to 40 years 53,84%	41 to 50 years 43,75%	MSc or PhD 54,54%	Post Graduate 44,60%	Professor/Res. 61,91%	Advisor/Tec 44,12%	Humanities 54,93%	Exact Sciences 44,32%
	78/159	28/52	14/32	18/33	33/74	13/21	30/68	39/71	39/88
Q14	63,52%	31 to 40 years 71,15%	41 to 50 years 53,12%	Graduate 67,30%	Post Graduate 60,81%	Professor/Res. 80,95%	Executive/Man. 59,46%	Humanities 70,42%	Exact Sciences 57,95%
	101/159	37/52	17/32	35/52	45/74	17/21	22/37	50/71	51/88
Q15	36,48%	51+ years 47,83%	31 to 40 years 30,77%	Graduate 48,07%	MSc or PhD 30,31%	Other 50,0%	Liberal Prof 23,08%	Exact Sciences 39,77%	Humanities 32,39%
	58/159	22/46	16/52	25/52	10/33	10/20	3/13	35/88	23/71
Q16	69,18%	21 to 30 years 79,31%	51+ years 65,22%	Graduate 80,77%	MSc or PhD 51,52%	Professor/Res. 85,71%	Advisor/Tec 63,23%	Exact Sciences 69,31%	Humanities 69,02%
	110/159	23/29	30/46	42/52	17/33	18/21	43/68	61/88	49/71
Q17	53,46%	31 to 40 years 65,38%	41 to 50 years 43,74%	Graduate 59,62%	MSc or PhD 36,37%	Other 65,0%	Executive/Man. 40,54%	Exact Sciences 62,50%	Humanities 42,25%
	85/159	34/52	14/32	31/52	12/33	13/20	15/37	55/88	30/71

Group 3 addresses global and remote communication barriers, which can interfere with the effectiveness and results of the work being carried out. In question 12, we had 84.27% of respondents in "Compliance", admitting that the language is a real barrier, although with a difference of 92% and 62% (30 percentage points among all profiles). It is a small surprise, since the population consulted is in the largest urban centers, in the largest Brazilian state, a source of wealth generation and with interfaces with the entire planet. Future evaluations on the existing diversity in the cities of São Paulo and Campinas fit here, since they are centers that attract Brazilians from all states and professionals from all over the world. Question 13 shows that the process of contacting other cultures and different nationalities is expanding and growing. The total compliance value is 49.05%, convergence between 62% and 44% (18 percentage points between all profiles). It can be considered promising, since it is close to 50%, with maturity in the range of 31 to 40 years (53.84%), with 10 points dispersion for the range of 41 to 50 years (43.75%).

Q14 indicates that 63.52% understand that greater procedures and rules are needed to make effective communications more effective, with high dispersion between profiles between 81% and 53%. In the Exact (57.95%), Executive / Manager (59.46%) and 41 to 50 years old (53.12%) profiles, we had the lowest rates. These values may indicate that these profiles may be easier to deal with uncertainties and, therefore, depend less on more detailed and rigid procedures to deal with different situations.

Q15 indicates that groups of more than 10 people (36.48% "Compliance") do not represent communication barriers. Despite this, dispersion is high within each profile, with ranges ranging from

17% to 27%. Only the Area of Performance profile has low dispersion, with 7% (Exact with 39.77% and Human with 32.39%).

Q16, on the other hand, indicates that the lack of commitment to remote work is a major barrier (69.18% of "Compliance"). Convergence varies between 86% and 52%, considering all profiles as if they were one (34% percentage points) and, within the profiles themselves, only the Practice Area shows total convergence (69.31% for exact and 69.02% human). This leads us to infer that the acculturation of the working groups needs extra reinforcement to obtain good results.

Finally, in Q17, in which the respondents evaluate the reactivity that other people have in the use of digital tools, the overall "Compliance" index is 53.46%, which is considered a high index, since in group 1, we have great acceptance of digital tools. We have here a convergence value within the profiles that fluctuates considerably, between 20% and 25%, wide range, which indicates different views of the respondents. Only by addressing who would be the interlocutors of these profiles could we make new comments.

Table 5 Group 4: Personal Attitudes and Behavior. Grouped Results

Question	% General Compliance	AGE		EDUCATION LEVEL		POSITION		EDUCATION AREA	
		> % Compliance	< % Compliance	> % Compliance	< % Compliance	> % Compliance	< % Compliance	> % Compliance	< % Compliance
	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total
Q18	95,60%	51+ years 100,0%	31 to 40 years 90,39%	MSc or PhD 100,0%	Post Graduate 93,24%	Liberal/Other 100,0%	Advisor/Tec 92,65%	Humanities 97,19%	Exact Sciences 94,32%
	152/159	46/46	47/52	33/33	69/74	33/33	63/68	69/71	83/88
Q19	87,42%	31 to 40 years 92,31%	21 to 30 years 82,76%	MSc or PhD 90,91%	Graduate 84,61%	Liberal Prof 100,0%	Advisor/Tec 82,36%	Humanities 90,14%	Exact Sciences 85,23%
	139/159	48/52	24/29	30/33	44/52	13/13	56/68	64/71	75/88
Q20	84,28%	51+ years 86,96%	31 to 40 years 82,69%	MSc or PhD 90,91%	Graduate 78,85%	Executive/Man. 89,19%	Other 75,0%	Exact Sciences 85,23%	Humanities 83,10%
	134/159	40/46	43/52	30/33	41/52	33/37	15/20	75/88	59/71
Q21	87,42%	41 to 50 years 90,63%	21 to 30 years 86,21%	Post Graduate 90,54%	MSc or PhD 78,79%	Professor/Res. 95,24%	Other 80,0%	Exact Sciences 88,64%	Humanities 85,91%
	139/159	29/32	25/29	67/74	26/33	20/21	16/20	78/88	61/71
Q22	96,23%	51+ years 100,0%	21 to 30 years 93,10%	Post Graduate 100,0%	MSc or PhD 90,91%	Liberal/Other 100,0%	Executive/Man. 91,89%	Exact Sciences 97,73%	Humanities 94,36%
	153/159	46/46	27/29	74/74	30/33	33/33	34/37	86/88	67/71

In the group of Personal Behaviors and Attitudes, values are very homogeneous and with high rates of "Compliance". In the five questions analyzed, we have values that vary from 84.28% (Q20) to 96.23% (Q22). Convergence, within the issues and within each profile assessed, has some variations.

In Q18, regarding preparation for meetings, we have "Compliance" of 95.60% and the variation is within 3% (Practice Area) and 10% (Age Group).

In Q19, regarding synthesis capacity, we have a "Compliance" of 87.24%, with a variation between 5% and 10%, except in the Function profile, where we find a variation of 18%. It seems natural, in this profile, that this may occur, considering the different types of professional work, already mentioned above.

In Q20, which deals with the ability to negotiate and manage conflicts, we have a "Compliance" of 84.28%, with outstanding variations between profiles, ranging from 4% (Age Group) to 14% (Function / Position). Again, the Role may require different efforts on this issue.

In Q21, on Empathy, we have 87.42% "Compliance" and variations ranging from 4% (Age Group) to 15% (Function / Position), for which the same comment as the previous question is worth.

Finally, in Q22 there is a strong convergence in the results, obtaining 96.23% of General "Compliance" and variations of 7 to 10 percentage points in the indicators of higher and lower "Compliance" in each profile.

Table 6 Group 5: In the Company or Main Work Organization.

Question	% General Compliance	AGE		EDUCATION LEVEL		POSITION		EDUCATION AREA	
		> % Compliance	< % Compliance	> % Compliance	< % Compliance	> % Compliance	< % Compliance	> % Compliance	< % Compliance
	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total	Compliance/ Total
Q23	49,05%	51+ years 54,34%	41 to 50 years 40,62%	Post Graduate 54,05%	Graduate 42,31%	Professor/Res. 57,14%	Other 25,0%	Exact Sciences 51,14%	Humanities 46,48%
	78/159	25/46	13/32	40/74	22/52	12/21	5/20	45/88	33/71
Q24	73,59%	21 to 30 years 82,75%	51+ years 65,22%	Post Graduate 78,38%	Graduate 67,30%	Executive/Man. 83,78%	Other 60,0%	Humanities 76,05%	Exact Sciences 71,59%
	117/159	24/29	30/46	58/74	35/52	31/37	12/20	54/71	63/88
Q25	57,86%	51+ years 63,05%	41 to 50 years 53,11%	Post Graduate 58,11%	MSc or PhD 57,58%	Executive/Man. 70,27%	Liberal Prof 38,46%	Exact Sciences 59,09%	Humanities 56,34%
	92/159	29/46	17/32	43/74	19/33	26/37	5/13	52/88	40/71
Q26	86,16%	21 to 30 years 93,10%	51+ years 73,91%	Post Graduate 89,19%	MSc or PhD 81,82%	Advisor/Tec 91,17%	Other 70,0%	Exact Sciences 86,36%	Humanities 85,91%
	137/159	27/29	34/46	66/74	27/33	62/68	14/20	76/88	61/71
Q27	86,16%	21 to 30 years 89,65%	31 to 40 years 84,61%	Post Graduate 91,89%	MSc or PhD 78,79%	Executive/Man. 91,89%	Professor/Res. 76,20%	Humanities 87,33%	Exact Sciences 85,23%
	137/159	26/29	44/52	68/74	26/33	34/37	16/21	62/71	75/88
Q28	68,55%	31 to 40 years 75,0%	51+ years 60,87%	Post Graduate 75,68%	MSc or PhD 60,61%	Executive/Man. 78,37%	Professor/Res. 52,38%	Humanities 70,42%	Exact Sciences 67,04%
	109/159	39/52	28/46	56/74	20/33	29/37	11/21	50/71	59/88

In this last group of questions, there is the adherence of the company or organization with which the respondents work most, in relation to global and remote work.

The Q23 assesses whether there is an established Culture for the use of this type of communication and indicates a “Conformity” of 49.05%. Convergence is high within the profiles, varying only in the Function item, in which we have a large variation of 32%, between teachers and other functions, in which there may be no uniformity. Q25, on feedbacks, is also related to Q23 and also has a lower “Compliance” of 57.86%. Also, in this item, we have convergence between profiles, except in function, with a variation of about 32% between executives / managers and professionals.

In these two cases, Q23 and Q25, high rates are not observed and both are opposed to the questions assessed in G2, on the use of digital tools, and with G4, on Personal Behaviors. It would be as if respondents rated themselves differently from their assessment of the company with which they work. One could accept the possibility of gaps within companies, which required specific work, of greater acculturation, for the use of remote work, in a global environment. On the other hand, these values demonstrate coherence in relation to the G3, in which the communication barrier is assessed, since Q13, on local culture, and Q17, on reactivity in the use of digital tools, present low “Conformities”, of 49, 05% and 53.46 %%, respectively.

Q24, on the development of complex projects via global and remote work, is surprising, since it has a general rate of 73.59%, high if we consider the previous answers. If the values for Executive / Manager (83.78%) and Age Group from 21 to 30 years (82.75%) are observed, there are high rates, above 80%, which can shift the final value up slightly, since they represent only 55 in the total of respondents.

Q26, on negotiation and conflict management (86.16% “Conformity”) and Q27, on commitment to Goals and Objectives (86.16% “Conformity”), corroborate the result of Q24, even though the convergences vary between 20% and 15% between some of the profiles covered in the two questions, respectively.

In the last question, regarding the registration and control of meetings held globally and remotely, we have an overall “Compliance” index of 68.55%, which can be considered a good value, since the control methods may not be fully disseminated and homogeneous.

5 Conclusion

There are many conclusions in our research. Firstly, it is to be noted that this study is representative and relevant, since several articles that address remote work are based, in essence, on socioeconomic aspects as its mainstream. In this research, the approach evolves with greater diversity, taking into account the respondents 'profile, the use of digital tools, the communication barriers, the respondent's individual behavior and the companies' maturity in the use of global and remote communication. As the current research has an exploratory approach, this allowed for a number of findings that will probably allow a list of new research on the proposed theme of this work to keep on contributions on the area.

Digital tools are, or a fact, a crucial component of the development and usage of global and remote communication as an effective enterprise tool. However, a chief point of reflection resides in the search for enhanced interaction between people and consequent humanization in direct contacts between them.

It remains a proposal for evaluation that technology cannot prevent people from the fundamental human relationship in daily life, which can allow greater empathy, negotiation capacity and conflict resolution. This allows us to infer that the development of the already known soft-skills is an even more important factor than has already been highlighted, and should be a focus on the growth of all professionals.

The functions and positions studied in this research showed that there is a great variation in the indicators of the tables already mentioned above. These variations may offer a new opportunity for future studies, since they demonstrate different characteristics between these positions. Studies with greater specificity may lead to new discoveries. The role of Executive Manager has high values of "Compliance" throughout the entire survey, as indicated in the comments made. This may also suggest that the use of digital tools is well accepted by these professionals and, at the same time, that, perhaps, they can no longer renounce their use, for global and remote communications. Today and in the Future.

It could also be observed that there were no significant variations between people from Humanities and Exact Sciences areas of activity, which may suggest a homogeneity in the use of communications.

There are some relationships that could be pointed out in the present study. In group 5, in Q23 and Q25, high rates are observed, but both are opposed to the questions evaluated in G2 regarding digital tools; and also with G4 on Personal Behaviors. There is a possibility that respondents use different criteria for their own personal assessment and for their assessment of the company for which they work. Gaps within companies may require specific development, of acculturation, to use remote work in a global environment. On the other hand, these values demonstrate coherence in relation to the G3, in which communication barriers are assessed, since Q13, on local culture, and Q17, on reactivity in the use of digital tools, present low "Conformities", of 49.05% and 53.46 %%, respectively.

Our contribution, with this study, highlights the close relationship between the use of digital tools, aspects of personal behavior, together with the acculturation of companies. Only with this integrated work, it will be possible to effectively execute the global and remote communication process in its fullness as may be needed everyday more needed.

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The Establishment of Knowledge Management System on Publishing Houses

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Abstract: With the accomplishment of presses' structural reform to enterprises, the establishment of a highly efficient and scientific knowledge management system, which is crucial for building core competitiveness, would be of great value for the publishing houses. Specifically, it consists of four subsystems, that is, the learning organization operating subsystem, the human resources management subsystem, the information database management subsystem, and the knowledge marketing subsystem. The four systems supplement each other and are synergistic and indispensable.
Keywords: Knowledge management; Knowledge management activity; Knowledge management system; Learning organization; Knowledge marketing

1 Introduction

In the era of the new economy, the value of knowledge has suddenly become prominent, and it has become a key element resource in the production system of enterprises in all walks of life, and presses are no exception. Nowadays, the production and operation process of China's press and publishing industry will further integrate with the market competition mechanism for the survival of the fittest. Establishing and perfecting an efficient system for knowledge collection, acquisition, utilization and innovation, that is, a knowledge management system, will surely become the main line for building the core competitiveness of presses.

The theoretical research and practice of knowledge management began in the 1980s. It has become one of the most popular management reform and research topics in the field of management. It will become the most important guiding ideology of all kinds of organizations in the operation and management activities in the era of knowledge economy in the 21st century.

Knowledge is a broad concept that collectively indicates intellectual ability and ideas including technologies and information. Knowledge management activities play an integral role in institutionalizing the vibrant creation and sharing of knowledge within organizations (Choe & Choi,2015; Weinreich &Groher,2016; Wu,2016). They are part of a corporate's organizational process that promotes the maximization of value creation (innovation performance) by integrating data and information-processing abilities using information technology with human creativity and innovative abilities.

A knowledge management system is an information management system that systematizes and shares the organizational and unit knowledge accumulated by human resources within an organization to enhance its performance. The core value of a knowledge management is that it centrally manages knowledge scattered throughout many departments within an organization and establishes a smooth work cooperation system to enhance the knowledge management and sharing capacity (Hyun-Ju Choi, 2020). The knowledge management helps to easily locate the desired data and information. In addition, it can increase innovation performance by developing new knowledge through effective learning.

The so-called knowledge management of presses refers to the intensified management of relevant knowledge and its production, coordination and value-added processes in the production operation of the press, in order to further improve the efficiency of knowledge capitalization and productization, and promote the sharing and dissemination of high-quality knowledge products, while achieving its own development and growth (Liu Xueming, 2001). Press is a knowledge-intensive organization. Its production and operation model is a process of collecting information, processing information, storing information (in the form of paper or electronic media), and disseminating information to society through distribution to realize the value-added knowledge and protect its own interests. The knowledge management system contributes to improve the decision-making ability of the enterprises, enhance organizational memory, shorten the management processes, increase the employee's work efficiency, achieve the competitive advantages and exert a tremendous influence to enterprise development (Zhang Pu, 2016). It can be seen that this basic attribute is highly consistent with the concept of knowledge management, which also determines the feasibility and necessity of the introduction of knowledge management by presses.

At present, academia and publishing circles have basically reached a consensus on the press's transformation of management mode and strengthening of management under the new situation. Some scholars have also put forward targeted countermeasures and suggestions for presses and journals to strengthen knowledge management (Xu Qinghua, 2018). However, the author believes that due to the

different professional knowledge of personnel in various departments such as editing, proofreading, publishing, printing, warehousing, and finance in publishing and production, and the various processes are very closely related, so the knowledge management of presses can not only stay in the indoctrination of a single concept or the implementation of a single strategy, but also from the perspective of the overall strategy. Only by strengthening the knowledge coordination of all links in the production chain and building a knowledge management system can we promote a qualitative leap in the management mechanism of presses. The system should include four parts, namely, learning organization operation system, human resources scientific management system, knowledge information database management system, and knowledge marketing system.

2 The Main Content of Knowledge Management System of Presses

2.1 Learning organization operation system

The theory of learning organization was first proposed in 1990 by Peter M Sange, a professor at the Massachusetts Institute of Technology, in the book *The Fifth Discipline: The Art and Practice of Learning Organization*. He pointed out that a learning organization is an organic, flat, humane and sustainable development organization that is established by cultivating a learning atmosphere that pervades the entire organization and gives full play to employees' creative thinking ability. It includes five signs, namely personal proficiency, mental model, shared vision, team learning and systematic thinking (Peter M Senge, 1990).

Specific to presses, the key to building a learning organization operation system is to establish and improve a team learning mechanism based on a common vision, which mainly includes press internal knowledge sharing mechanisms and external communication mechanisms.

The internal knowledge sharing mechanism of the press is mainly to strengthen the exchange, dissemination and sharing of knowledge, information and resources within the organization so that it can be fully utilized and optimized. It can be divided into vertical knowledge transfer mechanism and horizontal communication mechanism. The former is mainly for tacit knowledge, and it is a learning mode that the veteran teaches the novice personally. Tacit knowledge here refers to unstructured knowledge that is intuitive and not easy to express, such as lessons learned from practice, business tips, creative problem-solving ability, and the feelings and talents used to make decisions (Li Rong,2008). The horizontal communication mechanism includes not only the sharing of experience between employees in the same business department, such as brainstorming and private conversation, but also the information feedback between different departments, such as press-correctors feedback to editors on the quality of manuscripts and work suggestions, publisher feedback to commissioning editor on market information, responsible editors provide targeted publicity materials to publisher and electronic department staffs, etc. This is easier to achieve under the project team structure system, which can effectively avoid the inefficiency and waste caused by information asymmetry in the production process. The closer the employees communicate with each other, the deeper the knowledge fusion and the stronger the publishing innovation ability.

Of course, as a socio-economic cell, presses cannot operate in isolation from the external environment. Therefore, it is necessary to establish an effective external communication mechanism to build the learning organization operation system of the press, including the learning interaction with related organizations or individuals such as brother press, periodical agency, library, private publishing company, author group, target consumer group, typesetting point, printing house, etc.

2.2 Human resources scientific management system

The core link of publishing is content acquisition and editing. Therefore, to a certain extent, the competition between publishing companies is ultimately the competition of talents and information. Under the institution system, many presses have the problems of strong randomness in management, either there are no rules to follow, or there are rules not to follow, resulting in low efficiency in the use of human resources, unreasonable structure and layout, frustrated enthusiasm of employees and other disadvantages. Therefore, in order to adapt to the requirements of market competition, in the context of the new era, presses to implement scientific human resources scientific management is an inevitable choice.

Firstly, we need to change the unreasonable distribution system of salary according to seniority and different pay for the same work. We should change the shortcomings of cadre management, personnel management and identity management, and establish a system of distribution of interests based on ability and performance, fair and reasonable, and encouraging knowledge innovation.

Secondly, an effective incentive mechanism should be established. A study by Harvard University professor William James found that the on-time pay distribution system only allows employees to exert 20% to 30% of their abilities, but if fully motivated, this proportion will reach 80% to 90%.Especially

for young editors and publishers, we should encourage innovation, allow failure, give them greater autonomy, enable them to play their subjective initiative and creativity, and constantly improve themselves through learning by doing.

Thirdly, establish the mechanism of competitive employment. Adhere to the principle of "capable of being superior", implement contractual management of personnel, and give full play to the role of the market competition mechanism of survival of the fittest in the allocation of human resources.

2.3 Knowledge information database management system

The knowledge information database should sort out the information of press itself, such as organizational structure, business performance, financial status, production process, and publication and distribution information. It is also necessary to collect and pay attention to national and regional news, publishing policies, regulations, publishing market conditions, and publishing dynamics of similar publishers, and more attention should be paid to the control of external resource information, that is, author and book seller information.

Generally speaking, knowledge information database management system includes intranet, document management system, workflow system, data warehouse, information search engine, and other data mining tools, which can be established by purchasing professional software (such as Keditong System).

An excellent knowledge information database management system focuses on the archiving processing and intelligent service of knowledge and information, which can be further divided into the archiving of explicit knowledge and the archiving of tacit knowledge. The former is to accumulate, organize and archive the encoded and solidified knowledge such as publications, workflows and databases, and strengthen the development and utilization of archive knowledge and intelligent services. In contrast, the latter has more links to make tacit knowledge explicit. At present, foreign presses attach great importance to the use of coding strategies to strip tacit knowledge, making it independent of specific individuals or organizations, and extracting it in a database for sharing by the entire organization, which is also one of the directions of future knowledge management development. Domestic presses should learn from this experience. The knowledge information resources that stay in the minds of employees should be solidified in the form of archives and incorporated into the knowledge information database to prevent their loss due to personnel changes.

2.4 Knowledge marketing system

To build a healthy knowledge marketing system, the following three aspects should be done:

First of all, establish the brand concept and create a high-quality image. The brand building of the press is a systematic project. It is a comprehensive complex of book brands, author brands, editor brands, etc., and the quality of books occupies a central position. Presses should strictly control the publishing process to ensure the quality of the book. Authoritative experts can be invited to interpret and comment on high-quality and featured publications to expand their influence.

Secondly, strengthen planning and actively explore the network marketing model. With the continuous penetration of network economy into traditional economy, network marketing has become an important part of the overall marketing strategy of press. However, at present, there are many problems in domestic presses, such as lack of attention to network marketing, weak sense of competition, and lack of relevant talents. Therefore, it is more necessary to change the concept and strengthen the construction of network marketing force. In this process, the key is to strengthen planning and incorporate online marketing into the overall marketing strategy framework of the press. Make it closely cooperate with the traditional marketing mode such as book exhibitions and seminars and play the effect in coordination. We should actively explore the new e-commerce mode of cooperation with Dangdang, Zhuoyue and other B2C websites, and strengthen the construction of publishers' own websites, including enhancing the content attraction and information feedback ability of websites.

Thirdly, strengthen customer relationship management and increase customer loyalty. One is to pay attention to communication and maintenance with customers, organize editors and issuers to visit colleges and universities regularly, conduct in-depth and comprehensive topic selection planning and marketing promotion, and do follow-up tracking services. The second is to change the extensive marketing and service mode, and provide targeted personalized services based on the positioning and needs of customers such as libraries, bookstores, and college textbook departments. The individual needs of customers are the starting point of modern marketing. A comprehensive market survey should be carried out to collect multiple aspects of information and form a decision intersection, find the best fit of publication use value and customer needs, and organize targeted marketing and promotion activities (Yang Jun, 2018).

3 Conclusion

The above four systems are complementary and inseparable, and they are all an integral part of the knowledge management system of presses. The learning organization operation system provides a good environment for the human resource management system, knowledge information database management system and knowledge marketing system. Its knowledge sharing mechanism and communication mechanism are helpful for finding problems and improving in time. The human resources scientific management system provides talent guarantee for the establishment and improvement of the knowledge information database management system and knowledge marketing system. In turn, the good results achieved by information database management and knowledge marketing will further stimulate the subjective initiative of knowledge talents and promote the full realization of human resources value.

In addition, it should also be noted that the four systems operate inter-embedded. They have a wide range of functions and no clear boundaries. For example, the chief editor's office may not only be responsible for the human resources scientific management of presses, but also play a key role in the construction of learning organizations. The electronic department is not only responsible for the construction and maintenance of the knowledge information database management system of the press, but also the main force of network marketing. Therefore, the knowledge management system of presses should not pursue a unified model but should be formulated according to the situation of the press and implemented as a guiding strategy.

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Evaluating the Information and Communication Technologies Used in Education in Sierra Leone During COVID-19

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Abstract: ICTs have been deployed in most developing countries in this COVID-19 pandemic to facilitate learning and improve the quality of education. Sierra Leone (S.L.), a West African nation plagued by a decade of civil war and the deadly Ebola virus, was gradually rejuvenating when hit again by this COVID-19 pandemic. Many sectors are affected, including education. As with almost all nations of the world, S.L. resorted to online teaching. The literature states that ICT is a necessity and can complement, enrich, and transform education for the better. This paper evaluates the effectiveness of the available technologies used during the pandemic in the delivery of education in S.L.
Keywords: Education; Information; Online teaching; ICT; Teaching and Learning; COVID-19

1 Introduction

ICT or information and communication technology (or technologies) is the infrastructure and components that enable modern computing. ICT is generally recognized to mean all devices, networking components, applications, and systems that combined and allow people and organizations (i.e., businesses, nonprofit agencies) to interact in the digital world (Rouse, 2019). In an increasingly connected world where more and more can be accomplished through the Internet, one of the latest educational trends is online or distance learning. Online education is gaining ground and may even become the prevalent form of learning someday (Acer for Education Newsletter, 2019). The benefits are undeniable: reduced costs, great flexibility for the student, and the ability to train thousands of people all over the globe at the same time. In addition, you can monitor what students are doing at any given moment, and it breaks with the inertia and passivity of classroom courses (Gamelearn Team, 2020).

With the reality of COVID-19, nations, as well as governments all over the world, are introducing online teaching methods to meet the challenge. Sierra Leone (S.L.) is still grappling in the educational sector as with many other areas. To continue the delivery of education and information services, S.L. has joined the world in using ICTs for development in the educational sphere. Educational institutions in the country are making use of online applications to provide educational services. This paper seeks to evaluate the technologies used during this period. The motivation for this study, is to have a reference point where the Government of S.L. will draw up sound policies for the implementation of ICTs in education.

COVID-19 **:** The symptoms include cough, fever, and shortness of breath. The virus spreads person-to-person in closing proximity or from contact with contaminated surfaces. The coronavirus outbreak was declared by the World Health Organization (WHO) as a pandemic, and the name COVID-19 was given to the disease. The COVID-19 is related to other coronaviruses such as SARS and MERS but is not the same virus. Infection by COVID-19 is rarely fatal, according to the WHO. Vulnerable people

who are likely to be severely ill with the virus are the aged and pre-existing patients with a medical condition (such as diabetes and heart disease) (The Bulletin of the Atomic Scientists, 2020).

The ensuring state of this pandemic is that the world has come to a stand-still, normalcy has been interrupted. Whereas countries are at different points in their COVID-19 infection rates, universally, there were actively over 1.2 billion pupils in 186 countries affected by the closure of school due to the pandemic. In Denmark, nurseries and schools are resuming for children up to the age of 11 after initially closing on 12 March 2020, but in South Korea, students are responding to roll calls from their teachers online (World Economic Forum, 2020). Nonetheless, with this sudden shift away from the classroom to online learning in many parts of the globe, it is my concern of how such a shift would impact the education system in S.L. with the new technologies.

Research goal:This paper seeks to evaluate the technologies in use and their effectiveness in delivering education and information services in S.L. during the COVID-19 pandemic. In particular, the study seeks: (1) to be able to determine the knowledge of ICTs in the educational sector; (2) the kinds of technologies available for teaching and learning; (3) the use of these technologies in delivering online education; and (4) what are some of the benefits and challenges, and possible solutions to the use of these technologies

Sierra Leone, at a glance:S.L. is a small West African country. It has a tropical climate of two distinct seasons (dry and rainy). S.L. has a diverse environment ranging from savanna to rain forests. Also, it has some of the best beaches in the world and is rich in natural resources (like iron, bauxite, gold, diamonds, etc.). S.L. is a constitutional democracy with an elected president. Today, S.L. is still ranked as one of the poorest nations on earth with the worst life expectancy in the world as a result of the war raged from 1991 until 2002 (51.3 average age expectancy) (UNDP Human Development Reports, 2016). However, since the civil war ended formally in 2002, S.L. had started rebuilding, and the economy has shown a steady growth ever since. But this growth was struck again by the deadly Ebola disease. In Guinea West-Africa, the largest and most complex Ebola broke out in March 2014 since it was discovered in 1976. In May 2014, it was spread to Sierra Leone (Schooling for life, 2020). As if this was not enough, the COVID-19 has also brought a significant blow not only on the economy but the educational sector of the country. The nation responded by introducing online teaching. Nevertheless, owing to an already fragile educational system, how worthwhile will be the introduction of technologies for learning in S.L.?

2 Literature Review

Education can become transformative when teachers and students blend information across subjects and experiences, critically weigh significantly different perspectives, and incorporate various inquiries. Educators are able to construct such possibilities by fostering critical learning spaces, in which students are encouraged to increase their capacities of analysis, imagination, critical synthesis, creative expression, self-awareness, and intentionality. A byproduct of fostering such new approaches has been the creation of online courses developed in the United States and worldwide at exponential speed (Sun and Chen, 2016). UNESCO (2020) had noted that ICT could complement, enrich, and transform education for the better. The integration of ICT and Education has been considered the main key to human progress. In S.L. all the major tertiary institutions, such as the university and polytechnics, have computer centres for training students and giving concessionary Internet access to staff and students. The University of Sierra Leone has a computer centre that provides teaching in basic computer skills to all staff and students. The

centre also offers Internet and electronic library services. At the school level, there is very little infrastructure in terms of computers and the Internet. The competing education needs means that very little has yet been done in the area of equipping schools with computers and efforts in this area are mainly through the support of NGOs (Mangesi, 2007).

The advent of online education has made it possible for students with busy lives and limited flexibility to obtain a quality education. As opposed to traditional classroom teaching, Web-based instruction has made it possible to offer classes worldwide through a single Internet connection. Although it boasts several advantages over traditional education, online instruction still has its drawbacks, including limited communal synergies. Still, online education seems to be the path many students are taking to secure a degree (Paul and Jefferson, 2019). Again, Sun and Chen (2016) noted that it is becoming increasingly common at many higher education institutions, offering fully online and/or hybrid/blended courses combining online instruction with face-to-face teaching. Zhang and Worthington (2017) reported an increasing cost benefit for the use of distance education over face-to-face instruction as seen at 37 Australian public universities over 9 years from 2003 to 2012. Maloney et al. (2015) found significant savings in higher education when using online learning platforms versus face-to-face learning. In the West, the cost efficiency of online learning has been demonstrated by several research studies (Craig, 2015). The study by Agasisti and Johnes (2015) discovered that the cost benfits of online learning is significantly greater than that of face-to-face learning at U.S. institutions. In this vein, Picciano (2017) proposed an integrated model that described the phenomenon of pedagogically driven online education. Key to this model is the assumption that online education has evolved as a subset of learning in general rather than a subset of distance learning. As blended learning, which combines face-to-face and online instruction, evolves into the dominant form of instruction throughout all levels of education, it serves as the basis for an integrated model. It is likely that, in the not-too-distant future, all courses and programs will have some online learning components, as suggested in this integrated model.

3 Methodology

The study was carried out in S.L., targeting Tertiary Institutions (T.I.) operating in the Western Area District (WAD). The WAD is selected for the research because Freetown, the capital and biggest city of the country, and one-third of all the TI are located there. Also, the government is seated in Freetown, in the WAD, with an estimated population of 800,000 residents and is the business center of the country. However, 63 respondents from 5 T.I. (those with the highest responses) were considered for this research. An open-ended online questionnaire (using surveyplanet.com) was the research instrument used for data collection. A questionnaire is an instrument used in research consisting of a series of questions (or other types of prompts) for the purpose of gathering information from respondents. Many research projects call for qualitative or quantitative research methods. There are advantages of using a questionnaire in either method. A questionnaire is used to collect data that is used to validate the hypothesis of the research project.

Furthermore, it is cost-effective, it reduces bias, it shows more anonymity and it helps to pick up rare phenomenon (Rainwater, 2020). In order to be able to ascertain the objectives of the research, the information from the questionnaires was analyzed, and a conceptual framework of the study is provided in Figure 1.

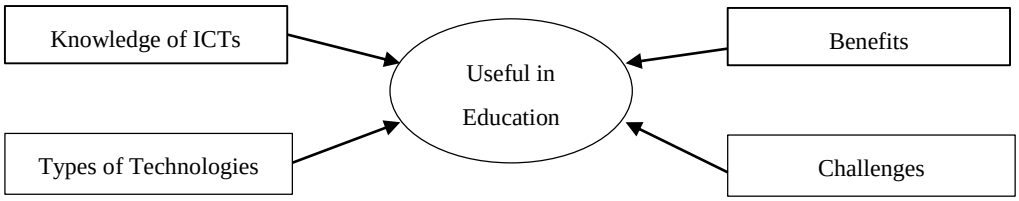

Figure 1 Conceptual Framework of the Study

The table below shows the T.I. that responded to the questionnaires; the number of respondents for each institution, and the percentage are self-explained in the table.

Table 1 Number of Respondents

Institution	Number of respondents	Percentage
FBC	27	42.85
IPAM	11	17.46
COMAHS	9	14.29
UNIMTECH	10	15.87
MMCET	6	9.52
Total	63	100

Source https://app.surveyplanet.com/results/5ed8c28c3d27693c7ebfd9b6

3.1 Analysis of questionnaire results

Out of the 100 questionnaires administered to the respondents, a total of 63 usable questionnaires were filled in which translated to 63% response rate. We commence the analysis by testing for multicollinearity using the Correlation Matrix, where the determinant among the set of independent variables should not be greater than 0.7 (Field, 2000). Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy was used to find out whether data collected in the Likert scale was appropriate for factor analysis. KMO statistic is a measure of sampling adequacy both overall and for each variable (Field, 2000). High values of between 0.5 and 1.0 indicated that factor analysis was appropriate (Muganda, 2008). To evaluate the proposed model that the variables are not correlated in the population, Bartlett's test of Sphericity was used. Significant Bartlett's Test of Sphericity means that factor analysis is appropriate as a method of data reduction.

We made use of SPSS to run the data and the main analysis was done via correlation and regression analysis after computing for each variable of the study.

Table 2 Reliability and Sample Adequacy Results

Construct	No. of items	Alpha	KMO
Useful in Education	3	0.759	0.789
Knowledge of ICTs	3	0.758	
Types of Technologies	4	0.866	

As indicated in table 2, Reliability test for final study Cronbach's alpha coefficient were all above 0.7 for all the variables. This indicates that the questions that were in Likert scale were testing what they were expected to test. The Mayer-Olkin (KMO) results 0.789 also show data adequacy, which means the data set was adequate for analysis. Consequently, the results from the questions were used for further analysis in the study.

3.2 Descriptive statistics

Means, standard deviations, and correlations, as summary statistics of all variables are presented in table 3.

Table 3 Descriptive Statistics, Correlations

Variable	Mean	SD	1	2	3	4	5	6
1UE	3.64	0.84	1.00					
2KICT	3.27	0.53	0.314**	1.00				
3TT	3.55	0.71	0.257*	-0.053	1.00			
4Gender	3.17	0.63	0.068	0.033	-0.103	1.00		
5Age	32.73	4.62	0.075	-0.118*	0.022	-0.400**	1.00	
6Education	1.86	0.34	0.160*	0.062	-0.102	0.378**	-0.287**	1.00

Note N= 63, UE = Useful in Education, KICT = Knowledge of ICTs, TT = Types of Technologies. Notes: ** and * indicate significance at the 1%, and 5% respectively.

The result shows a significant positive relationship (r = 0.314, p<.01) between Knowledge in ICTs and its Usefulness in Education as well as between Types of Technologies and its Usefulness in Education (r = 0.257, p<.05). So, there is a higher magnitude of positive correlation among these sets of variable.

However, the correlation relationship between the set of control variables and ICT Usefulness in Education were found to be statistically insignificant except for respondents' education that was found to be positive and statistically significant (r = 0.160, p<.05). The results of the correlation coefficients among the sets of independent variables were all below 0.7 which shows the absence of multicollinearity in the model.

3.3 Testing of the proposed model

We conducted multiple linear regressions using SPSS software to test our proposed model. The results in table 4 present the effects of the control variables (gender, age and education) and the independent variables (knowledge in ICTs and types of technologies) on the dependent variable (ICT usefulness in education). As stated, our study also tested the impact of control variable on ICT usefulness in education and found positive and significant effects of respondents' level of education (β = 0.329, p < 0.01), while age and gender showed insignificant effects.

Table 4 Regression Results

Variables	ICT usefulness in Education				
	B	S.E	β	t	Prob.(Sig.)
(constant)	0.837	0.289		2.899	.007***
Age	-0.124	0.093	-0.317	-1.330	.241 ns
Education	0.329	0.069	0.354	4.761	.000***
Gender	0.144	0.216	0.088	.664	.507ns
Knowledge in ICTs	0.246	0.056	0.233	4.391	.000***
Types of Technologies	0.286	0.074	0.248	3.882	.000***
F			246.511		.000***
R^2			0.456		
Adjusted R^2			0.372		

Note: Entries are unstandardized coefficients (B), standardized coefficients (β), and standard errors (S.E.), ** p < 0.05, *** p < 0.01, ns = non-significant

The results presented in table 4 further reveal that knowledge in ICTs is statistically significant and positively associated with its usefulness in education (β = 0.246 p < 0.01), which means if knowledge in ICTs improves by 1 percent, its usefulness in education will increase by 0.246.

Similarly, the results also reveal that the types of technologies are statistically significant and positively associated with its usefulness in education (β = 0.286 p < 0.01), which means if the different types of technologies improves by 1 percent; their usefulness in education will increase by 0.246.

In order to complement the results from the quantitative findings, the respondents were asked to give their level of knowledge of ICTs with the following indicators: none, fair, satisfactory, good, and very good.

Table 5 Knowledge of ICTs

Choices	Number of respondents	Percentage
None	9	14.3
Fair	13	20.6
Satisfactory	18	28.6
Good	18	28.6
Very Good	5	7.9
Total	63	100

Source https://app.surveyplanet.com/results/5ed8c28c3d27693c7ebfd9b6

The study reveals that 14.3% of the respondents have no knowledge of ICTs. 20.6% have fair knowledge; 28.6 have satisfactory knowledge; whereas another 28.6% have a good knowledge of ICTs. Only 7.9% have a very good knowledge of ICTs. Taking the good and very good choices (as the highest in ranking) into consideration, we can state that out of 63 respondents, representing 5 T.I. in S.L., only 36.5% (28.6% + 7.9%) have adequate knowledge of ICTs. This follows that education and training are paramount requirements for the use of ICTs in S.L.

Respondents were asked to choose from a list of ICT devices (Television, radio, mobile phone, desktop computer, and laptop computer), which one is used regularly for educational purposes.

Table 6 ICT Usage on a Regular Basis

ICT Device	Number of regular usages	Percentage
Television	0	0
Radio	0	0
Mobile phones	42	66.7
Desktop computer	5	7.9
Laptop computer	16	25.4
Total	63	100

Source https://app.surveyplanet.com/results/5ed8c28c3d27693c7ebfd9b6

It was also discovered that mobile phones (66.7%) were the most used ICT device in S.L. for educational purposes. This was followed by laptop (25.4%) and desktop computers (7.9%), respectively, on usage. However, radio and television were not used regularly for educational purposes.

Respondents were asked about the effectiveness of these technologies to them in teaching and learning with the indicators of poor, fair, satisfactory, good, and very good.

Table 7 Effectiveness of ICTs on Education

Choices	Number of respondents	Percentage
Poor	2	3.2
Fair	7	11.1
Satisfactory	17	27
Good	18	28.6
Very Good	19	30.2
Total	63	100

Source https://app.surveyplanet.com/results/5ed8c28c3d27693c7ebfd9b6

As shown in table 7, 3.2% of respondents indicated that these technologies were poor in teaching and learning; 11.1% fair; 27% satisfactory; 28.6% good; and 30.2% indicated very good. This shows that the available technologies used in education were effective to some extent for teaching and learning during the COVID-19.

The major advantages of using these technologies were: Up-to-date information, easy access, and convenience; a fast way of getting information; research purposes; increase knowledge and capacity; and online lectures. In fact, respondents indicated in another question that the major uses of these technologies were for online teaching, research, and course notes. The survey also shows that 'all things being equal' 55.6% of respondents were convenient with the online teaching using their available technologies. Apart, 82.5% of respondents were certain that online teaching using mainly mobile phones, desktop, and laptop computers will advance their careers.

Respondents indicated that the main challenges of using the technologies were: poor electricity, poor network; poor services from telecommunication vendors; the cost of data; and the problem of ready access to the internet.

The solutions to these challenges were as follows: a proper telecommunication infrastructure, a readily available electricity supply; training and education in the use of ICTs; improve the network system; and the reduction of the internet cost.

4 Conclusion and Recommendations

It is still confounding to state that in this 21st century Information Society that the knowledge of ICTs in 5 T.I. in S.L. yet falls below 50%. The study shows that about 36.5% of respondents have adequate knowledge of ICTs. The study further shows that mobile phones, followed by laptop and desktop computers respectively, were mostly used regularly for educational purposes during the COVID-19 in S.L. Furthermore, these technologies proved to be very effective for teaching and learning. Up-to-date information, easy access, and convenience; a fast way of getting information; research purposes; increase knowledge and capacity; and online lectures, were the advantages of using these technologies in education.

Notwithstanding, respondents enumerated challenges in using these available technologies to be – poor electricity, poor network; poor services from telecommunication vendors; the cost of data; and the problem of ready access to the internet. They, however, provided the following recommendations to overcoming these challenges – a proper telecommunication infrastructure, a readily available electricity supply; training and education in the use of ICTs; improve the network system; and the reduction of the internet cost.

We have looked at the technologies that were useful for teaching and learning in 5 T.I. in the WAD of S.L. during the COVID-19 pandemic. In the future, a comprehensive study should be undertaken to determine the penetration of ICTs in all T.I. in the country. Furthermore, a survey to update the current state of online education in the country would be worthwhile.

Acknowledgment

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Evolutionary Analysis of the "Combination of Sports and Education" Mode of High-level Sports Teams in Chinese Universities Based on System Dynamics Model

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Abstract: "Combination of Sports and Education" is an important measure for China to integrate education and sports resources and implement talent development strategies. This article uses the principles and methods of system dynamics and the interview data of the Wuhan University of Technology basketball team to clarify the system boundary of the "Combination of Sports and Education" mode. And establish the system dynamics model of the "Combination of Sports and Education" talent cultivation mode by analyzing the causality between the various factors of the system. Through simulation analysis results, it is concluded that "Combination of Sports and Education" is a scientific and effective training mode, and is suitable for the current status of talent training of high-level sports teams in Chinese universities.

Keywords: Combination of Sports and Education; System dynamics; Simulation; Talent development

1 Introduction

On May 19, 2020, the Memorandum of Understanding for Promoting the Integration and Development of Sports and Education was jointly signed by the Chinese Basketball Association, the Chinese University Sports Association, and the Chinese Middle School Sports Association at Peking University. This marks a breakthrough in China's "Combination of Sports and Education" model for training high-quality competitive sports talents. Since the original State Sports Commission issued the "Notice on the Trial Recruitment of High-Level Sports in Higher Education" in 1987, "Combination of Sports and Education" has been an important measure for China to integrate education and sports resources and implement a talent training strategy. In more than 30 years of exploration and practice, "Combination of Sports and Education" has determined the operation mode with colleges and universities as the main body and talent training as the core, and has achieved remarkable results in education. Through the "Combination of Sports and Education", the comprehensive quality of athletes has been improved, and practical problems such as lack of cultural level and difficulty in retiring from transition have been solved. However, in the development process of "Combination of Sports and Education", the expected talent blowout did not appear. The core members of my country's competitive sports are still mainly professional athletes. At the same time, the talent training model of "Combination of Sports and Education" has encountered new difficulties such as shortage of training funds, lack of professional coaches, loss of high-level athletes, outstanding contradictions in learning and training, and a decline in competitive levels. (Zhang Tianfeng, Li Guo, 2016) Therefore, to find the cause and eliminate the predicament to promote the sustainable development of "Combination of Sports and Education" has become the focus of sports workers and management scholars. This is also the motivation and focus of this article.

Carvalho pointed out that the success of athletes is the result of the interaction of various factors. (Carvalho, 2018) Liao Lubin et al used AHP to find that the factors that affect the cultivation of reserve talents for competitive sports are: training model, training goals, guarantee mechanism, human resources,

and social environment. (Liao Lubin et al, 2016) Song Tao believes that the diversity of training goals under the "Combination of Sports and Education" model gives athletes more choices in the future, thereby increasing the possibility of high-level athletes losing. (Song Tao, 2017) There is no clear athlete-training fund in the funding of college education funded by the financial; at the same time, the coaches of high-level sports teams in colleges and universities also have teacher attributes, the pressure of teacher assessment and job title evaluation greatly reduces the magnetism and stickiness of professional coach recruitment. (Liu Wei, Pan Kunfeng, 2018)

Yang Yiwu found through literature review that with the development of the times, the contradiction between learning and training in the training of high-level sports players has become increasingly prominent. (Yang Yiwu, 2015) Knight believes that the reason is that high-level sports players have the dual identity of students and athletes, which makes them pursue academic and athletic performance (Knight, 2018) Many Western countries have adopted the "sports-education integration" model very early, and they have played a good role in demonstrating the balance between athletes' academic level and competitive level. Issurin pointed out in his research that excellent athletes are characterized by strong learning ability and athletic ability. (Issurin, 2017) Rees et al· found through literature review that some excellent athletes in European countries have very good academic achievement. (Rees et al, 2016) Bolen et al based on the NCAA basketball league, used data envelopment methods to introduce indicators such as training funding, coaching ability, and experience to build a comprehensive evaluation system that measures the team's competitive level and academic ability· Some college basketball teams have scored very well on the "sports balance". (Bolen et al, 2018) Although China adopted the "sports-education integration" model 30 years ago, the contradiction between learning and training is still complicated under this training model. Zhang Chunhe et al. used the structural equation model to explore the relationship between training results and influencing factors, and suggested that high-level sports teams reasonably allocate training and learning time to improve the current situation of poor training effectiveness in the "sports-teaching fusion" mode. (Zhang Chunhe et al, 2015) Zhang Li and Yang Bo put forward that from the point of view of system theory, Chinese high-level sports teams should strengthen communication with the outside world, share information and resources to enhance the level of competition and expand academic horizons. (Zhang Li, Yang Bo, 2017)

Based on the above literature analysis, this study will use the theory and methods of system dynamics to clarify the external environment and internal factors that affect the development of the "Combination of Sports and Education" model, and analyze the causal relationship between the external environment and internal factors. At the same time, establish a multi-level and multi-dimensional simulation model, and the actual data under the "Combination of Sports and Education" mode of the Wuhan University of Technology basketball team are used for simulation analysis to explore the influence of parameter changes of different elements on the effect of education. To provide the "Combination of Sports and Education" mode for Chinese universities sustainable development provides theoretical basis and policy recommendations.

2 Model

System dynamics is an applied discipline that studies the dynamic behavior of system evolution. (Torres, 2019) It is mainly based on system science theory and computer simulation technology. The realization path is to analyze system structure, clarify system elements, build mutual relationships, and draw causality diagrams and data flow diagrams and establish system dynamics equations. The

characteristics of connection and feedback contained in system dynamics are suitable for the analysis of the evolutionary system of "Combination of Sports and Education" studied in this article, so system dynamics is chosen as the main research method of this article.

2.1 System boundary analysis

The "Combination of Sports and Education" evolution system involves multiple subjects, from the education management department and sports management department responsible for top-level design and policy formulation, to higher education institutions and sports associations that play the role of carrier and promotion, and finally to specific implementation and practical High-level athletes for business. (Marttinen R H J et al., 2016) This study cuts in from different participation dimensions and constructs three subsystems of the "Combination of Sports and Education" evolution system: the top-level design subsystem, the middle-level propulsion subsystem, and the bottom execution subsystem. The system boundary of the "Combination of Sports and Education" evolution system is shown in figure 1 shown.

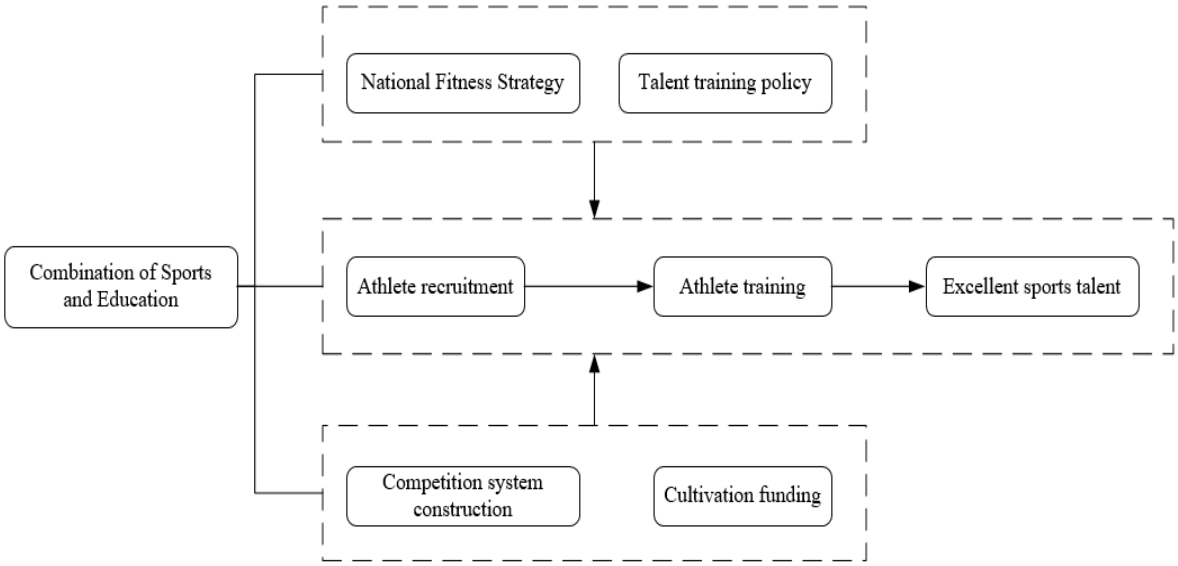

Figure 1 System Boundary of "Combination of Sports and Education" Mode

2.2 Subsystem analysis

According to the system boundary diagram, the "Combination of Sports and Education" evolution system can be divided into three sub-modules: top-level design sub-module, middle-level push sub-module, and bottom-level execution sub-module.

(1) Top-level design submodule. The top-level design of this study is mainly completed by the education management department and the sports management department. The strategy implementation and policy promulgation of the two departments will increase social attention, thus affecting the allocation of enrollment indicators and education funds. This sub-module includes a positive feedback loop: policy influence coefficient → social attention coefficient → enrollment index allocation → education expenditure allocation → policy influence coefficient.

(2) Middle-level promotion submodule. The middle-level advancement of this study is mainly completed by colleges and universities under the education management department and sports associations under the sports management department, both of which are mainly responsible for the allocation of funds, the organization of events, and the implementation of enrollment. This sub-module includes four feedback loops, of which there are two positive feedback loops, namely: enrollment number

→ education funding allocation → teaching funding input → teaching level → academic achievement → social attention factor → enrollment index allocation → enrollment number; enrollment number → Education funding allocation → training funding investment → competitive level → competition awards → social attention factor → enrollment index allocation → enrollment number.

(3) The bottom execution submodule. The bottom-level execution of this research is mainly performed by athletes. In this sub-module, there are 24 circuits with excellent sports talents as the core, which is limited to space and will not be repeated here.

By analyzing and analyzing the boundaries and main variables of each sub-module in the "Combination of Sports and Education" evolution system, this study uses system dynamics to establish a causality diagram of the system, as shown in Figure 2.

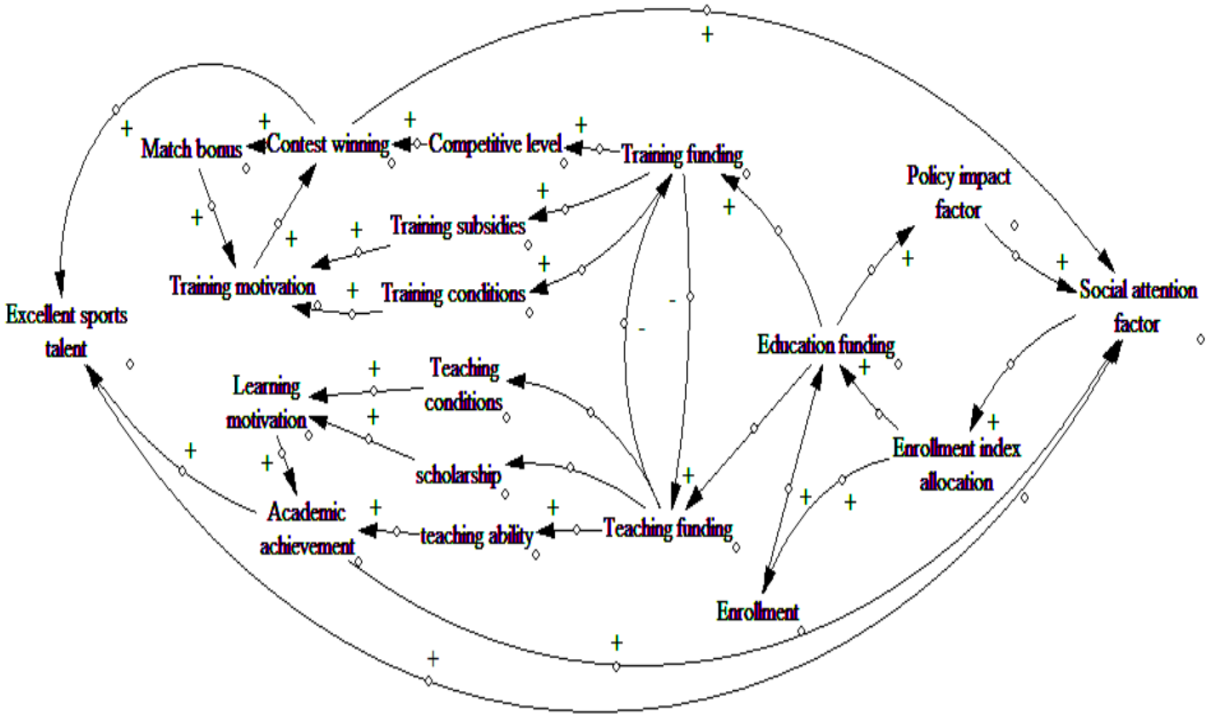

Figure 2 Causality Diagram of Evolutionary System of "Combination of Sports and Education"

2.3 System flow diagram and equation setting

According to the causality diagram in Figure 2, this paper uses Vensim software to draw a system flow diagram of the "Combination of Sports and Education" evolution model, as shown in Figure 3.

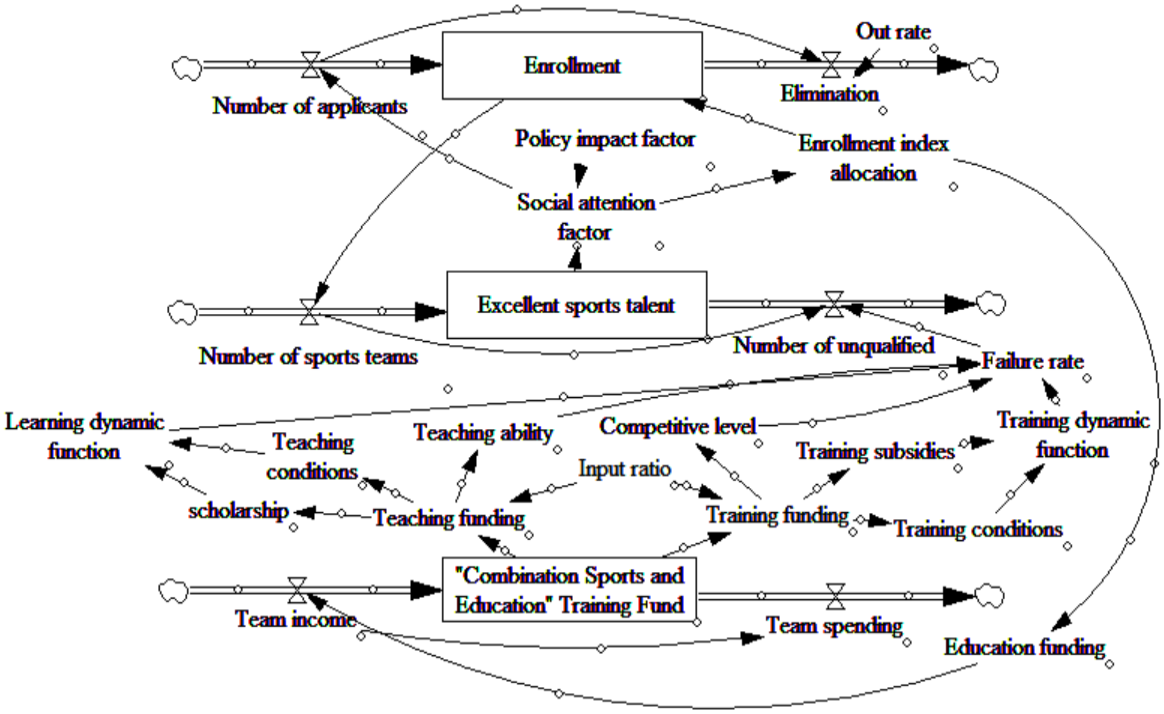

Figure 3 Data Flow Diagram of "Combination of Sports and Education" Evolution System

The key to the "Combination of Sports and Education" evolution system lies in the determination of the relationship between variables. This article uses methods such as metrological analysis, literature analysis, and statistical analysis to determine the interrelationships between variables. The main quantitative relationships are listed below:

Enrollment（ EM ）is determined by the number of applicants（ AM ）、the number of eliminations （ FM ）and the allocation of enrollment indicators（ EIA ）.The function equation is as follows:

$$EM = Integer(Min(EIA, AM - FM)) \tag{1}$$

Outstanding sports talents（ ST ）are determined by the number of sports teams（ NST ）、and the number of unqualified（ FN ）， and the function equation is as follows:

$$EM = Integer(NST - FN) \tag{2}$$

The input of training funds（ TF ）is determined by the training funds of "integration of sports and education"（ $SETR$ ）and the ratio of input of training funds（ IR ）， The function equation is as follows:

$$TF = SETR * IR \tag{3}$$

Similarly, the function equation of teaching funding input（ EF ）is：

$$EF = SETR * (1 - IR) \tag{4}$$

Due to space limitations, other equations are no longer listed here.

3 Simulation

Based on the system dynamics method, combined with the actual situation of the current "Combination of Sports and Education" mode of operation in our country. This study chose Wuhan University of Technology as the research object, combined with the data collected through interviews and surveys, analyzed the substantive relationship between system variables, through System simulation to get the "Combination of Sports and Education" model and the development trend of sports talent training and give policy recommendations based on the simulation analysis results.

3.1 Simulation tool selection

In this study, Vensim software is selected. Vensim software has powerful image processing capabilities. Through the internal processing of the software, it can characterize the constructed system dynamics model and can add corresponding constraints to the model. By setting the model simulation time and compensation, the simulated value can be obtained, the simulated value is compared with the actual value, and the model is adjusted according to the comparison result to make the model construction more reasonable.

3.2 Parameter settings

In the evolutionary system of "Combination of Sports and Education", this research is based on the actual work of the author and conducts field investigations on the Sports Department of Wuhan University of Technology. Through interviews with leaders, experts, coaches, athletes, and the author's teaching experience, we can get relevant data such as the number of enrollments and training funds. In view of the fact that the basketball team of Wuhan University of Technology has been at the forefront of the country in the practice of "Combination of Sports and Education", it has also cultivated high-level sports talents such as Han Dejun and Dai Huaibo. Therefore, the data of the basketball team of Wuhan University of Technology can be used to assign values to the relevant parameters in the model. Of course, some of the data in the model cannot be directly obtained. This research mainly determines the data based on the opinions of experts in sports, management, and pedagogy. The initial year of this study is set to 2017, the simulation time is set to 2017-2037, and the step size is set to 1 year.

3.3 Result

The goal of the "Combination of Sports and Education" training model of the Ministry of Education and the General Administration of Sports is to cultivate excellent sports talents with high comprehensive quality, which makes colleges and universities need to achieve "unification of learning and training" in the process of training talents. The investment in education, namely China, should be given an equal emphasis on the investment in training.

In the era of the nationwide system of competitive sports, the cultivation of sports talents in China takes competitive performance as the core evaluation standard, often ignoring academic performance. And with the development of economic globalization and the advent of the knowledge age, people's attitude towards high-level employment and high-quality life as demand increased, some colleges and universities began to strengthen the assessment of academic performance and professional ability of high-level sports teams, resulting in a decline in the proportion of training investment.

Based on the above analysis, this study will conduct simulation experiments on the three modes of "Combination of Sports and Education", "Sports-based", and "Teaching-based" to observe and compare the trends of talent training quality under the three modes. The specific parameter setting is to keep other parameters unchanged, and three quality curves of sports talent training can be obtained by adjusting the input ratio. As shown in Figure 4

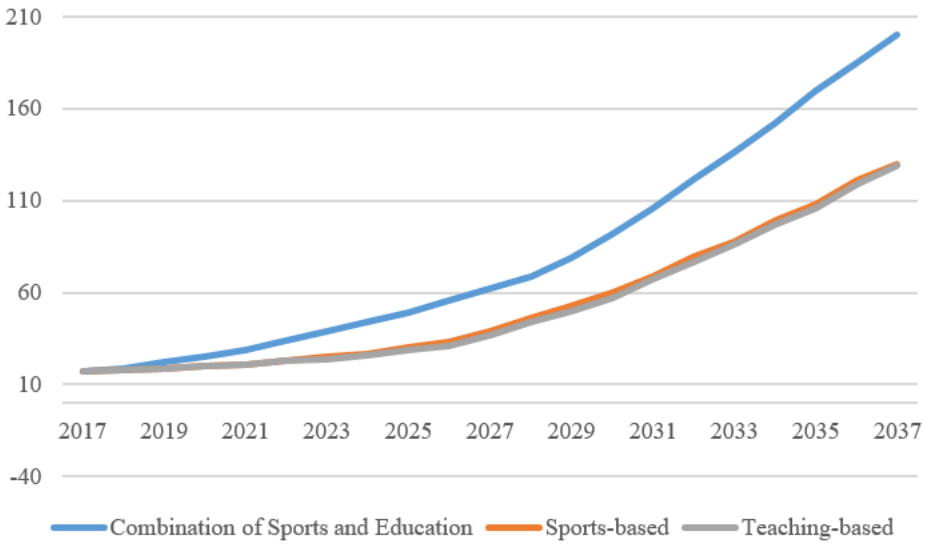

Figure 4 Comparison of Simulation of Excellent Sports Talents in Different Modes

It is not difficult to find from the above picture that the quality of personnel training under the "Combination of Sports and Education" model is significantly better than the other two models. Athletes can achieve a balance between "learning" and "training", they can well stimulate motivation for learning and training, strengthen academic and competitive levels to become a comprehensive outstanding sports talent. Therefore, the "Combination of Sports and Education" model is suitable for the current status of talent training of high-level sports teams in Chinese universities.

4 Conclusion

Through system dynamics simulation analysis, specific examples of Wuhan University of Technology indicate that the current high-level sports team talent training in my country should adopt the "Combination of Sports and Education" model. The traditional nationwide system model is not in line with the times, and the "Value learning, despise training" mode does not conform to the actual situation of athletes. Only under the mode of "Combination of Sports and Education", the quality of the training of outstanding sports talents will show maximum sustainable development. This is because there is an interaction between learning and training. Learning improves the athlete's cognitive level, knowledge structure, and enables them to adapt to the complex training and tactical system, thereby improving athletic performance. The improvement of athletic performance strengthens the athlete's initiative and enthusiasm for learning, thereby improving Academic performance, ultimately "learning" and "training" form a cycle with a positive feedback effect, which promotes the further improvement of the quality of training outstanding sports talents. Different from the current research at home and abroad, this article uses the method of system dynamics to make a dynamic analysis of the education results of "Combination of Sports and Education", and discusses the relationship between "learning" and "training" and its influence on talent training. The research results have certain theoretical contributions and practical significance.

Accordingly, this study proposes the following suggestions: First, colleges and universities should use the relevant documents issued by the Ministry of Education and the General Administration of "Combination of Sports and Education" as a guide to formulate enrollment, teaching, and training plans

based on the actual conditions of the school and high-level sports team athletes. Second, colleges and universities should strengthen cooperation with sports associations to promote linkage and integration between the two sides in competitions, training, and employment. Third, strengthen ideological guidance and career planning for high-level sports team athletes and promote their academic and competitive development has been comprehensive.

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Research on Social Benefit Evaluation of Dujiangyan Water Conservancy Project

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Abstract: Dujiangyan water conservancy project has played an important role in flood control and irrigation for a long time, it also brings significant social benefits. This paper uses AHP to construct a scientific index system, combines qualitative and quantitative analysis, on the basis of quantifying the qualitative index, using fuzzy comprehensive evaluation and inviting experts to obtain the evaluation result of social benefits of the project. Through this process, find its inspiration to the modern projects and build more ecological and environmental protection projects.

Keywords: Dujiangyan water conservancy project; Social benefits; Analytic hierarchy process; Fuzzy comprehensive evaluation

1 Introduction

The development of social benefit evaluation in China started in 1980s, with the determination of the coordinated development view and sustainable development strategy between economy and society, people are no longer limited to the pursuit of economic benefits but pay more attention to social development, environmental protection and other aspects. At present, Chinese scholars have made some achievements in social benefits research. Sun Hongxing made a specific analysis on the transformation project of Handan power grid at the three levels of macro, micro and meso, and established a fuzzy hierarchical evaluation model for comprehensive evaluation of social evaluation (Sun Hongxing, 2001). In the paper: Comprehensive benefit evaluation of Jiangdu Water Control Project, the author uses AHP and lists various indicators and quantitative data in detail (Xu Hui, Liu Cui, Fan Xu, 2016).

Water projects play an important role in irrigation and flood control, expanding cargo transportation, accelerating material circulation, and promoting the development of commercial economy. At the same time, these projects also pay more and more attention to green ecology and environmental friendliness. The total amount of water resources in China is abundant, and the overall terrain is high in the west and low in the east. It is rich in exploitable water resources. The construction of large-scale water conservancy projects can greatly benefit the people's livelihood. But there is no general evaluation method. However, there are still some deficiencies in the evaluation of social benefits in China, and the index system is not scientific and comprehensive, with several indexes intersecting with each other.

Foreign project evaluation work began in the 1960s, the aspect of the project evaluation is mainly based on economic and technical level, therefore have rich theories in economic, financial evaluation and the mature technology, but for the study of social benefit do not have a strict theoretical concept, and the method of using economic benefits of projects to measure the social benefits in western countries has lasted for a long time. Mohammad Arif Rohman believes that successful engineering projects are based on customer satisfaction, good engineering quality and the promotion of regional economy (Mohammad Arif Rohman & I. Putu Artama Wiguna, 2019). Australian scholar Frank Vanclay proposed twelve basic principles of social impact assessment, focusing on planning intervention to improve the sustainable development of society. Emphasizing the use of proper means in the implementation of evaluation; reducing negative social evaluation (Wang Wenli, Yu Jinghong, Huo Dongle, 2015).

In the past 20 years, many scientists in western countries have participated in the research of social evaluation, but the social evaluation has a wide range and many indicators, which are difficult to quantify. Although some new methods have been developed, but the research results are mainly focused on project financial or economic evaluation. Up to now, it is still difficult to make a breakthrough in the social evaluation of engineering projects, and its related theories and methods are still in development and need to be standardized.

2 Overview of Dujiangyan Water Conservancy Project

2.1 Composition of the project

Dujiangyan water conservancy project is mainly composed of three major projects: Baopingkou, Yuzui and Feishayan. The three main projects make full use of topographic conditions and the principle of water flow to coordinate the tasks of Minjiang river diversion, discharging sand and floodwater, water diversion irrigation.

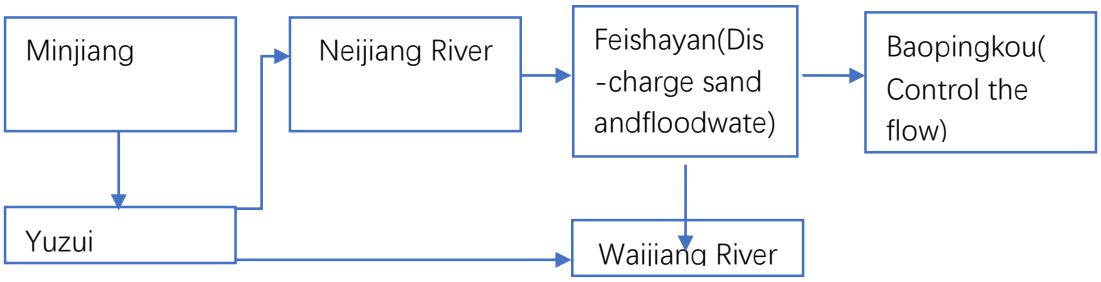

Figure 1 Diversion Diagram of Minjiang River

The Yuzui is located in the middle of the Minjiang River, which divides the Minjiang River into two parts, forming the Neijiang River and the Waijiang River. The Waijiang River is mainly used to divert excessive water, while the Neijiang River is used to guarantee crop irrigation. In spring and winter, the water level of Minjiang River is low. The height difference between the Neijiang River and Waijiang River, making sixty percent of the water flows into the Neijiang River to ensure irrigation work. In summer and autumn, when the water level rises, the main stream line of the river becomes straight, sixty percent of the water flows into the Waijiang River, ensuring that the flood will not endanger the lives of people live in the downstream.

2.2 Current situation of Dujiangyan water conservancy project

Thanks to its ancient water conservancy projects and famous sceneries, Dujiangyan was awarded the title of "China's Outstanding Tourist City" by the National Tourism Administration in 1999 and after the Wenchuan earthquake, the main project is still in good condition, thanks to the good state of the project and the support of government policies, the regional economy quickly recovered (Biswajit Nath, Zheng Niu, Ramesh P. Singh, 2018). Built in 2006, zipingpu hydropower station, which located in the upstream of the Minjiang River, effectively control the sediment in the river water, coordinated the downstream water demand, and expand the irrigated area. On the basis of the environment protection, Dujiangyan continues to attract investment and introduce 26 cultural tourism projects and will continue to improve the infrastructure of urban supporting facilities and build a stereoscopic network of transportation; improve the urban governance system. In 2018, after awarded world cultural heritage and world natural heritage, Dujiangyan was awarded the world irrigation project heritage. By 2019, the irrigation area of Dujiangyan water conservancy project will reach 7333 square kilometers, rice planting

area will exceed 4000 square kilometers, and the irrigation project will store about 1 billion cubic meters of water, benefiting 23 million people.

3 Data and Methodology

3.1 Analytic hierarchy process

Analytic hierarchy process (AHP) was proposed in the 1970s by T.L. Saaty, an American operations research scientist and professor at the University of Pittsburgh. It is a method used to make decisions in the face of a variety of objectives. It is characterized by convenient operation and low requirement for specific quantitative information.

The influence of Dujiangyan water conservancy project on society, economy and environment is interrelated. The completion of the Dujiangyan Water Conservancy Project has directly changed the regional environment in terms of agricultural irrigation (Kuang Liangbo, 2018), indirectly promoted the development of the city, strengthened commercial development and accelerated the process of urbanization (Yuri Alekseev, 2019). In the analysis of various examples, Marta Bottero uses SWOT analysis to evaluate economic conditions using GDP indicators, population data, and imports and exports (Marta Bottero, Elena Comino, Federico Dell'Anna, 2019). Yin Cui introduces indicators such as income level, residents' health status and urban development potential to evaluate the social benefits of urban infrastructure. By summarizing these previous research results, the social benefit evaluation index system of Dujiangyan water conservancy project in this paper should be analyzed from three aspects, including natural environment, social economy and urban development. The specific index system is as follows.

Table 1 Social Benefit Index System of Dujiangyan Water Conservancy Project

Social benefits of Dujiangyan water conservancy project (A)	Natural environment (B_1)	Wildlife (C_{11})
		Water resource utilization (C_{12})
		Agricultural irrigation (C_{13})
		Atmospheric precipitation (C_{14})
	Socio-economic (B_2)	The GDP growth rate (C_{21})
		Land value increment (C_{22})
		The industrial development (C_{23})
		Standard of living (C_{24})
	Urban development (B_3) (Yin Cui, Yu Sun, 2019)	Urbanization rate (C_{31})
		Population growth rate (C_{32})
		Cultural activities, health care, physical activities (C_{33})[57]
		The social security (C_{34}) [58]

3.2 Expert scoring

Expert scoring is a qualitative description and quantitative strategy. It relies on relevant experts and their theoretical knowledge and rich experience in a certain scientific field to evaluate the relative weight of each evaluation index in the form of scoring. It is based on quantitative and qualitative analysis, and its results have mathematical and statistical characteristics (Khalid Salmi, Hamid Magrez, Abdelhak Ziyyat, 2019).

In this paper, four experts are invited to participate in the expert scoring, all the experts have a

[57] http://www.djy.gov.cn/
[58] http://www.djy.gov.cn/

national first-class constructor certificate, they also have been engaged in water conservancy projects for more than fifteen years and have rich practical experience and theoretical knowledge, which fully guarantee the scientific nature of the final data. However, due to the specific situation of Dujiangyan itself, there may be inconsistencies between the relative importance of indicators and national policy guidance in the expert scoring process. The scoring table is designed according to the social benefit index system, using a hundred-point system to score the index of the factor layer.

Table 2 Scoring Table

Indicator			Score
Social benefits of Dujiangyan water conservancy project	Natural environment	Wildlife	
		Water resource utilization	
		Agricultural irrigation	
		Atmospheric precipitation	
	Socio-economic	The GDP growth rate	
		Land value increment	
		The industrial development	
		Standard of living	
	Urban development	Urbanization rate	
		Population growth rate	
		Cultural activities, health care, physical activities	
		The social security	

Each expert scores the scoring table independently to ensure the relative objectivity of the data, and take the average of each expert scoring table to get the final score of the index, the expert scoring table is shown below.

Table 3 Expert Scoring

Indicator			Score
Social benefits of Dujiangyan water conservancy project	Natural environment	Wildlife	87.5
		Water resource utilization	92.75
		Agricultural irrigation	95.75
		Atmospheric precipitation	86.25
	Socio-economic	The GDP growth rate	82
		Land value increment	81.25
		The industrial development	76.75
		Standard of living	75.75
	Urban development	Urbanization rate	83.75
		Population growth rate	77.5
		Cultural activities, health care, physical activities	79
		The social security	83.25

3.3 Fuzzy comprehensive evaluation method

In 1956, American automatic control expert L. A. Zadeh put forward the concept of the fuzzy set in his paper "Fuzzy set theory", and put forward the mathematical concept of dealing with fuzzy phenomenon. On the basis of subjective data, the fuzzy comprehensive evaluation method can effectively solve the existing problems of fuzziness and multiple indicators.

Table 4 Judgment Matrix of Criterion Layer

A	B_1	B_2	B_3	$\overline{w_i}$	w_i
B_1	1	5	3	2.466	0.637
B_2	1/5	1	1/3	0.405	0.105
B_3	1/3	3	1	1	0.258

			(3.871)			

λmax=3.033, Consistency test: CR=CI/RI=0.03<0.1, Pass the consistency test.

Table 5 Weight Calculation of Each Index of Natural Environment

B_1	C_{11}	C_{12}	C_{13}	C_{14}	$\overline{w_i}$	w_i
C_{11}	1	1/3	1/5	2	0.604	0.110
C_{12}	3	1	1/3	3	1.316	0.239
C_{13}	5	3	1	7	3.201	0.581
C_{14}	1/2	1/3	1/7	1	0.393	0.071
			(5.514)			

λmax=4.064, Consistency test: CR=CI/RI=0.024<0.1, Pass the consistency test.

Table 6 Weight Calculation of Each Index of Socio-Economic

B_2	C_{21}	C_{22}	C_{23}	C_{24}	$\overline{w_i}$	w_i
C_{21}	1	2	3	5	2.340	0.477
C_{22}	1/2	1	3	3	1.456	0.297
C_{23}	1/3	1/3	1	2	0.687	0.140
C_{24}	1/5	1/3	1/2	1	0.427	0.087
			(4.91)			

λmax=4.065, Consistency test: CR=CI/RI=0.024<0.1, Pass the consistency test.

Table 7 Weight Calculation of Each Index of Urban Development

B_3	C_{31}	C_{32}	C_{33}	C_{34}	$\overline{w_i}$	w_i
C_{31}	1	3	3	2	2.060	0.439
C_{32}	1/3	1	1/2	1/3	0.485	0.103
C_{33}	1/3	2	1	1/3	0.687	0.147
C_{34}	1/2	3	3	1	1.456	0.311
			(4.688)			

λmax=4.121, Consistency test: CR=CI/RI=0.045<0.1, Pass the consistency test.

4 Results

The evaluation set of social benefits of Dujiangyan water conservancy project is V = {V1, V2, V3, V4, V5} = {excellent, good, general, poor, very poor}. According to the calculation results, the final weight of each index can be obtained, and can get the evaluation of each index according to the expert opinion at the same time. The weight of criterion layer B, B= (0.637,0.105,0.258).

W_1= (C_{11},C_{12}, C_{13}, C_{14}) = (0.110,0.239,0.581,0.071), $R_1=\begin{pmatrix} v_{c11} \\ v_{c12} \\ v_{c13} \\ v_{c14} \end{pmatrix}=\begin{pmatrix} 0.25 & 0.75 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 0.5 & 0.5 & 0 & 0 & 0 \end{pmatrix}$

$B_1=W_1*R_1$=(0.883,0.118,0,0,0);

$B_2=W_2*R_2$=(0.477,0.297,0.140,0.087) $*\begin{pmatrix} 0.25 & 0.25 & 0.5 & 0 & 0 \\ 0 & 0.75 & 0.25 & 0 & 0 \\ 0.25 & 0.25 & 0.5 & 0 & 0 \\ 0 & 0.5 & 0.5 & 0 & 0 \end{pmatrix}$=(0.154,0.421,0.426,0,0);

$B_3=W_3*R_3$=(0.110,0.239,0.581,0.071)$*\begin{pmatrix} 0.5 & 0.25 & 0.25 & 0 & 0 \\ 0.25 & 0.5 & 0.25 & 0 & 0 \\ 0.25 & 0.5 & 0.25 & 0 & 0 \\ 0.25 & 0.5 & 0.25 & 0 & 0 \end{pmatrix}$=(0.278,0.473,0.250,0,0);

The specific evaluation results are as follows:

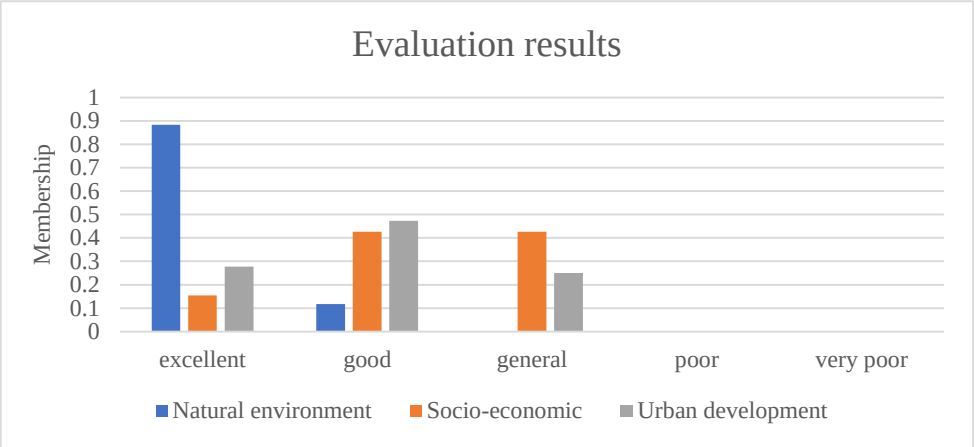

Figure 2 Evaluation Results

R is the final evaluation matrix, R=(B_1, B_2, B_3) , and can calculate the final evaluation result B,

$$B=W*R=(0.637,0.105,0.258)*\begin{bmatrix}0.883 & 0.118 & 0 & 0 & 0\\ 0.154 & 0.421 & 0.426 & 0 & 0\\ 0.278 & 0.473 & 0.250 & 0 & 0\end{bmatrix}=(0.650,0.241,0.109,0,0)$$

According to the principle of maximum membership degree, the final evaluation result is 'Excellent'.

5 Conclusion

Through the final calculation, it is concluded that the social benefits 0f The Dujiangyan water conservancy project are excellent, and according to the principle of maximum membership, the evaluation result for the natural environment is 'excellent', the evaluation result for the social economy is 'general', and the evaluation result for the urban development is 'good'. The final evaluation results show that The Dujiangyan water conservancy project promotes the development of the ecological environment, however, in the development of urban economy, the government should step up efforts to attract investment and create a stable and harmonious social environment as the basis for excellent investors to enter; in the process of urbanization, by strengthening exchanges with provincial capitals, learning advanced urban planning knowledge, expanding logistics and transportation capabilities, and promoting economic development to accelerate the pace of industrial upgrading.. The enlightenment for the construction of large-scale water conservancy projects with higher efficiency and environmental friendliness is as follows: The project construction not only involves the operation income after completion, but it should promote the regional economic and social development, natural environment changes and population factors are also included. Therefore, the project construction should fully consider the above factors and bring greater social benefits.

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The Growing Moral Challenge in the Face of Technologies: Internet, Social Networks, IoT, Blockchain and Artificial Intelligence

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Abstract: The study evaluates five technologies or technological arrangements: internet, social networks, internet of things, blockchain and artificial intelligence. These technologies are in different degrees of maturity and make up the new wave of technological innovation, the effects of which will cause severe changes in the economy, in labor relations, in employment and in society in general. The objective of this research is to carry out a basic assessment of these technologies in terms of their characteristics, implications and impacts on human and social relations, expanding the analysis to understand the ethical issues and human values involved, with an emphasis on the Brazilian reality. The method used is an exploratory, multidisciplinary research, which uses as references, among others, articles from the social sciences and philosophy, the basis for ethics. The first topic discusses the ethical helplessness in which we live today, followed by the analysis of the contexts of technologies and the moral dilemmas involved. The final topic presents the assessment of human values and virtues present in the interaction with the technologies analyzed.
Keywords: Human values; Ethics; Artificial intelligence; Blockchain; Internet of things; Social networking

1 Introduction

The issue of ethics in the face of the expansion and use of new technologies has provoked an intense debate, especially for the advance of Artificial Intelligence. This debate involves central issues that are still unresolved, as we are a society built on racial, gender and economic differences. Despite the immense contribution to ethics and morals brought by Aristotle, Plato, the illuminists Kant and Hegel, for example, these thinkers of morality and ethics, coexisted and were not opposed to the slave society, as Freitag (2013) recalls. Algorithms, increasingly present in the contemporary world, are replicating prejudices based on the use of databases impregnated with human vices. The internet, in turn, has been an environment characterized by freedom. However, it is still an unsafe and inaccessible environment for many people. Social networks, a remarkable phenomenon at the beginning of this century, bring interesting benefits to society. On the other hand, it is a field for the propagation of lies, hate speech and disinformation. Monitoring technologies increase security, but contribute to a lack of privacy and exaggerated surveillance. The increasing interaction between people and technologies and their growing application by companies and other organizations reinforces the need to revisit ethical precepts and reinforce certain moral values.

2 Theoretical Argument

Postmodern man has lived helplessly by ethics and lives with limited morals, that is what important thinkers of our time report, such as Morin, Bauman, Lipovetsky. Bauman (2011) believes that ethical values are lost in fragmented society and that solutions depend more than ever on individual morals. Lipovetsky (2009) demonstrates that the fantasies of consumption helped in the pursuit of happiness as the ultimate end, leaving duty to the background. Morin (2005) clarifies that the ethical challenges are great, as the individual ethics was stifled by self-centeredness and the community no longer finds the deserved solidarity.

In Moral Blindness, Bauman (2013) recalls that the evil of our times is not restricted to totalitarian ideologies, but it is revealed when we fail to react to the suffering of other people, when we refuse to understand others or are insensitive to the pain of others. For him, an invisible form of evil is when a country's economic and political power is above the value of each individual, when financial interests outweigh the respect of each. For the sociologist, the individualistic and egocentric mentality of human beings is part of a process that took place with the Modern Age, as men distanced themselves from religions, they became individualists. Modern processes have forced them to take charge of their lives, dissipating their efforts. The void brought by distance from religion and modern life could not be filled by the rules imposed by legislation and by the State (Bauman, 2014).

Morin (2005) gives the moral concept a certain mystical, rational and also emotional identity. The thinker sees that morality depends on an act of rewiring with the other, rewiring with a community. It

also shows that morality is somewhat natural, as it corresponds to the nature of the subject and society. Individual conscience is the intellectual and moral conscience. This awareness arises from the development of what he calls the individual - species - society relationship. However, there is an antagonism in this relationship: politics does not always obey ethics and the economy considers business ethics, following the imperatives of profit that, in turn, lead to the exploitation of human beings. Science itself sometimes puts knowledge for knowledge, or at the service of economics, of politics, leading them to immoral ends. This is what happens with wars or improper genetic manipulation. Thus, human activities need professional ethics. This professional ethics must always include the moral perspective of human beings. The ethical crisis that Morin (2005) narrates is a general crisis of the foundations of certainty, a crisis of knowledge itself.

Lipovetsky (2009) understands that postmodernity suffers a demoralization, a time when ethics is in darkness. The title of his work in french is Le crepúscule du devoir. This designation has the sense of weakened duty, a time when the notion of personal sacrifice lost its social justification, when morality is not devoted to a higher end and where subjective rights prevail over imperative commandments. Morality, to the extent of the sacrifice it implies, is run over by the desire for a better life, consumption, entertainment. The responsible for this dismantling of duty was the civilization of consumerist welfare, which no longer has the brakes for desire. The culture of happiness distances us from subjective introspection and usually triggers a dynamic that generates anxiety, as we are always looking for a happy future, the ideal appearance, we are never satisfied. Lipovetsky reports with metaphorical adjectives the behavior nowadays where we are in search of happiness in small terms, but it seems to us more and more distant. Paradise is no longer in the other world, it is in this one and depends on the progress of the law and the material conditions of existence. Humanity does not accept suffering passively, but wants the ideal of happiness in comfort, in pleasures. He reports that in the post-duty society, evil is an attractive spectacle, there are no more heroes, there is no need to be virtuous.

3 Methodology of Analysis

This work considered technologies or technological arrangements that have a relevant impact in terms of efficiency gains, cost reduction and improvements in processes, indirect benefits to human beings, but whose impact is strongly perceived in their lives: either because of the change in forms work, relationships, lifestyles, learning or social contact. It was decided not to consider technologies directly related to the preservation of life, that is, the technologies most linked to medical and health areas, such as biotechnology and genetic engineering, were not considered here. The work is exploratory and brings together, among others, references from works in the social sciences and philosophy to support the debate on ethics and moral values, brought about by the use of these technologies. There is a specific cut, but not restricted, to the Brazilian reality.

4 Technologies and Their Respective Moral Requirements

4.1 Internet: the principle of freedom and the need for greater security

The networks promoted changes in social and urban flows conditioned by the flow of capital flows, adding new structures and new services. There are at least two flows: the flow of electronic circuits, telecommunications, high-speed transport systems and the flows that make up the nodes of this network: communication centers - which have the function of coordinating the passage of information. The expansion and consolidation of resources in telecommunications and technology not only reduced the distance between people, but also changed their flow, influencing the process of globalization and local development (Castells, 2006).

With the change in the flow of information caused by the Internet, there was also a break in mass communication, whose flow was characterized by having a single meaning: from an interlocutor to several receivers. With the Internet, the flow of communication became multidirectional and this brought

prominence to new actors. Long before social networks dominated the Internet, the Internet, as a technology in itself, was able to put human beings at the center of the communication process. Communication companies now have an exchange role shared with other Internet users. Many created their blogs, websites and started to produce content and disseminate information competing with media companies and creating a new space for freedom of expression. The Internet has made possible a structural change in the media, where some traditional media have been extinguished (such as the CD), others have been significantly reduced (magazines and printed newspapers) and others are being threatened, as is the case with TV, by online and on demand video solutions. Traditional media companies went for online, open, free and free communication, competing with the generation of content from ordinary individuals and other companies.

Along with the web, a series of specific cyberspace behaviors emerged, a topic already studied by many researchers such as Santaella (2008), Lemos (2015) and Levy (2010) who raised issues such as privacy, security, excessive freedom and how life has been completely transformed with immersion in online. One of the typical tribes of this universe, is the tribe of hackers. The hacker movement practically emerged with the internet, and was characterized by individuals, programmers and adherents of the free web that created code exchange communities. Hacking has legitimate purposes, such as looking for flaws in systems and improving them and illegitimate purposes, such as hacking systems and stealing data for illegal purposes. Most illegal activities occur in the so-called deep web (Graglia, Huelsen, Cacciari, 2018). The deep web, also known as the invisible internet, maintains the anonymity of those who access it, but does not guarantee the user's security. This terminology is used to refer to addresses that are not indexed by search engines. There is also a subdivision of the deep web, a small part called the dark web, which is not indexed and where the most obscure transactions are carried out. In this environment there is a little bit of everything: closed information accessed by joint ventures, libraries, confidential government data, access to prostitution networks, drug sales, human trafficking, counterfeiting, murder orders (Wrigtht, 2017; Beckett, 2009).

4.2 Social networks: acceleration of social interaction, the practice of truth and respect

The phenomenon of social networks, as well as other technological arrangements and their applications, could only exist because of the existence of the Internet. Thus, part of the values and moral dilemmas reported below are also related to the web. Social networks are characterized by being a space for sharing information and social exchanges in an accelerated and intense way. Computer-mediated communications (CMC) led to the emergence of specific groups and communication networks, named by Rheingold (1996) of virtual communities. The word community translates trust and emotional connection, however, this does not seem to really happen, as Bauman (2004, p. 23) says: “Pure relationships are the portent, not so much of the mutuality of liberation, but of a mutuality of insensitivity”. Social networks show the challenge of respect and good human interaction, in an environment of relationships intensified by millions of accesses, guided by pseudo friendships and strong exposure of images. A recurring phenomenon reported as the bubble of networks, shows the formation of interest groups that are closed in their own prejudices. This is due to the use of artificial intelligence systems, the algorithms of the social networking platforms direct news, products and friendship suggestions according to the user's previous choices, leaving individuals restricted in their bubbles of intention and comfort. Bakshy, Messing and Adamic (2015) surveyed ten million American users on Facebook and found that users who were subject to the action of algorithms that recommended targeted news and who had no access to the opinions of others, with different views, were more likely to do not change your mind on the reported topics than those who have not been subjected to these conditions.

Among the negative aspects, there is not only the exacerbated individualism described by postmodern sociologists, but also exhibitionism, voyeurism, immeasurable fun, unpaid work, the practice of illegalities, constant lies. Social networks are an environment for freedom, but also a space for masks and false identities and a place for manipulating information. The manipulation comes from users,

hackers, data companies, technology companies, governments. If, on the one hand, meetings and protests in favor of democracy are promoted, on the other hand they function as a mirror of human evil: pedophile networks, extremist groups, illegal sales, insecurity exists everywhere. Social networks promote freedom, but together with that, they cause fear, lack of privacy, insecurity and the spread of untruths (Huelsen, 2018, 2019).

Among the positive actions present in the networks, we highlight the exchanges of knowledge, typical of blogs and online communities or even groups of collaborative and solidary action that, through the so-called crowdfunding, are able to raise funds to finance projects. Castells (2006) reported the solidarity and the value of the possibility of expressing sincerity in networks, even if people do not have strong ties. Another aspect is that of social mobilization in translating the interests of groups from social networks to the streets through social mobilization, which was called by Castells (2013) as "networks of indignation and hope" and by Negri (2016) "multitude"[59]. Brazil has experienced two great moments of social mobilization through networks in recent years. The first moment took place with the protests of June 2013, which marked the demonstrations of ordinary citizens, many masked, claiming the cancellation of the bus fare increase, the reduction of violence, improvements in living conditions, among other demands that began on the streets of São Paulo and spread across the country. The other moment was in May 2018 with the stoppage of truck drivers who met through social networks (especially WhatsApp) and stopped the country's transport for ten days. The consequences were serious: product shortages and fuel shortages, in addition to reduced economic growth that year. There is no doubt that organized groups are also part of these manifestations, but the form of organization was largely autonomous and spontaneous and took place through social networks (Lazzareschi, Graglia, Huelsen, 2020).

The political and social importance that these social platforms have acquired is unquestionable. On the other hand, the use of fake accounts, the use of algorithms and robots that direct and propagate hate messages and fake news, put Brazilian democracy to the test. More recently, Facebook, Twitter and WhatsApp have adopted control measures to contain abuses, such as account suspension, blocking posts and restricting the limits allowed for sharing messages. The phenomenon of fake news in the country has generated such an impact that investigations are being conducted by the Supreme Federal Court, by the National Congress, through a Joint Parliamentary Commission of Inquiry, and by the Federal Court of Accounts (Graglia, 2020). There are accusations of injuries to government opponents, the formation of anti-democratic networks that spread news of hatred and misinformation through the dissemination of false and unsubstantiated scientific data about the pandemic of COVID-19, confusing Brazilians as to the reality of the situation, its risks, the efficacy of medicines and sanitary measures to fight coronavirus. These situations show that digital crimes, like technologies, go faster than justice.

4.3 Internet of Things - IoT: opportunities to control resources and the fear of surveillance

The Internet of Things is not in itself a unique technology, as it depends on a series of existing technologies to happen. This technological arrangement prospered with the arrival of cloud computing, big data and web analytics, systems capable of collecting a lot of data, evaluating them statistically and predicting future actions (Patel, Patel, 2016). A major advance for the progress of IoT was made with IPv6, the most current version of IP. The release of IP control numbers to the world is centralized in the Internet Number Administration Authority (Iana) and, until recently, version 4 of IP (IPv4) was used exclusively, which allows a combination of 4.3 billion protocols. This number of IP addresses would not be enough to support billions of objects with the potential to be connected. With the deployment of IPv6, a combination of 3.4x1038 addresses is possible, that is, it has sufficient capacity to create an IP-type identity for every existing device or equipment. This new protocol version will still live with the old one for many years (Oliveira, 2011). IoT depends, in addition to the need to protocol each device with an IP,

[59]https://outraspalavras.net/geopoliticaeguerra/antonio-negri-da-recusa-ao-trabalho-a-tomada-do-poder/

on the existence of a comprehensive and efficient data transmission network, such as the existing 4G, 5G, GSM, RFID etc., wireless sensors, as well as systems and control and data storage platforms, as well as intelligence systems capable of handling the collected data (Patel, Patel, 2016). The Internet of Things is expected to gain scale in the coming years with the increase in devices and devices connected by IPv6. IoT applications involve different areas and sectors, such as agriculture, transport and logistics, civil construction, retail, industry in general, energy and environmental control.

For Brazilian export agriculture, the use of IoT has a lot to contribute, 70% of large farms already apply soil amendments at variable rates, but still have a lot to do with the use of automatic sowing, crop monitoring, pilots automatic, and the large-scale application of IoT. The arrival of this technological arrangement and networks in the field means better use of resources (Teleco, 2020[60]). But it is not just in the countryside, the Internet of Things makes it possible to control and monitor entire cities with cameras, sensors and intelligent systems in various applications, such as intelligent traffic lights, electricity management, emergency centers, atmospheric controls, energy consumption management. water, public services, among others, collaborating to apply the concept of smart cities or smart cities.
The security and control benefits brought by this technology are enormous, but, together with this, the question already raised by Foucault (1987) arises of the disposition to a life under surveillance and subject to punitive actions. The surveillance of citizens could, for example, exclude good and bad payers, act in favor of social segregationism or undermine human rights. On the contrary, these systems must guarantee the coexistence of autonomy and heteronomy, in a society of respect and tolerance. The moral code made by modern man, and for him, advocates that freedom must be "taken care of" so that men do not act for evil. A freedom "guarded" if not by the individual, by what is outside, by the agents of justice and thinkers who guarantee the best judgment, capable of showing that it is not worth doing evil. The individual's autonomy and the heteronomy of rational administration could not be without one another, but their existences necessarily imply conflicts. This is an aporetic contradiction, without overcoming. The conflict between the best adjustment of the individual and common interests is a landmark of modernity that tried to seek solutions via universality and reasoning, but without much success (Bauman, 2013).

4.4 Blockchain: de-bureaucratization, transparency and the growth of inequality

Blockchain is a distributed ledger type technology. Its principle is the organization of records in blocks (groups of records that have a fixed number), one by one in a chain, following a mathematical logic that relates them to a distributed database system in log and that is managed in a decentralized way through a P2P (peer to peer) network (Formigone Fo, Braga, Leal, 2016). The technology can be applied in different types of industry to reduce bureaucracies and increase control, it is even used in conjunction with other technologies and technological arrangements, such as Artificial Intelligence (AI) and Internet of Things (IoT). Blockchain technology has great potential for use in the public sector, for example, in applications for citizen registration systems (documents in general) and benefits control. Also for the private sector, as in banking transaction systems, supply chain management, logistics, retail, among others.

In Brazil, blockchain technology has been applied mainly in the financial system and the means of payment industry, which is undergoing a major transformation. The arrival of this technology allows the direct transfer of values with much more security and potential for reducing intermediaries. The current gains made by companies that benefit from the high complexity and artificially created borders between payment networks, are impacted by blockchain technology. For example, due to the unified record keeping in the blocks, financial clearing and settlement services may no longer be necessary due to the possibility of reconciling statements and amounts to be fully automated. will also cease to exist (Holotiuk, Pisani, Moormann, 2017). In this way, entire parts of the payment processes are eliminated and the links in the chain no longer make sense: like distributors, called acquirers and sub-acquirers, card brands and the bank itself. In fact, this technology, which was marginalized because it is a technology linked to

[60] https://teleco.com.br/iotbrasil.asp

cryptocurrencies (not recognized by governments) today receives the attention of major banks and governments and has the potential to offer greater equity to players and reduce costs for customers, leading transactions costing cents. In addition to cost savings, one of the biggest benefits of technology is security against fraud, errors and hacker attacks. The reshaping that banks and the payment methods ecosystem will undergo is compared to what the media industry underwent with the arrival of the Internet. One of the biggest challenges in the implementation of this technology will be the gain of scale. Brazil has more than 45 million individuals (about 1/3 of the economically active population over sixteen years old) who do not have accounts with bank institutions, either because they prefer cash payments or because they work in the informal economy (Locomotiva, 2019[61]). The potential positive impacts of applying this technology are clear: less bureaucracy, shorter processing times, more access to finance and loans. An important aspect to ensure security in the use of sensitive data and information from users is the entry into force of the General Data Protection Law (LGPD) scheduled for the second half of 2020 (Huelsen et al, 2020).

The moral values that will be tested here will be honesty and transparency. There is a clear risk of greater surveillance and control by the State and companies over people. It is a technology that should reduce bureaucracies, avoid rework and remove intermediaries, but it will depend on the advantages offered by the Central Bank for the citizen to get out of paper money and informality in exchanges, otherwise there is a risk of creating more barriers for the individual. and increase social differences in the country, between those who are connected and those who are not. The ethics of differences is no longer a desired ethics for this century. Another aspect to be considered that corroborates the increase in inequalities is a greater destruction of jobs than the creation of new jobs, as reported by Graglia and Huelsen (2019).

4.5 Artificial Intelligence, criticality when dealing with robots

AI correspond to systems capable of interpreting external data correctly, learning from that data and using it to achieve specific goals and tasks in a flexible and adaptable way. These systems are classified by three levels of maturity. Narrow AI corresponds to systems capable of having autonomy for simple and specific activities, such as voice recognition and basic communication systems. The second level corresponds to AI systems in general, so called when they can act in different areas, such as voice communication, writing or motor activities. The third level concerns super AI, where the skills of the machines are highly developed and begin to have their own conscience. This level is the most distant from the current reality and will probably not be reached anytime soon (Kaplan, Haenlein, 2019).Although the use of artificial intelligence is widespread and already used in the most diverse areas, such as health, military intelligence, autonomous vehicles, recruitment of people and even judicial evaluation (Livingston, Risse, 2019), in Brazil the technology is growing. The sectors with the greatest application of AI are retail, with service chatbots, banks, with risk and investment analysis applications and agribusiness, which uses AI solutions associated with Internet of Things applications, involving from intelligent systems of water irrigation to georeferencing using drones and image processing. In the cultural sector, there are use cases for AI applications that interact with museum visitors in the city of São Paulo, answering questions and enabling visitors to interact with works of art (Graglia, Huelsen, 2019). In the area of education, innovations are mainly concentrated in the field of natural language processing - NLP, in speech and text and with collaborative learning linked to learning management

[61]https://www.ilocomotiva.com.br/single-post/2019/09/24/Um-em-cada-três-brasileiros-não-tem-conta-em-banco-mostra-pesquisa-Locomotiva

systems. These AI systems contribute to more individualized learning, and can be applied mainly to active learning and its implementations, such as an inverted classroom. The use of AI in education is promising and includes the possibility of studying ethics (Vicari, 2017). The importance of using Artificial Intelligence in medicine is undeniable, especially as support for diagnostics and clinical research. The country has used AI to predict the spread of the disease, support in the diagnosis, development of new drugs and vaccines, management of hospital beds, detection of human agglomerations and combating pandemic fake news (Tunes, 2020).

The spread of the use of Artificial Intelligence systems revives the debate on ethics, essentially in two aspects. The first concerns how we, beings with moral capacity, must deal with machines, how we must respond to them. The second has been shown to be at the heart of current discussions, how machines should act before us. This disregarding the controversial issue of consciousness that these machines could acquire, hypothetically, in the third phase of evolution and then become morally capable of acting for themselves.

As for the first aspect, it is noteworthy that many people do not recognize that they are communicating with machines, or receiving messages from machines, not questioning whether the indications they are receiving make sense or are consistent. Harari (2018) mentions the case of a driver who fell over a precipice while trying to cross the ocean, as the indication of the geolocation application, which used AI, indicated a path that ignored geographical interruptions. Intelligent machines have chosen or induced the news that is read by people, the products that are consumed, the paths and routes that are followed in daily commuting. On the one hand, AI facilitates everyday life, on the other hand, it limits choices, induces errors, directs thoughts and also serves to manipulate public opinion. What will become of a people where freedom, free will, respect and encouragement of choices are limited? Carr (2008) already said that the Internet was making human society more stupid, but the arrival of AI can intensify the laziness of thinking and reflecting, when exactly the opposite is necessary: thinking even more, reflecting even more, to avoid deception, the manipulation. It is necessary to review values and seek the best way to act in the face of technological innovations and their implications.

As for the aspect of the machines acting according to some ethics, it is clear that this goes through human action, in many aspects. One concern understanding how machines learn. There are models of machine learning, called machine learning, where the algorithms are parameterized to identify patterns (behaviors, images, etc.) and suggest trends or actions. For example, the identification of images by robots on the Internet uses these models and when an individual chooses the images on a website's CAPTCHA[62], he is teaching the algorithms to recognize true images. There is also deep learning, or deep learning, where learning occurs in layers, in a structure similar to the neural networks of the human brain. Masses of data are used to feed the learning algorithm directly: the output data of a layer is the input data and each layer has an algorithm. This type of learning is used for speech recognition, writing and computer vision. There is also reinforcement learning, which happens when it is possible to improve the learning performance of the algorithm based on past data, constantly improving it (Livingston, Risse, 2019). But, regardless of the type of machine learning, when it comes to AI and moral values, one must analyze the interference of humans, whether in codes, in the parameterization process that occurs during the stages of learning artificial intelligence, in the choice databases or in the analysis of possible biases.

[62] Completely Automated Public Turing test to tell Computers and Humans Apart is an automated test for differentiating between computers and humans, used as an anti-spam.

In the case of databases, it is known that they normally contain historical records of human processes and decisions. Thus, they capture what is good and bad and can hide distortions: discriminatory actions of race, gender, social status, religious belief, sexual option, political affiliation and worldview. Technology and data companies have been looking for ways to address the ethical issue involved in the development of their products and services, including the creation of codes of ethics and oversight committees. One of the ideas that make up this debate is the encouragement and definition of inclusion and diversity policies even for areas of programming and development of artificial intelligence systems. The logic lies in the conviction that teams that are more heterogeneous and representative of the existing differences in society are able to improve the group's reflections in search of the right choices and, thus, ensure a more ethical performance for their teams and organizations. However, currently the systems development teams for AI are mostly composed of white men, trained in the exact area, specialized in information and communication technologies, systems programming and data science. There are additional difficulties, at this current stage of development of this technology: in the case of the most sophisticated learning algorithms, despite the possibility of controlling the input data and checking the assertiveness of the system by comparing them, in some way, with the results (output data), the programmers cannot explain how the system can learn. In other words, one can know the entrances and exits of the system, but it is not very well understood how the learning processes occur. This phenomenon is known as black box in AI. Thus, if any action subverts the ethical and moral principles, it can be discarded, but not so easily understood and therefore the mechanisms of transparency of companies do not help. The issue goes even deeper with Super AI, with the so-called awareness of the machines, which according to Livingston and Risse (2019) could become the moral agents.

In any case, the protection and protection measures seem to be under the exclusive care of the companies and technology teams involved in the development of AI systems, which end up becoming responsible for judging what is good or bad or what is right or wrong in terms of the results and actions of the machines. This poses a great risk as technology companies currently have enormous economic power, with the top five having the highest market value among all companies, as an example, which makes them more economically relevant than many countries in the world. Certainly, they are also interested in what they are willing to control, violating the principle of exemption. The interests become those of those who have the capital, the technology companies. The debate on the ethical issue grows as the technology itself develops and the possibilities of application multiply in several fields of human action. IBM (International Business Machines) has announced that it will stop investing worldwide in the AI market for facial recognition. Other tech giants, Amazon and Microsoft, have taken similar steps. The issue of the use of images and social monitoring is controversial in the West and is already debated in the face of the issue of individual privacy. The theme falls on the controversy between increasing monitoring and security and restricting the right to come and go, the right to privacy and the risk of these systems being used for some type of social control by the State or by companies.

5 Brazilian Legislative System, Slowness in Laws, Hope in Companies and Citizens

If the law is delayed, what to expect from its application and enforcement? This is one of the biggest dilemmas in the country's legal system: the combination of the lack of regulatory frameworks defined by specific legislation and the historic difficulty of monitoring and demanding compliance with laws in a comprehensive and equitable manner. From a regulatory point of view, the country has only the Regulatory Framework for the Internet, a document that establishes principles, rights and duties for the

use of the Internet in Brazil, which encourages citizenship, education, culture and freedom of expression and values that the Internet be freely accessible to all Brazilians (Brasil, 2014)[63]*. In August 2020, the LGPD (General Data Protection Law) will come into force, a regulation very similar to the European Data Protection Regulation created in 2018. In general terms, this law requires companies and organizations to be transparent in the use of data, not discrimination, security and damage prevention when using data from their customers or users (Brasil, 2018)[64]*. The country is also discussing a bill against fake news, spurred by the various scandals involving the spread of hate messages and disinformation on an industrial scale, as well as attacks on the reputation of the Republic's policies, public officials and institutions. It is feared that the eagerness to regulate these harmful practices will end up putting at risk some principles that have hitherto governed the use of the Internet in Brazil, including the right to expression and the right to privacy. A regulatory text for the use of AI was also initiated, starting from an initial public consultation phase: it is the Bill 21/20, which establishes principles, rights and duties and governance and transparency instruments (Chamber of Deputies, 2020)[65]*.

If the State is unable to keep up with reality and provide ethical parameters for the proper use of these technologies, there is hope that technology companies, either on their own initiative or under pressure from customers, advertisers and users and from civil society itself, will seek an appropriate positioning regarding the ethical issue. Although the legal signs are late, it is possible that the technology will corroborate with its own security and validation mechanisms. The proper use of artificial intelligence or even the de-bureaucratization of processes, made possible by blockchain technology for example, can pave the way and facilitate these mechanisms. Which may mean the possibility of having robots to fight fake news, robots that warn us of inappropriate "conduct" or even faster mechanisms for creating and applying laws for digital environments (Huelsen, 2019).

6 Conclusions

This article sought to demonstrate the urgency of the debate on ethical issues and the need for greater reflection in relation to the challenges of the moral values of men facing new technologies. Customs permeate networks and society lives with common moral dilemmas before the accelerated changes brought about by new technologies. This is experienced in all instances, from individual to collective: individuals, friendship groups and family members, organizations, companies, universities, schools and the State itself, which acts reactively to innovation, delaying the elaboration and application of laws. The COVID-19 pandemic has been provoking reflections, but Brazilian society still faces issues of the political game, such as the threat brought by the massive and malicious use of fake news that shocks by showing movements away from reason and common respect. A setback compared to the relevant values that are being demanded in the interactions of individuals with each of the technologies evaluated in this research (internet, social networks, IoT, blockchain and AI): freedom, respect, quest for truth, unattended security, careful exhibition of human harms, honesty and critical awareness. Chart 1 summarizes the human aspects in relation to technologies and technological arrangements, their benefits, impacted sectors, expected values and virtues or essential values for the coexistence among men and the analyzed technologies.

[63] http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2014/lei/l12965.htm

[64] http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2018/lei/L13709.htm

[65] https://www.dataguidance.com/news/brazil-chamber-deputies-announces-introduction-bill-ai

Table 1 Summary of Technologies and Required Values

	Technologies or Technological Arrangements	Impact	Benefits for humans	Major impact in brazilian industry	Human values often required	Fundamental human value
1	Internet networking	Structural impact on work arrangements, distribution and network formation	Reduction of efforts, changes in distribution networks and intensification of network relationships	All sectors: Retail, Consumer Goods, Industry, Services	Attention, efficiency, freedom	Freedom, Security
2	TICs/ Social Networking	Impact on lifestyle changes, image and media consumption	Intensification of interpersonal relationships, ease of access to others	Almost all sectors: Retail, Consumer Goods, Media, Advertising	Will (interaction, exhibition), Friendship	Respect, Truth, Solidarity
3	IoT	Strong impact on monitoring natural resources and impact on cities	Monitoring, combating waste, predicting natural disasters, urban mobility	Cities Management (Smarts Cities), Agriculture, Industry in general, Retail	Security, prudence, surveillance	Individual Freedom
4	Blockchain	Impact on cost reductions and information security, reduction of interfaces, intermediaries	Reducing efforts, operating costs, time optimization, financial transaction costs	Banks, Payments Means, Logistic, Supply Chain, Government Support, Sanitation, Electricity, Registry	Transparency, self sufficient, individual freedom	Honesty
5	Artificial Intelligence	Acceleration of the man-machine relationship, influence on choices, formation of clusters.	Robot learning, interaction, socialization, increased life expectancy (health)	General services, Health, Banks, Agriculture, Retail, Industry in general	Open Spirit, Machine knowledge, Self-knowledge	Critical spirit, prudence

It is necessary to ensure that the relationships brought about by these technologies are productive, to direct attention so that they are able to teach, facilitate, allow better use of time, optimize natural resources, protect the environment, unite people and enhance human beings. If these technologies are partly being used in the opposite direction, it is a sign that adjustments are needed. We don't use AI to think less. We do not want to monitor crops with Internet of Things to degrade the planet. We don't want to save distances over the Web to simply have an even more intense work routine. We do not want to eliminate more and more jobs and accelerate structural unemployment and the increase in inequality. It is necessary to avoid misuse of data, violations of the right to privacy and a threat to democratic stability. We cannot rely solely on the use of individuals' moralss in the face of technology. The challenges that these technological mechanisms are instigating, depends on an effective participation of the State, Legislative and Judiciary Powers and technology companies.

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From a Society of Knowledge to a Society of Conciousness A Call for Awareness Is on Its Way

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Abstract: The convergence of today´s critical sanitary environmental and social-economical crises is pressing Humanity towards Shifting Point from which e New Paradigm could emerge, where accelerated scientific-technological innovations transforming social relations may enable a leap of conscience with the improvement appreciation of human life conditions and better caring the planet as a whole opening for a more Fraternal Cooperation and Sustainability mind set. The crisis is systemic and has moral roots, so the solutions is asking for a change in Human Values and Human Conciousness that may already be found in Initatives like a New Socio-Economic Models such as the Economy of Francisco, the Society 5.0 that are emerging and the 2030 Agenda for Sustainable Development; moreover there is already a Humanity Awareness Movement that defines patterns for levels of Global Conciousness that together with other Development Systems Models may help to follow up the process of the transition from the Society of Knowledge to the Society of Conciousness. This close global monitoring would be given us chance for a better global and local management showing signs of improvements, and given calls for alerts. This paper presents advances in this direction and shows how the ICT revolution on its way may already give support to collectively on-line follow-up with already existing important synthetic indicators that represent basic sensors for the process, showing what may be the Way for the Future, and what kind of Methamorphose we may be emerging.
Keywords: Present day crisis; Global Conciousness; Monitoring transitions

1 Introduction

We are living now at Critical times where the extent of the impacts of the Covid 19 pandemic on human life, global economy and organizations remains unclear. However, we known that it has already become a catalyst for change and could explore this process more deeply (Fuller, 1982). The need for innovation and a leap in consciousness are very great, leading to challenges never faced before. The question is how will be dealing with that. No doubt advanced technologies like ICT (Huawei, 2020) may help to join efforts to deal more efficiently with new challenges, but it is necessary to know their impacts on people and the world. It is clear that is affecting the daily lives of most of the population, and the uncertainties about a nearby future are great; however this crisis is also driving to new ways of seeing, feeling, thinking, doing, believing and praying, so we may hope that it may lead to a new way of Being: a Humane Centered Metamorfose.

Social isolation in quarantines has led to an accelerated jump in the Digital Age with children and parents online. We are far and near at the same time. The domestic church (Pope Francis) in the midst of a pandemic makes it possible to supply the needs of the spirit in search of God, provides families to gather in the domestic environment for an encounter with God, that children continue to learn about the things of God, that people find solace in the midst of losses and gains because he, God, is everywhere regardless of the advancement of technique, although information and communication technology is beginning to be propagated in religious circles as a means of valuing and propagating faith and gospel.
In Japan, in the absence of physical fans, due to the social isolation imposed by the Covids pandemic, fans are even used in games made up of robots that wave flags and simulate the crowd dance that four months ago was composed of human beings. People are quickly learning to connect by designing pages and lives on the internet following rules to please Google's search algorithm more than any human being (Harari, Geiger, 2018); then, just as a synchronized global crisis appears, it is possible to find a systemic convergence of solutions. Joining two problems sometimes leads to a solution.

2 The Roots of the Crisis

The accelerated advancement of technology is considered as the mentor and engine that is providing the transformations we are experiencing, starting with the reorganization of the capitalist institution, the health institution, the home, business, churches, education, leisure, living together at the same time of confinement and unlimited technological access, which simultaneously closes and opens. Closure because people are cloistered for fear of death, for often selfish care and obedience to the thought rules, it is not known how and imposed on those who do not know exactly what happens; openness because

relationships in new digital models are put into practice quickly to meet the need for people to be together even though they are separated, in a paradigm of both fragmentation and holism in which the human family needs protection.

Social relations are being forced to transform the way they happen in order to survive the storms not yet experienced in human history. What is really behind the 2020 pandemic? The need to advance technologically? A qualitative leap in life? The end of time? God in a new attempt to rescue humanity? Albert Einstein and Bertrand Russell sixty-five years ago expressed the need to remember humanity and to forget everything else (Figure 1).

The July 9, 1955 Russell-Einstein Manifesto message was as pertinent at that time as it is today. The crisis of humanity has multiplied exponentially in intensity and complexity: disease, hunger, poverty, unemployment, inequality, political, financial and economic destabilization, imbalance of national leaders, drastic climate changes culminating in a total global imbalance and the globalization of inequality, according with Pope Francis in his homily of July 8, 2020.

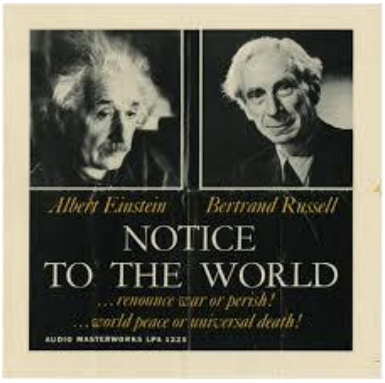

Figure 1 Albert Einstein and Bertrand Russel
Source: Audio Masterworks LPA-125

In the world society there are so many inequalities and more and more people are discarded, deprived of fundamental human rights, that it reaches the height of some feeling more human than others. "The common good presupposes respect for the human person as such, with fundamental and inalienable human rights oriented towards their integral development". The notion of the common good also encompasses future generations. One can no longer talk about sustainable development without intergenerational solidarity, which is a question of justice because the land we receive also belongs to those who are to come. As mentioned on the Laudato Si (Pope Francis, 2015):

The urgent challenge to protect our common home includes the concern to unite the entire human family in the search for sustainable and integral development, as we know that things can change. The Creator does not abandon us, never retreats in his project of love, nor does he regret having created us. But the crisis has arrived, and how to find overnight a social and economic model to deal with disruptions of all kinds, guided by the principle that it is necessary to protect humans and not Jobs as indicated by the Pope: "One should focus on providing for people's basic needs and protecting their social status and self-esteem" because employees are losing their relevance rather than being exploited, making human lives as if were not human. The crisis has deep moral and spiritual roots and the solutions are not found only in technique, but in a change in the human being.

3 A Human and Social Fragility

"The current pandemic is heralded as a global risk ignored by almost all countries. The crisis affected public health, the economy, social relations, transformed life all around the world. It is not yet possible to measure the impact in these areas, but we can ask ourselves: why are we so poorly prepared, why this lack of Resilience? and most importantly, how could we prepare for the day after?" Covid 19 has shown that societies are much more fragile than previously thought and expose the governments' inability to guarantee basic rights. (Miguel Gutiérrez, 2020). The global challenges of the IV Industrial Revolution - artificial intelligence, new systems of production of goods and services, digital changes - added to the pandemic 2020, which has become more than just a public health issue is leading to a very serious global social, economic and environmental crisis. The crisis is pressing local and multilateral institutions to overcome the situation and face the new scenario that is emerging. (Casanueva et al, 2020).

Excessive modern anthropocentrism, paradoxically, placed technical reason above reality (Laudato Si), the human being started to explore nature without worrying about what might happen to it and its relationships and the negative externalities on its way (Pope John Paul II). The limits impose by reality represent the possibility of a more pleasant and fruitful human and social development, since exponential and unlimited technical and economic development is meaningless for a finite world. "A disordered anthropocentrism generates a disorderly lifestyle" (Laudato Si), in which the priorities are in the individual interests not concerned with the other, nor with the environment or even less with the planet as whole. The human being replaces himself in the place of God, instead of placing himself in a position of humility as a collaborator of God in the work of creation (Laudato Si).

Technological growth has not been accompanied by human development in terms of responsibility, values and conscience (Laudato Si). Anthropocentrism leads to a crisis in values: the human being sacrifices others for himself, he lacks duties to the community, lies to himself, hides his shortcomings and weaknesses, rejects the evil he does to others and reduces him to nothing, the family's mission disappears and past experiences are not valued.

However, on the other hand, humanity is entering a stage of greater awareness, in which sensitivity to the environment and the care of nature and planet grows and some organizations like OXFAM[66] are leading the way. The pandemic has become a trend accelerator. We don't know how it will transform life, but we know that technical changes have no turning back. When the pandemic is over, we will see it as a rupture event that opened a new era.

4 A Crisis and Our Global Brain Waiting for a New Global Hearth

To help given rise to a *New Normality*, and already thinking that Crisies brings risks and opportunities, we may need to rapidly develop New Economic Models, as may soon be proposed by the Economy of Francesco[67], to quickly overcome the challenge of activating Economy and Work under the new Digital Era and our Global Brain going fast on its way; and already observing that this Covid 19 crises is leading to foster worldwide collaborative efforts, like the ones of the World Economic Forum – WEF[68], to perform a paradigm shift that may change the human condition systemically accelerating ecossociodevelopment changes so much needed to improve performance for the Well-Being of all (Gutiérrez, 2020); but using a more holistic interconnected approaches that may bring some light into hidden reality and deeper problems of the world system: environmental problems, human, family, work, urban contexts, starting from each person's relationship with themselves, and which generates a specific way of relating to others and with the environment (Laudato Si). The human family needs to become aware of the interconnection in the universe of God and to conceive a paradigm of sustainable solutions for the planetary crisis.

For this purpose is important to remember that Futurist Eleonora Mazani decades ago mentioned that there are three types of transformations to be considered: scientific-technological transformations (increasingly accelerated), socio-cultural transformations (much slower and more diversified) and institutional ones (always almost not running). The lack of coherence among the three processes makes the machine / system almost stop or freeze. More recently Vincenzo Balzani from the University of Bologna in Italy consider the great and urgent need of worldwide Economic, Energetic and Cultural Transitions[69].

The paths being chosen could end up determining the process of evolution from the Knowledge Society to the Society of Consciousness, and may or may not result in the integration of nature-society-man-technology. Considering a Complex Dynamics System approach (Krackauer, 2019) and the fact that there are Nivels of Reality and Nivels of Perception of Reality, accelerated advances in knowledge technologies may enable the development a new way of being, thinking and feeling that makes each human become an active element of the community and designs a new order of existence that integrates social organization through holomorphic networks, considering the importance from the behavior of each human being to the formation of a global planetary brain structurally and mentally healthier (de Hoyos, Dib, 2007).

Moreover the political, cultural, social, economic and ecological dynamics that impact the structure of the Global Brain in the face of the current crisis will need to be worked on and used with discretion,

[66] https://www.oxfam.org
[67] https://www.unitedwordproject.org/en/events/the-economy-of-francesco/
[68] https://www.weforum.org/agenda/2020/covid-19-the-great-reset
[69] http://www.settimananews.it/societa/tre-transizioni-necessarie/

since the trend is that unlimited growth in the use of technology and an increase in the degree of complexity of relationships causes more and more social instability. The saturation generated by the trivialization of the level of information conveyed by the media, like fake news, leads to the alienation of the population in general that reflect on daily life and consumerism, pressuring humanity to be at the service of capitalism, and not the other way around, more based on the ethics of solidarity and diversity. The future of society in the new scenario depends on both technologies and the development of ethical, aesthetic and spiritual dimensions in human beings and socio-political institutions in general.

5 Metamorphose and the Emergence of a Global Heart

Social institutions will not be able to survive with the current conscience that walks along the traditional path imposed more than 500,000 years ago. The challenge for the crisis is not to find the best of all worlds, but a better world that follows the necessary technical, social, health, institutional, ecological, educational, leisure and religious changes. A great crisis is not just a crisis, but the result of so many crises in different times and spaces, and they are all cognitive crises (Morin, 2013) and part of a Complex dynamics that may even lead to a Metamorphose. Hence a future to be thought about, needs a deeper understanding of what may be happening at the present moment. "If we take into account the complexity of the ecological crisis and its multiple causes, we must recognize that the solutions cannot come from a single way of interpreting and reforming reality." (Laudato Si). The problem is not in finding paths because they are there, and most likely the new path is a combination of different possibilities; and structural sócio-political transformations are necessary as mentioned by Greta Thunborg (2020):

The climate and ecological crisis cannot be solved within today's political and economic systems.

Moreover as observed by Edgar Morin: "…*politics should have a mission to achieve a human ideal of freedom, equality and fraternity and open the way for the disaster humanity to reach a compromise with reality and manage to change it*"

So, the fact that we cannot know with certainty what the future we want should be like brings anxiety and fear, and this may have impacts on our destiny (Barrett, 2012). The reforms have limits, because one cannot rationalize existence, and so there is no way to guarantee happiness. But, do we have the capacity to Transform Humanity to stimulate the Metamorphosis of the road? (Morin, 2013). Trust and mutual help are key points in this search, faith and reason must go together, and faith must be reasoned. The reforms will be interdependent, and they will mobilize each other, this movement will allow the changes to be dynamized among themselves. In the same way Yehezkel Dror (2020) from the University of Jerusalem considers that Humanity faces great challenges such as those of climate change and the current pandemic that requires to properly regulate the accelerated advances in science and technology that are having great impacts on the future of ourselves and the whole biosphere; for which institutional changes, limitations on sovereignty will be necessary to be able to implement global consensual and collaborative decisions promoting a new type of leadership based on merit and public support, such as Angela Merkel in Germany and other important female leaders in countries like Denmark, Finland , Iceland, and Norway and New Zealand which have been shown to be more efficient in dealing with the Pandemy (Shanal, 2020). Dror in fact considers that:

Taking into account the strength of nationalism and vested interests, it may well be that only catastrophes will teach humanity to metamorphose into a novel epoch without too high transition costs. But initial steps, such as United Nation reforms, are urgent in order to contain calamities and may soon become feasible.

The exploitation of resources in an irresponsible way with the purpose of taking possession of power, concentrating everyday more in the hands of a few, generates an imbalance in the world and in people, being the result of a partitioned vision. The ecological paradigm studies the relationships between living beings and the environment where such relationships occur and generates models of development, production and consumption, considering that everything is interconnected as well as time and space, atoms and subatomic particles, physical, chemical and biological elements, and techniques, societies and the world; already indicated on the Kybalion (Three Intitiates, 2008) and nowadays by the Fractoly approach[70]. Living species are intertwined in a plot that we can never fully understand, today it is concerned with fragments, and it is ignored that everything is interconnected, and that we are all responsible for balance, well-being, and for a fraternal society.

[70] https://fractology.info/

The global crisis is pressing local and multilateral institutions to be alert in order to be able to overcome todays context facing the emerging new scenario (Casanueva et al, 2020). Our care for the common home depends on skills to revitalize being and relationships and the use of high-performance computational and molecular technologies in therapeutic and everyday operations and interventions, which paradoxically for the first time in history are making the world incomparably better. In times of global awareness and home office work and study, the skills that have been most valued are adaptability, resilience and flexibility, followed by collaboration, communication, creativity and empathy, that are closed to the ones suggested by Italo Calvino some time ago (1993), among others. Social isolation is changing the way people relate to themselves, at home and socially in general.

6 The Humanity Awareness Movement

The way humanity has been dealing and interacted with nature and transformed the planet makes it self-organize or defend itself, the current state of affairs is causing nature to transform itself to survive, such is the emergence of pandemics caused by viruses like Covid 19. And so, the essence of the crisis resulting from global warming is in the entropy of our planet's natural system (Gore, 2006, 2013).
According to Lester Brown founder of the World watch Institute[71] our civilization in order to be saved must achieve four interdependent goals: stabilize the climate and population growth, eradicate poverty and restore nature's natural supports such as water, soil and air. A healthy innovation system could employ a combination of public funding and patents. Global and sustainable development is underpinned by a combination of harmonized public and private funding on a global scale to ensure that the needs of the poor and global common goods are adequately addressed and financed by shared contributions from governments around the world (Sachs, 2008).

The awakening of the global mind is disturbing established patterns of consciousness by opening space for emerging centers of influence outside the control of elites, and by generating potential for reform of established dysfunctional behaviors. Sustainable development requires removing the main sources of deprivation of liberty, poverty, tyranny, economic opportunities and systematic social destitution, neglect of public services and intolerance or interference by repressive states (Sen, 2000).
A closer look to how the European Union – EU is facing the crisis, allows us to understand why the Latin America and the Caribbean – LAC has not been successful either as a region or countries in the face of the pandemic and its effects. There is a great contrast on how these two regions are facing this systemic and multidimensional crisis that characterizes Covid 19 and prepares the future. The EU and LAC are two regions with undeniable historical relations and a strategic association formalized decades ago. The EU adopted decisions that countries cannot implement in isolation, actually more than seventy years ago they decided to start an integration process that has been sustained until today (except for the BREXIT), and whose basis is a political project with economic sustainability based on cooperation and the transfer of sovereignty, because without integration and Collaborative work there is no future. The EU is an example for LAC (Casanueva, 2020). More than ever cooperation is needed to deal with the challenges of the moment. According to Borge Brende, president of the World Economic Forum, it is not surprising that the coronavirus is a case of a lack of global cooperation that is opening new paths for competition (Brende, 2020). Moreover very recently, in the face of the current pandemic crises, the 27 EU countries unanimously approved a US$ 875,000 million support and recovery program in the “next generation” proposal that focuses on the future of Europe[72].

In 2015, the United Nations adopted the “2030 Agenda for Sustainable Development” with Sustainable Development Goals (SDGs) in the hope that the SDGs will occupy a central place to deal with the new challenges. New technologies and services are being created one after the other through new combinations and / or integration into an existing technology system, with important changes taking place in the world. At the same time as the lifestyle changes, social complexity increases, and negative aspects of the new digital society become apparent; and for example, in relation to Goal 8 the decrease in the workforce that will become much larger in the future (Keindaren Society 5.0, 2019).

In the call for the event “The Economy of Francesco” to be held in Assisi, Pope Francis (2019) mentions that

“ it is necessary to correct growth models that are unable to guarantee respect for the environment, acceptance of life, family care, social equity, workers' dignity, the rights of future generations. Unfortunately, the call to become aware of the seriousness of the problems and, above all, to implement a new economic model, the result of a culture of communion, based on fraternity and equity, remains

[71] https//www.climatenetwork.org/profile/member/worldwatch-isntitute
[72] https://ec.europa.eu/commission/presscorner/detail/enIP_20_1007

ignored. Francisco de Assis is an example par excellence of caring for the weak and an integral ecology ...".

The Humanity Awareness Movement[73] on the other hand is an initiative of the Barrett Academy for the Advancement of Human Values[74] that helps make tomorrow's awareness visible today, in an attempt to better address the question: what would a community or nation be like if it were operating from of a more human consciousness? Human consciousness is a new emerging worldview that empowers people to become aware of their world, a way of seeing and interpreting the world in which they live that goes beyond the premise of culture, because groups of people all over the world can share the same vision of the world even being from completely different cultures

Richard Barrett's model developed from Maslow's idea of the hierarchy of needs, provides a map to understand and create more harmonious and productive relationships for overcoming the current crisis. It is true that when the human being puts emphasis on beliefs based on fear and lack of trust, when meeting his low level needs, his subconscious mind seeks ways to satisfy these same needs, not allowing the development of high level needs to be explored (Barrett, 2018).

According to this model, the human being needs to survive, belong to a group, take care of self-esteem, evolve, move from the awareness of 'me' to 'us', seeking unity and service mentality, transforming ourselves from the inside out in a new man, a new woman and changing the way of seeing, and taking care of yourself and the world. Actually, only when the human being learns to satisfy and monitor his needs will his mind be free to transform and develop other higher needs. The human being reaches the stage of well-being in changing the level of consciousness when he reaches freedom and autonomy to be what he really is; and achieve well-being at the higher levels of consciousness when they find meaning and purpose for their lives, when they realize they can make a difference in the lives of others and when they can be of service to the family, community, nation or welfare of the Earth. The joy experienced with the development of needs leads human beings to desire to more for the well-being of all.

7 Monitoring Progress toward a Society of Consciousness

The ICT Revolution already on its way (Huawei, 2019) may help to yearly Monitor the Transition from a Knowledge Based Society to a Society of Consciousness. To see how this could be done were selected 4 Basic very representative Global Synthetic Indexes as well as an updated Data Bank consisting on 53 Countries, that have common data for the 4 Indexes selected, that were organized into 3 Groups/Regions: 12 Iberoamerican Countries (AIBER), 21 Advanced Economies Countries mostly form the EU (AVECO) and 19 Countries form other Regions (OTHER).

SPI Social Progress Index that deals basically with 15 topics: Basic Human Needs, Foundations of Well-Being, Opportunity, Nutrition and Basic Medical Care, Water and Sanitation, Shelter, Personal Safety, Access to Basic Knowledge, Access to Information and Communications, Health and Wellness, Environmental Quality, Personal Rights, Personal Freedom and Choice, Tolerance and Inclusion and Access to Advanced Education.

SDGI Sustainable Development Goals Index that deals with 17 Goals: No Povetry, Zero Hunger, Good Health and Well-Being, Quality of Education, Gender Equality, Clean Water and Sanitation, Affordable and Clean Energy, Decent Work and Economic Growth, Industry Innovation and Infrastructure, Reduced Inequalities. Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action, Life below Water, Life on Land, Peace Justice and Strong Institutions, Partnership for the Goals.

S5I Society 5.0 Index that deals basically with 10 indicators: 4 Regarding Skills for the future (Data Management, Business Global Ranking, Machine Learning and Software Engineering), 4 Regarding Society (Global Innovation Index, Control of Corruption, Vulnerability and Susceptibility) and 2 Regarding Development (SPI and HDI).

GCI The Barret Global Consciousness Indicator deals with 17 Indicators and 7 Levels each one focusing certain aspects: L1 (Level of Corruption, Physical and Mental Health infrastructure and Economic Performance), L2 (Personal Safety and Level of Militarization and Peace/Violence), L3 (Access to and Quality of Education, and quality of Business infrastructure, support to entrepreneurs and labor market flexibility, L4 (Individual Freedom and Social Tolerance, Level of Democracy, Press Freedom and Gender Inequality), L5 (Strength of Personal Relationships, Social Network Support and Civic Participation and Foundations and Opportunities for Social Progress), L6 (Health and Quality of

[73] https://assets.website-files.com/5da907821e9c2c81a986dd1e/5dbb1a04be2d936ec0130cf6_foundation-paper-for-humanity-awareness-february-2019.pdf

[74] https://www.barrettacademy.com/7-levels-of-consciousness

the Natural Environment and Quality of Preservation Efforts), L7 (Strength, Stability and Legitimacy of the State and Level of Happiness of the people).

Actually when seen through Statistical lens even given the complex local and global dynamics of the development processes, there is a close interrelation among most of the variables being considered that ends up into high correlations r among the 4 Indexes as could be seen on Figure 2, so that countries that are doing well on one of them most likely are also going well on the rest. Moreover Table 1 shows an ANOVA Comparison among the three Groups (AIBER, AVECO, OTHERS) using the four Selected Normalized Global Indexes (0 -100); and Figure 3 is the corresponding Radar Graph. As could be seen as was expected AVECO is always the best then comes AIBER and last OTHERS; and both SPIn and GCIn show greatest differences among the three Regions (p=0,000 in all cases), and AVECO always the best followed longly by AIBER

So in particular, as one could image, the countries that show greatest development in all the 4 Indexes and in particular regarding Global Consciousness are: Switzerland, Denmark, Norway, Finland, Sweden, New Zealand that already reach the People Awareness Worldview so they are very close to the an emergent highest one called Humanity Awareness Worldview that may e*nable people to make sense of their world—a way of seeing and interpreting the world they live in* (Barrett, 2019). Perhaps no wonder 4 of these 6 countries have Women leadership as mentioned before!

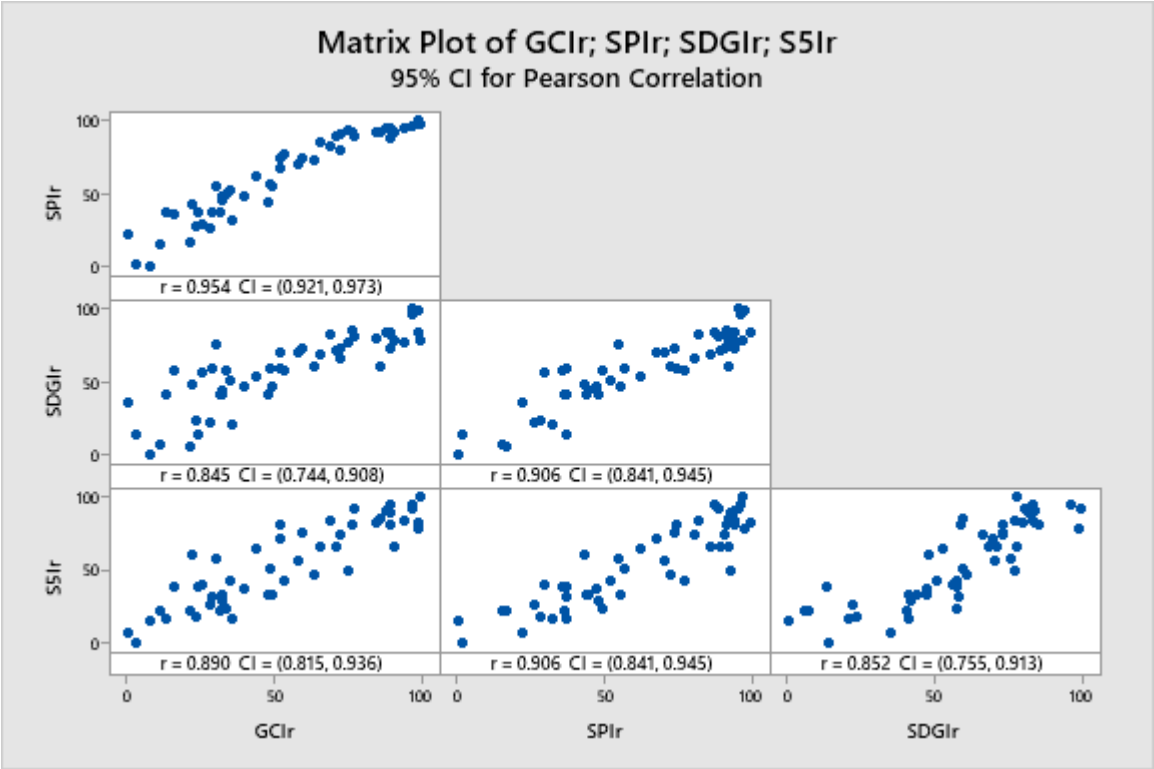

Figure 2 Dispersion Graph

Table 1 ANOVA Comparison of the 3 Regions Using the 4 Indicators

	SDGIn	SPIn	S5In	GCIn
AIBER(12)	51.3	56.69	43.16	44.49
AVECO(21)	78.76	90.56	80.67	83.22
OTHERS(19)	40.12	36.69	34.27	27.71
F	23.52	**55.26**	36.12	**61.18**

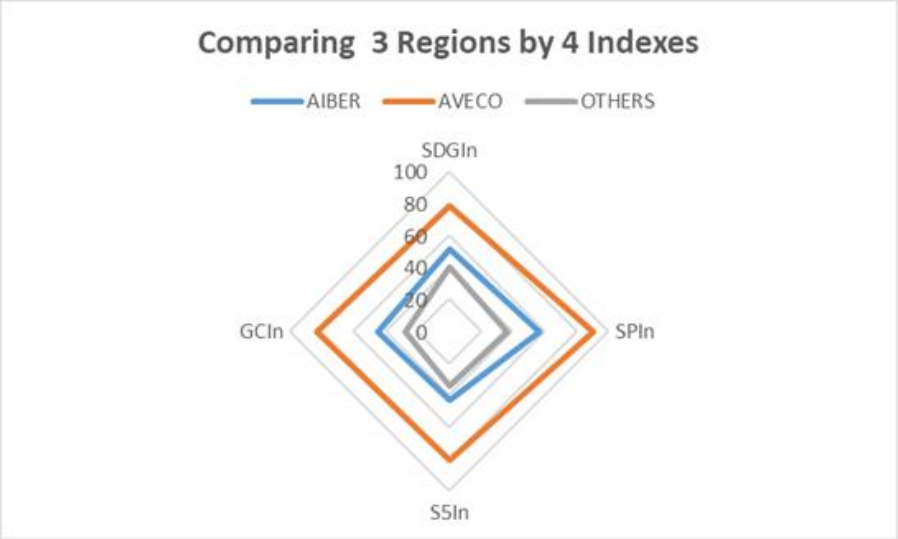

Figure 3 Radar Graph

8 Final Considerations: A Call for Awareness Is on Its Way

At present, the extent of the impact of the Covid 19 pandemic on human life, the global economy and organizations remains to be seen. But it is known that it has already become a catalyst for change, a *Shifting Point*. The need for innovation and leap in consciousness is very great, leading to challenges never faced before. The question is, how quickly can we act? Technologies can help to deal with new challenges, but it is necessary to know their impacts on people and the world. "For example, politics should have a mission to achieve a human ideal of freedom, equality and fraternity, open the way for the humanity avoid disaster and come-to a compromise with reality and manage to change it." (Morin, 2013) The challenges for changing the world are six (Gore, 2006, 2013): a fully interconnected global economy that integrates capital flows, production, consumer markets and governments; interconnected networks that bring together thoughts and emotions and connect equipment, robots, ubiquitous sensors and databases that form a global mind; world political, economic and military power being transferred to emerging centers of power; rapid and unsustainable growth; biotechnological innovations capable of leading to longevity and improving the productivity of the land and which has a strong influence on the evolution and maintenance of the biosphere; change in the relationship between human beings and nature to reestablish a healthy and balanced relationship between global civilization and the future prospects of the planet to overcome this Pandara Paradigm Shift; and for which one may need to go through a Global Awakening, a Methamorphose that may come through a Conscious Evolution[75] that may help to foster the ICT Revolution. In fact, and as mentioned by F. Capra and H. Henderson (2020) just widening human awareness would reveal how the planet actually functions. For this purpose a Science of Consciousness need to emerge with joint support of Science and Traditions like is the case on the Akashic Field of Ervin Lazlo (2004) and in particular the contributions of Teilhard de Chardin (1961) for our Evolutionary Processes of Conciousness, where he mentions that Knowledge accumulates and is transmitted in increasing levels of depth and complexity; this leading to a further argumentation of consciousness and the emergence of layers of consciousness that envelops the Earth the *Noosphere*; that will fuse and consume into a tipping *Omega Point*, representing all consciousness together as well as all that may be conscious of and that one may call The Society of Conciousness.

The Statistical analysis presented in this paper deals with a set of countries that make up 3 representative groups of nation/regions that we are calling AIBER, AVECO and OTHER, and shows the relevance, for Global Monitoring, of using some basic synthetic indexes: GCI, SPI, SDGI and S5I. As shown before the 21 countries that make up AVECO, are nations with a more developed economy and performed better in the four indexes than the other two groups. The results of these analyses support the current initiatives such as Society 5.0, the Humanity Awareness Movement; and of course, the UNSDG 2030 Agenda. So one may reach to the conclusion that present times needs global support for the development of Global Consciousness, the Economy of Communion, Consensual and Collaborative

[75] https://www.barbaramarxhubbard.com/

Global Decisions, Ecological Awareness, Vision of the Future, Cooperative Research in Health, Scientific-Technological Transformations; and following the European example seeking Startegic Colaborative Aliances to be able to be able to walk together in order to make a different and better future for the Planet and for each one of us.

The effects of individualism and selfishness in the westernized and globalized world were destroying solidarity. Globalization is both the possibility of the emergence of a new world and the possibility for humanity to self-destruct. A Global civilizatory policy will need to restore solidarity, rehumanize cities, revitalize the rural world, go from the quantitative to the qualitative, defend the best and not the maximum, and thus contribute to the reform of existence, for the Well-Being of all. Ecological policy should contribute to the policy of civilization, which in turn contributes to ecological policy. On other hand constitute a so much needed reform paths synericaly converging with other paths, such as education, consumption and life (Morin, 2013); moreover as already observed by Richard Barret on his book *Love and Fear and the destiny of Nations* what it makes a difference is Love, and as the wisdom of traditions indicates this is valid not only for our countries but also and in particular for each one of us, since Love is not only what gives meaning to Life (Dante Alighieri, 2016) but is what give LIFE to life:

But already my desire and my will were being turned like a wheel, all at one speed,by the love which moves the sun and the other stars.

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Research on the Relationships among Investments in Science, Technology & Innovation and Socioeconomic Development

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Abstract: The purpose of this article is to correlate socioeconomic development indicators from a sample of fourteen countries, including Brazil, and the performance indicators in Science, Technology and Innovation CT&I. Statistical techniques of correlation between Science, Technology and Innovation indicators published by International Reference Institutions were used and the results showed high correlations between gross investments in ST&I and the Gross Domestic Product - GDP, as well as the position in scientific production (R^2= 0.85 in both analyzes). The correlation between investments in CT&I and the competitiveness ranking was low; however, the innovation ranking showed a median correlation (R^2 = 0.61) when related to the percentages of GDP invested in CT&I. The correlations between the innovation and competitiveness rankings with the HDI were also median (R^2 = 0.61 and R^2 = 0.56, respectively). The ST&I indicators were not correlated with GDP growth rates and unemployment rates. The study is limited to a sample of fourteen countries, chosen due to similarities with Brazil, but it can help in directing public policies for generating knowledge through investments in science, technology and innovation. The study is particularly important due to the indication that investments in knowledge generation (science, technology and innovation) do not necessarily decrease unemployment, but improve the HDI - Human Development Index.

Keywords: Knowledge, Innovation, Technology, Science, People management

1 Introduction

Analysis of opportunities and threats, as well as clarity about global megatrends, allow countries to prepare for the constant changes that affect society and the economy of the current world (Marcial, 2015). The Brazilian economy has been formally in recession since the second quarter of 2014. The Brazilian per capita product fell about 9% between 2014 and 2016, the growth rate of the Brazilian economy fell from 4% to 2% per year and the sector Brazilian public went from a primary surplus of 2.2% in 2012 to a primary deficit of 2.7% in 2016 (Barbosa Filho, 2017).

Following the downturn in the economy, federal government budget cuts were made in different areas, including science, technology & innovation (CT&I). In 2014, Brazil allocated 1.27% of GDP to research activities, totaling R $ 7,3 billion (Davidovich, 2017).

Nevertheless, in March 2017, the costing and investment budget of the Ministry of Science, Technology, Innovations and Communications (MCTIC), which excludes personnel expenses, was limited to R $ 3.2 billion in 2017 - 44% lower than what had been established in the budget law, and less than half of the committed budget of 2014. The budget for 2018 was about one third of that allocated eight years ago (Davidovich, 2017). On March 29, 2019, contingency of 42,27% of the CT&I budget for 2018 was announced by the federal executive branch, having now only R$ 2,947 billion for discretionary expenses in 2019 (SBPC, 2019)[76].

2 Theoretical Background

Megatrends are driven by the innovation economy, whose scientific and technological advance expected for the next decades will put humanity in a new era, where several areas stand out, such as: automation, robotics, nanotechnology, biotechnology, among others (Marcial, 2015).

Faced with these cuts, the Brazilian scientific community, mainly coordinated by the Brazilian Academy of Science (ABC) and the Brazilian Society for the Progress of Science (SBPC), mobilize efforts to demonstrate to government officials that resources for “science is not spent, it is investment! " (ABC et al., 2017).

Even in organizations, research and investments in science and technology encourage employees to create and have the autonomy to take risks, aiming at increasing the company's innovation index and increasing employee motivation and loyalty (Barros Neto, 2002).

[76] http://portal.sbpcnet.org.br/noticias/entidades-cientificas-e-academicas-criticam-severo-corte-do-orcamento-atingira-em-cheio-a-cti-nacional/

The future is uncertain, whose unpredictability and globalization have an impact on unlikely, unpredictable and highly disruptive changes in a short period. Nevertheless, global megatrends remain - social, economic, political, environmental or technological - that are configured as changes that are slow, however, once they take root, they have a lasting influence on many activities, processes and perceptions (Boumphrey and Brehmer, 2017). This relative stability makes it possible to predict a likely medium-term future in the long run, with some degree of confidence, and today guides the governance of public and private organizations.

Where there is potential for innovative action, a new idea or another way of doing what already exists, then there will be a favorable situation for a potential entrepreneur who will demand more research and investments (Barros Neto, 2018).

3 Methodology

In order for comparative analyzes between socioeconomic and ST&I indicators to be carried out, some countries were chosen for data collection. The choice was based on different parameters, namely: (i) countries that have active cooperation with Brazil, that is, that have cooperation agreements in the area of ST&I in force and several activities in progress; and (ii) countries that are renowned for scientific production, innovation and competitiveness in the world.

Among all the countries that fit the above characteristics, a categorization was carried out in order to balance the number of countries according to the following characteristics: GDP, HDI and how much is invested in ST&I (percentage of GDP)[77]. Four groups were created, whose countries in each group have the following indicators in common:

• Group 1) leading countries in the world economy (highest GDP), with high HDI (developed countries) and with significant investments in ST&I: United States, Japan, Germany and South Korea.
• Group 2) leading countries in the world economy or with expressive GDP (over U $ 1 trillion / year), with a median HDI (developing countries) and which have representativeness in ST&I: China, India, Brazil and Mexico.
• Group 3) countries with lower GDP (below U $ 1 trillion / year), with a high HDI (developed countries) and with a high percentage of GDP invested in ST&I: Netherlands, Switzerland, Israel.
• Group 4) countries with lower GDP (below U $ 1 trillion / year) and low investment in ST&I: Turkey, Argentina and Chile.

4 Results

Data on socioeconomic development and CT&I performance for the selected countries can be seen in Table 2. The countries that invest most in ST&I (in US $) are, in decreasing order, the United States and China. Brazil, in turn, is in seventh position among the selected countries. Chile, on the other hand, is the country that least invests in ST&I among the countries analyzed here, both in terms of gross investment values and the percentage of GDP, with the lowest GDP as well.

Although Israel is the second lowest GDP, its gross investment in CT&I equals that of Switzerland and Mexico. This is because Israel, like South Korea, is the country that most bets its development strategies in ST&I in relation to the percentage of GDP (4.3%).

The correlation between GDP and investments in ST&I in 2018 (in US$) shows a high exponential correlation (R^2 = 0.85), as shown in Figure 1. However, when comparing the GDP of the selected countries with the percentages of GDP invested in CT&I there was no correlation (R^2 = 0.13).

[77] https://www.weforum.org/agenda/2018/12/how-much-countries-spend-on-r-d

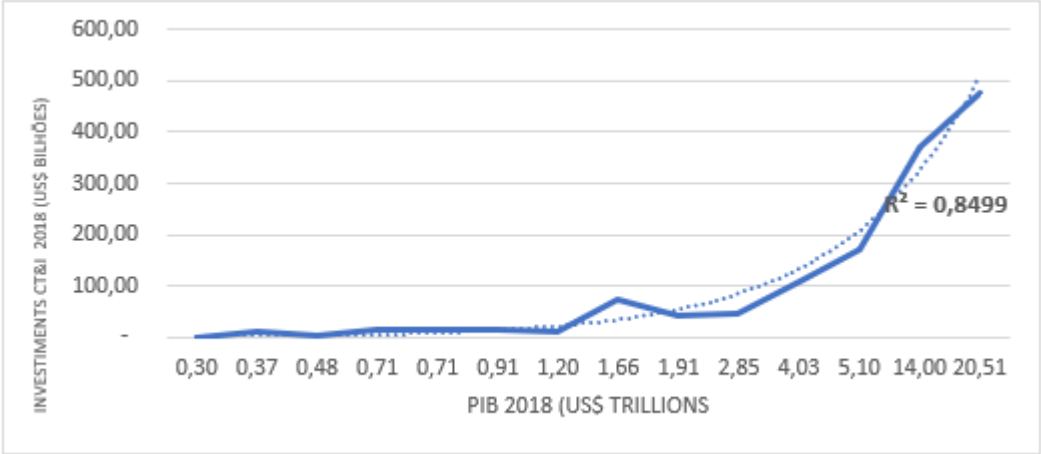

Figure 1 Correlation Between 2018 GDP and CT&I Investments in 2018, in Gross Values (US $)

Source of data: Desjardins (2018) and IMF (2019).

It appears that there is a high exponential correlation between how much is actually invested in CT&I (US $) and the position in the SJR ($R^2 = 0.85$). Nevertheless, the linear correlation of GII and the exponential correlation of CGI with gross investments in CT&I were low ($R^2 = 0.43$ and $R^2 = 0.32$ respectively). This can be explained because the SJR considers, in the main, the numbers of publications and citations - concrete results of investments in CT&I and, therefore, reflect the volume of research projects and scholarships awarded.

The CGI and GII are more complex rankings, considering more factors for determining the index that determines the position in the ranking. The GII, for example, in addition to considering the number of patents, takes into account the business, political and regulatory environments, as well as human resources, infrastructure, market sophistication and business. The GCI, on the other hand, considers trust in the analyzed market, such as transparency, property rights, security, and social capital, among others. The correlation in the rankings was demonstrated according to the percentage of GDP invested in CT&I. In this context, the SJR does not show a high correlation when compared to gross investments (R^2 of only 0.26). The GCI correlations for gross investments or percentage of GDP were similar (R^2 close to 0.45 for both). The GII, on the other hand, presented a slightly more pronounced linear correlation when considering the percentage of GDP invested in CT&I, although the correlation is still moderate ($R^2 = 0.61$).

Regarding the correlations between the GDP growth rates and investments in ST&I - both gross investment (US $) and the percentage of GDP -, as well as the positions in the Global Innovation Index and the Global Competitiveness Index, were not found any correlations for 2018 (negative R^2 - data not shown).

Considering the HDIs of 2018, the correlation analyzes with investments in ST&I in the same year showed that, when the gross values (US $) were considered, there was no identification of correlation in the countries analyzed ($R^2 = 0.008$). However, when considering the percentage of GDP investment in CT&I, the correlation was moderate ($R^2 = 0.42$) as may be seen in Figure 2. It is noteworthy that the HDI is a complex and multifactorial index, which includes as one of its parameters the percentage of GDP invested in ST&I, not gross investment.

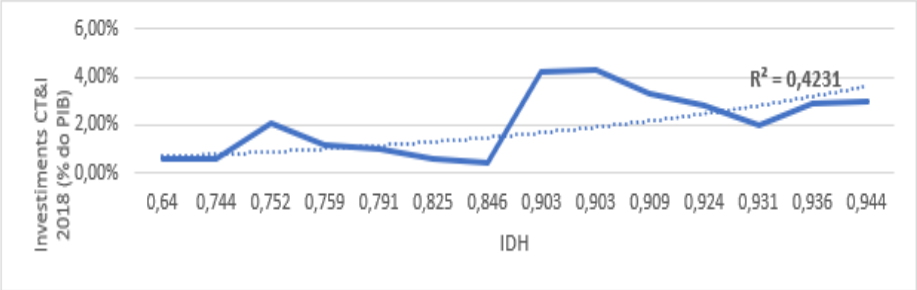

Figure 2 Correlation between Human Development Indices (HDI) and GDP Percentages Investments in ST&I in 2018

Source: UNDP (2018)

When the HDI correlations were evaluated in 2018 and the positions in the GCI, GII and SJR, there were median exponential correlations in the first two (R^2 close to 0.6) and no correlation with the last (negative R).

When analyzing unemployment rates and investments in ST&I - in gross values (US$) and percentages of GDP - low correlations were identified ($R^2 = 0.2$ for both).

The correlations between the 2018 unemployment rates and the GCI, GII and SJR positions were also insignificant (R^2 below 0,2).

When assessing the correlation of the country's degree of innovation, inferred by its position in the Global Innovation Index, there was a greater correlation when considering the percentage of GDP invested than when considering the gross value of investment in CT&I.

Brazil occupies the 64th position in the Global Innovation Index 2018 (Dutta et al., 2018) and the 72nd position in the Global Competitiveness Index 2018 (Schwab, 2018), which shows little adherence to the "Blue Ocean" theory strategy, not creating business environments and favorable regulation to stimulate innovation and, therefore, greater competitiveness.

Nevertheless, the country is the 14th in terms of scientific publications in Scimago Journal & Country Rank 2017 (SJR, 2017), which may indicate that there are few resources being invested in the country in research, but rather the business strategy of investing in innovation, here inferred by the percentage of GDP that the country invests in ST&I, may be the limiting factor.

The HDI correlations and the positions in the Global Competitiveness Index 2018, the Global Innovation Index 2018 and the Scimago Journal & Country Rank 2017 show moderate correlations in the first two. The three correlated indices are multifactorial and have similarities in parameters. This fact may possibly explain the presence of a correlation between the countries evaluated.

With the world increasingly inserted in industry 4.0, digital transformation and adaptation to global megatrends are now essential. In this context, perhaps investing in ST&I does not necessarily provide more jobs, contrary to what many claims and as demonstrated by the lack of correlation between ST&I indicators and unemployment rates.

This may be explained because machines today are increasingly replacing human labor and, therefore, the population will necessarily have to invest more in training.

Investments in CT&I, as well as involving resources in granting research grants, assist in the training of human resources; however, although it has not been analyzed in this work, investment in education must be more correlated with the unemployment rate than investment in ST&I itself.

It could be observed that, although all the correlation shown are relatively low, they could help to infer trends, since the relationships may not be necessarily linear. It is also noteworthy that the selected countries had an expressive relationship with Brazil within the scope of CT&I and do not necessarily represent a considerable sample number for statistical analysis.

5 Conclusion

It is inferred that countries that adopt as a strategy to allocate a higher percentage of their GDP in ST&I are those that use more of innovation to promote their development. It is not necessarily the gross amount invested in CT&I that defines a country's degree of innovation, but rather the prioritization that the country gives to the area.

It is possible that countries that invest a higher percentage of their GDP in ST&I also invest more in providing dynamic business environments, with regulation that reduces bureaucracy and gives security to processes, which stimulate creativity and innovation.

With a view to the study, more accurate comparative analyzes are suggested between the countries and / or the selected groups and Brazil, especially in indicators that showed high or moderate correlations, in order to identify good strategies that could be used for possible public policies
Additionally, the number of samples or indicators could be increased. In this study, some multifactorial indicators were used so they may have distorted the direct correlation performed here. Therefore, another possibility could be to choose some specific parameters for each index and make the direct correlation.

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Research on the Influencing Factors of End Distribution Capacity of Cold Chain Based on DEMATEL-ISM

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Abstract: In order to effectively solve the problem of cold chain end distribution, on the basis of a large number of literature and expert discussion, this paper selected 10 cold chain end distribution capacity influence factors, constructed the DEMATELISM integrated modeling method, used Matlab programming, sought the hierarchical relationship between the various influencing factors, analyzed the direct factors, important factors and deep factors of the multi-layer editing structure model. The conclusion shows that: industry development and cold chain professional ability is the main factor affecting cold chain end distribution. Finally, the targeted suggestions can provide theoretical reference for the management decision-making of the relevant enterprises.

Keywords: Cold chain distribution; Terminal distribution; DEMATELISM model; Influencers

1 Introduction

Cold chain logistics refers to the logistics process of fresh products from the factory to transportation to the hands of consumers using refrigeration technology to ensure that the product is always in a specific low temperature environment, so as to ensure quality and reduce wear and tear. Terminal distribution refers to the logistics delivered to the consumer, is to meet the delivery of the terminal (customer) for the direct purpose of the logistics activities. The rise of the "Internet Plus" and people pay more attention to the freshness of ingredients, cold chain end distribution has become a business competition for the blue sea area. However, China's cold chain logistics started late, its level of development and the breadth and depth of theoretical research still need to be improved. At present, domestic and foreign research on cold chain end distribution mainly includes the following:

Jan B et al.(2006) analyzes the whole supply chain for the quality development of vegetables and fruits, and studies the cold chain requirements in its storage, distribution and other logistics activities, so as to solve the problems of cold chain logistics in the import and export trade of perishable products; S.S. Lysa et al.(2018) puts forward a performance evaluation index system for the development of the last stage of e-commerce logistics, considering the efficiency and benefit of logistics activities from the customer's point of view, and uses formulas for quantitative evaluation to solve the problem of end-of-line distribution scientifically and effectively. Taking the advantage of UAV in terminal distribution as the research background, Raj, Alok et al. (2019) analyzed the critical success factors (CSFs) and divided them into causal and net-effect CSFs by using an integrated multi-criteria decision-making technique, decision making trial and evaluation laboratory, combined with the Grey-based approach. Liu Mingfei et al.(2020) makes use of the hierarchical relationship among the influencing factors of fresh cold chain pre-warehouse logistics service quality risk and their influence on fresh cold chain pre-warehouse logistics service quality risk, so as to provide a reference basis for relevant enterprises to improve product quality and reduce logistics service quality risk and operation cost; Jiang Peng et al.(2018)evaluates the

key factors of green logistics and their causality by using and ANP methods, and puts forward improvement measures in the light of IPA results, and finally verifies the validity of this model by example; Based on the distribution problem of intelligent refrigerator, Guo Di et al.(2018)uses ISM model to determine the hierarchical relationship of various risk factors, so as to provide theoretical support for the scientific formulation of risk response measures for fresh product distribution.

This paper will take the cold chain end distribution as the research object, and use DEMATEL to analyze the importance of the factors affecting the cold chain end distribution capacity, combined with the ISM model for the hierarchical analysis of the various influencing factors, and put forward suggestions to provide references for relevant enterprises to take measures.

2 Determination of Factors Affecting Distribution Capacity at the End of Cold Chain

Through reading and analyzing a large number of literatures, combined with the characteristics of cold chain logistics and the requirements of end distribution services, the factors affecting the capacity of cold chain distribution are divided from the macro and micro aspects, the explanation between the factors is shown below.

Table 1 Influencing Factors of Cold Chain Distribution Capacity and Their Binary Relations

Influencing Factors	Explanations	References
Government support S1	The guidance and support of macro policies directly affect the development direction of fresh cold chain distribution	Ahmet Satir et al. (2020)
Industry development S2	The standardization of cold chain distribution industry greatly affects its development speed and internal management level	Raj, Alok et al. (2019)
Infrastructure S3	Urban road conditions directly affect the whole process of fresh distribution	Zhao Xu et al. (2016)
Information platform construction S4	The stability of information system, order response and logistics tracking information are the basis of ensuring distribution efficiency	Jan B et al. (2006)
Cold chain professional capability S5	Enterprises continue to train professional personnel, development of energy saving and efficiency of the cold chain related technology, the formation of the sustainable development of the cold chain distribution core advantages	Guo Di et al. (2018)
Improvement of cold chain system S6	The core of fresh cold chain distribution is to improve the distribution equipment and cold storage with refrigeration effect	Guo Di et al. (2018)
Distribution center setup S7	Reasonable distribution center network layout, improve material utilization and inventory turnover rate	Jiang Peng et al. (2018)
Distribution path planning S8	Optimizing fresh cold chain distribution path directly affects distribution efficiency and environmental pollution rate	Zhou Lijun (2018)
Distribution personnel manage the S9	Train terminal delivery personnel to improve their push ability and customer satisfaction	Liu Mingfei et al. (2020)
Customer management S10	Only by reaching a consensus with customers and forming a good cooperative relationship can users ensure the extraction efficiency after receiving information	S.S. Lysa et al. (2018)

3 The Construction of DEMATEL-ISM

DEMATEL (Decision-making Trial and Evaluation Laboratory) is a methodology that combines graph theory with matrix to simplify the structure of complex systems. According to the logical relationship among factors in the system, a direct influence matrix is constructed to calculate the influence degree, affected degree, center degree and cause degree of each factor. This method makes full use of expert resources and enhances the accuracy of problem processing.

Interpretative Structural Modeling Method, referred to as ISM method is a widely used system science

method, which first establishes the adjacency matrix by sorting out and analyzing the direct binary relationship between various subsystems (factors, elements) of the system, then forms the reachable matrix through Boolean logic operation, and finally reveals the structure of the system by hierarchical decomposition, which is presented in the form of the simplest hierarchical directed topology graph.

With the combination of the two methods, DEMATEL can not only analyze the cause degree and center degree of the influencing factors, but also simplify the calculation process of ISM. This article is programmed with the help of Matlab 2018b.

3.1 Initial direct influence matrix

This study adopts the 0-5 scoring criteria, which represents that the degree of influence is non-influential, weak, slightly weak, medium, slightly strong and strong, through consultation and discussion by scholars and staff of related professions in Delphi method, and finally reach an agreement to form an initial direct influence matrix, among them, a_{ij} indicates the degree to which factor i affects factor j.

$$A=\begin{bmatrix} & S1 & S2 & S3 & S4 & S5 & S6 & S7 & S8 & S9 & S10 \\ S1 & 0 & 4 & 5 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\ S2 & 0 & 0 & 1 & 4 & 5 & 5 & 1 & 0 & 1 & 1 \\ S3 & 0 & 1 & 0 & 0 & 0 & 0 & 5 & 3 & 0 & 0 \\ S4 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 3 & 4 \\ S5 & 0 & 2 & 0 & 0 & 0 & 3 & 5 & 5 & 0 & 0 \\ S6 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 \\ S7 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 5 & 0 & 0 \\ S8 & 0 & 0 & 0 & 0 & 0 & 1 & 2 & 0 & 1 & 3 \\ S9 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 5 \\ S10 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2 & 3 & 0 \end{bmatrix}$$

3.2 The comprehensive influence matrix

Firstly, the normalized matrix B is obtained by normalizing the original relation matrix. The maximum value t is found by comparing row sum, column and maximum value method, and the new matrix obtained by dividing each element of A matrix by this maximum value is normalized matrix B. The calculation formula is as follows:

$$B=A/t \quad (1)$$

$$M=max\left[max\sum_{i=1}^{n} a_{ij}, max\sum_{j=1}^{n} a_{ij},\right] \quad (2)$$

Using the formula (3) on the basis of the normalized matrix B can obtain the comprehensive impact matrix C (Table 2), where I is the identity matrix

$$C=B(I-B)^{\wedge}(-1) \quad (3)$$

Table 2 Comprehensive Influence Matrix C of the Factors Affecting the Distribution Capacity at the End of the Cold Chain

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
S1	0	0.2472	0.2915	0.2216	0.0788	0.1083	0.1359	0.1198	0.0746	0.1037
S2	0	0.0384	0.0577	0.2308	0.3168	0.3749	0.2018	0.1731	0.1350	0.1753
S3	0	0.0580	0.0032	0.0129	0.0207	0.0530	0.3204	0.2686	0.0302	0.0592
S4	0	0.0018	0.0001	0.0004	0.0160	0.0617	0.0124	0.0401	0.2173	0.2894
S5	0	0.1169	0.0065	0.0260	0.0491	0.2510	0.3584	0.4024	0.0487	0.0928
S6	0	0.0065	0.0004	0.0015	0.0586	0.0181	0.0776	0.0388	0.0041	0.0083
S7	0	0.0006	0.0000	0.0001	0.0058	0.0753	0.0388	0.2965	0.0260	0.0567
S8	0	0.0010	0.0001	0.0002	0.0092	0.0676	0.1241	0.0595	0.0927	0.2024
S9	0	0.0068	0.0004	0.0015	0.0614	0.0168	0.0249	0.0577	0.0544	0.3032
S10	0	0.0013	0.0001	0.0003	0.0113	0.0103	0.0179	0.1273	0.1860	0.0730

3.3 Determination of influence degree, affected degree, center degree and cause degree

Influence degree refers to the sum of the I-row elements of the matrix C, indicating the comprehensive influence value of the S_i on all other elements; affected degree refers to the sum of the j-column elements of the matrix C, indicating that the S_j are affected by the comprehensive influence value of all other elements; influence degree and affected degree of the element S_i are added to get the center degree of the element, subtracted to get cause degree, and the results are shown in Table 3.

Table 3 Influence Degree, Affected Degree, Center Degree and Cause Degree

influencers	influence degree	affected degree	center degree	cause degree	factor attribute
S1	1.3814	0	1.3814	1.3814	cause factor
S2	1.7038	0.4785	2.1823	1.2253	cause factor
S3	0.8262	0.36	1.1862	0.4662	cause factor
S4	0.6392	0.4953	1.1345	0.1439	cause factor
S5	1.3518	0.6277	1.9795	0.7241	cause factor
S6	0.2139	1.037	1.2509	-0.8231	Result factor
S7	0.4998	1.3122	1.812	-0.8124	Result factor
S8	0.5568	1.5838	2.1406	-1.027	Result factor
S9	0.5271	0.869	1.3961	-0.3419	Result factor
S10	0.4275	1.364	1.7915	-0.9365	Result factor

Taking the center degree as the horizontal axis and the cause degree as the vertical axis, the Cartesian coordinate system is established, and the values of each factor are corresponding to the coordinate system. The attributes of the influencing factors can be clearly identified, which can be divided into cause factors (cause degree > 0) and result factors (cause degree < 0). As can be seen from figure 1, S2 and S5 are the key factors affecting the distribution capacity at the end of the cold chain, and S1, S2, S3, S4, S5 are the cause factors, and S6, S7, S8, S9, S10 are the result factors.

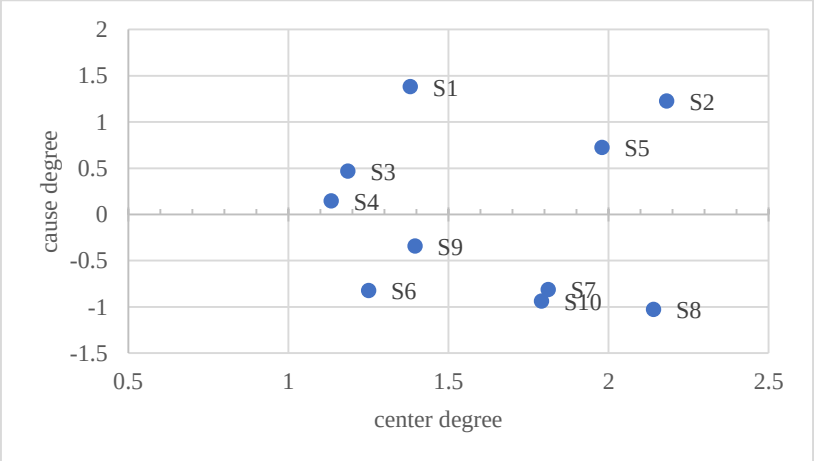

Figure 1 DEMATEL Causality-Centrality Analysis Chart

Center degree indicates the role of this factor in the evaluation index system. It is known from the data that the center value of S8 and S2 is advanced by the data, indicating that factors have a more significant effect on improving the distribution capacity at the end of the cold chain. Among the cause factors, the reason value of S1 and S2 is high, which means that the strength of government support and the standardized development of the industry have the greatest impact on the distribution at the end of

the cold chain; among the result factors, the improvement of cold chain system S6, the setting of distribution center S7 and customer management S10 are easily affected by other factors.

3. 4 Reachable matrix

The reachable matrix refers to the degree that can be achieved after a certain length of path between the nodes of the directed connection graph in the form of matrix. According to the needs of the hierarchy, the threshold value ג is determined. When $M_{ij} \geq$ ג, M_{ij}=0, and vice versa. In this paper, the ג is 0.1, and the matrix can be up to.

M=

	$S1$	$S2$	$S3$	$S4$	$S5$	$S6$	$S7$	$S8$	$S9$	$S10$
$S1$	1	1	1	1	0	1	1	1	0	1
$S2$	0	1	0	1	1	1	1	1	1	1
$S3$	0	0	1	0	0	0	1	1	0	0
$S4$	0	0	0	1	0	0	0	0	1	1
$S5$	0	1	0	0	1	1	1	1	0	0
$S6$	0	0	0	0	0	1	0	0	0	0
$S7$	0	0	0	0	0	0	1	1	0	0
$S8$	0	0	0	0	0	0	1	1	0	1
$S9$	0	0	0	0	0	0	0	0	1	1
$S10$	0	0	0	0	0	0	0	1	1	1

3. 5 Establishment of multi-level hierarchical structure model

On the basis of reachable matrix, through region division and level division, the skeleton matrix L (strongly connected elements reduction, eliminating leapfrog relation, removing self-relation) is extracted and drawn. Finally, according to the actual meaning of each element, the multi-level hierarchical directed graph is directly transformed into an interpretive structure model.

L=

	$S6$	$S7$	$S9$	$S3$	$S4$	$S2$	$S1$
$S6$	1	0	0	0	0	0	0
$S7$	0	1	0	0	0	0	1
$S9$	0	0	1	0	0	0	0
$S3$	0	1	0	1	0	0	0
$S4$	0	0	1	0	1	0	0
$S2$	1	1	1	0	1	1	0
$S1$	1	1	0	1	1	1	1

As a result, the hierarchical relationship of each factor can be obtained, and the multi-level hierarchical directed graph can be drawn accordingly.

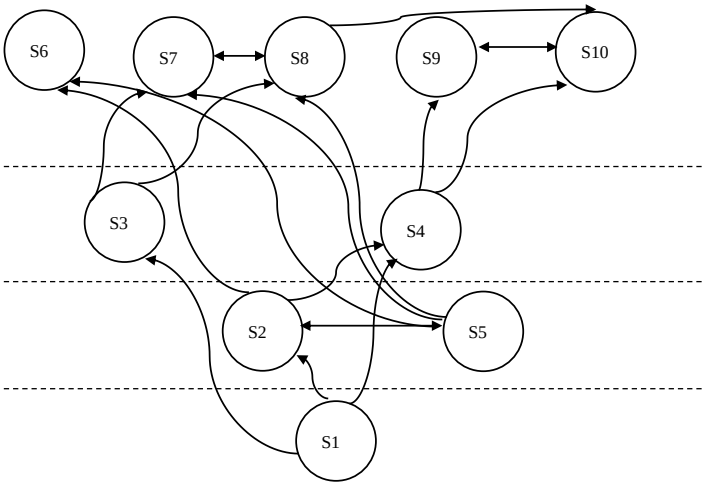

Figure 2 Multi-Level Hierarchical Structure Model Diagram

4 Analysis of Multi-Level Hierarchical Structure Model

It can be seen from figure 2 that the factors affecting the distribution capacity at the end of the cold chain can be divided into four levels, the factors of each level influence each other, and the influence of each factor on the logistics capacity of the cold chain is different. The factors at the lower level will have an impact on the upper factors, and now the factors at all levels are explained and analyzed.

The factor at the fourth level is government support. Government support is not only the factor of macro-control, but also the deepest factor. When developing the distribution at the end of the cold chain, enterprises should accurately control the direction of the macro policy, from the overall development of the government to the analysis of support, which is the basis and prerequisite to promote the development of the distribution at the end of the cold chain.

The factors in the third layer of the middle layer are the development of the industry and the professional ability of the cold chain. The continuous development of the cold chain industry has formed a certain scale and norms to enhance the flexibility of the market. At the same time, it can also take the lead in promoting the efficient distribution of the cold chain industry, forming the specialization and integration of the distribution at the end of the cold chain. With the continuous enhancement of the professional and technical ability of the cold chain, the severe problems related to the distribution process at the end of the cold chain can be solved.

The factor located in the second layer is the hard conditions of cold chain distribution, including infrastructure and information platform construction. Urban infrastructure is very important for products that need cold chain technology, which largely determines whether the products can be delivered to customers timely and efficiently; the improvement of the information platform is a strong support for enterprises and customers to grasp the dynamics of products in cold chain distribution, can quickly respond to user needs, timely solve unexpected situations in the distribution process, and avoid the uncertainty of cold chain distribution as far as possible.

The first layer of factors: the improvement of cold chain system, the setting of distribution center, the planning of distribution path, the management of distribution personnel and customer management are the direct factors that affect the distribution capacity at the end of cold chain. Cold chain systems, including the construction of cold storage and the improvement of cold chain facilities and equipment for distribution vehicles, directly affect the loss rate of products in the process of transportation; the reasonable setting of distribution centers and scientific planning of distribution routes can not only minimize the pollution caused by cold chain distribution, create social benefits, but also reduce costs, improve efficiency and create enterprise benefits. The standardized management and customer management of distribution personnel can establish a good image and reputation for enterprises, train distribution personnel to enhance their ground push ability, enhance the ability of terminal distribution service, and maximize customer satisfaction.

To sum up, when various factors affect the distribution capacity at the end of the cold chain, the elements at the lower level will directly or indirectly affect the upper elements. Therefore, in the process of dealing with the factor relationship, we should clarify firstly its structural relationship, and then implement the solution measures according to the actual situation, and finally achieve the overall optimal effect, so that the distribution at the end of the cold chain can be further developed fundamentally.

5 Conclusion

In this paper, 10 factors affecting the development ability of distribution at the end of cold chain are

extracted by using the methods of literature research and expert discussion. DEMATEL-ISM models and analyzes the influencing factors, and sorts out the hierarchical relationship of the influencing factors. The targeted suggestions can provide a certain theoretical basis for relevant enterprises to improve the cold chain end distribution capacity, in order to promote the sustainable development of China's cold chain end distribution industry. However, the number of influencing factors identified in this paper is limited, lack of detailed discussion on the weight of each index, and has not been verified with relevant examples, and its accuracy needs to be improved, which will be considered in future research.

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Research on the Location of Hazardous Materials Logistics Center

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Abstract: In recent years, with the application of hazmats more and more widely, the quantity and scale of hazmats logistics distribution centers have gradually increased, and the risks brought by them are also gradually increasing. Scientific and rational location planning is very important. This paper establishes a multi-objective model for location selection of hazmats logistics centers from three objectives of cost, risk and risk equity, and shows the preferences of decision-makers to three objectives through weight selection. At the same time, LINGO is used to give a reasonable solution to the location model. Finally, an example is given to verify the feasibility of the model in solving the location problem of hazmats logistics center.

Keywords: Hazardous material; Logistic distribution center; Multiple-objective program; Location model

1 Introduction

With the continuous development of economy, the demand for hazardous materials (hazmats in short） is increasing. It is estimated that the annual output of hazmats in China is more than 60 million tons, and the worldwide annual output of hazmats is about 30 to 40 million tons. Hazmat is an indispensable resource for industrial production and social life. However, hazmat is extremely dangerous and it will pose a huge potential threat to society and environment, especially in storage and transportation processes. For instance, on June 13, 2020, a serious accident happened in the process of transportation in Wenling City of Zhejiang province, resulting in 19 deaths and 189 injuries. Even though the accident probability is small, the conquences could be significant. Ensuring the safety of hazmats has become the undisputed primary task.

Only controlling the safety in transportation process is far from enough. We should also make careful decisions in the process of site selection. The location planning of hazmats logistics center is a very important but extremely complex problem. Site selection is the key point of strategic planning of logistics system. It determines the mode, structure and shape of the whole system. In the process of site selection, we must fully recognize the dangerous characteristics of hazmats. When selecting location, we should not only consider the cost, but also consider the safety and risk equity of location. Logistics companies pay attention to economic benefits, the public and the government are concerned about the risk that hazmats may bring to the society. How to effectively coordinate the conflict between them is the key to solve the problem.

Since the hazmats have become a major problem in the industrial society, various studies have focused on the hazmats. Firstly, numerous researches found the methods to access the risk of hazmats. The methods presented a framework and topics like routing, scheduling, facility location, network design and emergency problems have been considered (P. Fontaine, 2018). Erhan Erkut (1998) summarized the model of risk for hazmat transportation. Kwon(2011) proposed the “Conditional Value at Risk” measure to access risk in the routing of hazmat. Mohammad (2016) proposed a mathematical model for designing a reliable multimodal hazmat transportation network. Ehsan Ardjmand (2016) proposed a stochastic model for the locating and allocation of facilities of hazardous material. The model incorporated the cost and risk of establishing facilities, disposal sites, and transportation. Abdolsalam Ghaderi (2019) develops a generic planning to reduce costs and risks. However, both of them ignores the risk equity. From the above research, we can see that the research on location selection of hazmats distribution centers is not deep enough and no systematic system has been formed. However, such problems are widely studied in other fields. A hierarchical location model is proposed for health service network design, which is formulated based on a two-stage robust optimization approach (N.Zarrinpoor, 2017).

In the design of hazmat logistics system, location and distribution are two key issues, which can minimize risks. On the one hand, the optimal distribution center has a direct impact on storage risk and an indirect impact on transportation risk. On the other hand, the best transportation route determines the quantity of hazmats in each warehouse, which has a direct impact on the transportation risk and an indirect impact on the storage risk (Fan, 2019). What’s more, the location of hazmats logistics centers cannot ignore the risks that a few people may take. We should solve the problem in a fair way. Therefore, this paper establishes a location model of logistics distribution center for hazmats from three objectives of cost, risk and risk equity, which provides a basis for enterprises and government's decision making.

This paper is organized as follows. Section 2 defines the problem and formulates a corresponding mathematical model. The optimal solution is obtained by running the LINGO software. Then, an example is designed for the computational analysis to verify the effectiveness of the model in Section 3. Finally, Section 4 puts forward the conclusions and suggestions for future work.

2 A Multi-Objective Model

2.1 Target of system optimization

Cost: cost is an important factor affecting the location of logistics. This paper mainly considers the fixed cost of building stations (including land lease fees, station cost and operating cost for maintaining normal business process) and transportation cost. In this paper, the minimization of these costs is taken as an optimization objective.

Risk: risk exists widely in the hazmats logistics system. People hope that the distance between hazmats facilities and hazmats distribution routes will be as far away from them as possible. Generally speaking, the construction of distribution centers should consider two kinds of risks, one is the risk in transportation process, the other is location risk. The existing risk assessment methods mainly include: traditional risk, population exposure, incident probability, perceived risk, minimized maximum risk, value-at-risk and conditional probability. This study takes the number of exposed population to measure the risk. The risk and the distance between the hazmats logistics center and the residential area is linear. Suppose that V_{ik} is the risk factor, then $V_{ik} = 1-(d_{ik}/R)^{\tau}$, d_{ik} is the distance from the distribution center to the residential area, and R is the hazard radius of the distribution center. When $d_{ik}>=R$, $V_{ik}=0$, the value of τ can be determined according to the actual situation.

Risk equity: risk equity means that the risks can be shared equally as much as possible, and the extra risks cannot be unfairly imported to other people for the benefit of some people. The location of hazmats logistics centers cannot ignore the risks that a few people may take. We should solve the problem in a fair way (Taslimi, 2017). In this study, we minimized the absolute value of the difference between the risk of the hazmats logistics center in any residential area and the average risk in each residential area (Mao Jie, 2017).

2.2 Mathematical model

The location of hazmats logistics centers can defined as follows: A feasible set of potential facility sites and locations and expected demands of each customer are given. The system does not contain two grade transportation, it only includes the transportation from distribution center to customer. Distribution center do not distribute each other, and each customer provided by a distribution center only. The radius of risk and the Euclidean distance between the customer and distribution center are known, the fixed and the unit cost of distribution center are given. According to the above analysis and hypothesis, the problem is to determine the location of the distribution center and the routes from the distribution center to the customer to minimize the sum of the costs, risk and risk equity. Therefore, the multi-objective programming model of location selection for logistics distribution center of hazmats is as follows:

Mathematical model:

$$Min\ C = \sum_{i=1}^{m} f_i y_i + \sum_{i=1}^{m}\sum_{j=1}^{n} c_{ij} y_i a_{ij} d_{ij} x_{ij} \tag{1}$$

$$Min\ R = \sum_{i=1}^{m}\sum_{j=1}^{n} l_{ij} x_{ij} + \sum_{i=1}^{m}\sum_{k=1}^{h} V_{ik} q_k \tag{2}$$

$$Min\ E = \sum_{i=1}^{m}\sum_{k=1}^{h} |V_{ik} q_k - \bar{R}|\ y_i \tag{3}$$

$$st \quad \sum_{i=1}^{m} y_i = z \tag{4}$$

$$\sum_{i=1}^{m}\sum_{j=1}^{n} x_{ij} a_{ij} = w_j \tag{5}$$

$$\sum_{i=1}^{m} x_{ij} y_i = 1 \quad j \in N \tag{6}$$

$$\bar{R} = \sum_{i=1}^{m}\sum_{k=1}^{h} V_{ik} q_k / h \tag{7}$$

$$x_{ij} <= y_i \qquad i \in M, j \in N \tag{8}$$

$$a_{ij} >= 0 \qquad i \in M, j \in N \tag{9}$$

$$y_i, x_{ij} \in \{0,1\} \qquad i \in M, j \in N \tag{10}$$

Sets:

M—the set of potential distribution center; N—the set of customer; H—the set of residential area;

Parameters:

Z—the number of distribution center; f_i—the fixed cost of distribution center;

w_j—the demand of customer;

d_{ij}—the Euclidean distance between the distribution center and the customer;

c_{ij}—the unit cost between the distribution center and the customer;

l_{ij}—the exposed population between the distribution center and the customer;

q_k—the population of the residential area; V_{ik}—the risk factor;

Decision variables:

y_i—1, if distribution center i is established; 0 otherwise.

x_{ij}—1, if customer j is allocated to distribution center i; 0 otherwise.

a_{ij}—the traffic between the distribution center i and the customer j.

Eqs. (1) is the cost of distribution center, including the establishment and operation cost and transportation cost; Eqs. (2) is the risk minimization, including transportation risk and location risk; Eqs. (3) is the minimization of risk equity and Eqs. (4) guarantees that the number of distribution center is satisfied; Eqs. (5) indicates that all customers' needs can be met; Eqs. (6) indicates that each customer has only one distribution center to provide services; and Eqs. (7) represents the formula for calculating the average value of the risk; Eqs. (8) limits that after establishment of a distribution center, it provides services for the customer; Eqs. (9) indicates the restriction on the non negative variables; and Eqs. (10) indicates the restriction on 0-1 variables.

Generally speaking, it is difficult to solve the multi-objective problem directly, because achieve simultaneous optimization is rather difficult. As a result, we transfer multi-objective problems to single-objective mathematical programming problems. In order to reflect the preference of site decision makers on the three objectives of cost, risk and risk equity, this study uses linear weighted sum method to transform the model into a single objective problem and solve it. Set the weight of cost, risk and risk equity to $\omega_1, \omega_2, \omega_3$ （and $\omega_1 + \omega_2 + \omega_3 = 1$). The weights can be determined according to the actual situation by Delphy's expert evaluation method. At the same time, in order to better measure the cost and risk value, the α, which is transform factor of risk into economic index, and β, which is transform factor of risk equity into economic index, is introduced. The objective function at this time is $Min\ Z = \omega_1 C + \omega_2 \alpha R + \omega_3 \beta E$。

In order to improve the computational efficiency of the model, we use the LINGO to solve the above models and find out the optimal solution. Lingo software is easy to operate and easy to use. It is mainly used for solving linear, nonlinear or integer optimization models. It can help users to establish mathematical programming models quickly and efficiently solve them. Its built-in modeling language is very rich, and programming and mathematical language form is very easy to express.

3 Case Study

In order to verify the feasibility of the model, the following example is used to calculate. The data in the example are assumed values. In the actual situation, enterprises can take the model calculation to get the location results according to their actual conditions. Suppose that the manufacturer intends to expand the business and plans to build two large hazmats logistics centers in the densely chemical industry area. The distribution center mainly provides logistics, transportation and warehousing services for ten customers in the city. There are ten densely residential areas in the area. Five sites have been initially selected as potential sites for the logistics center. Next, we use the established model to solve the problem. Parameters are described first. The fixed cost of distribution centers are 1010, 1000, 1030, 1020, 1000, respectively; the demand from each customer is generated on the basis of a uniform distribution on [1,50]; the Euclidean distance between distribution center and customer is generated on the basis of a uniform distribution on [30,150]; the number of exposed population along the route is generated on the basis of a uniform distribution on [0,3]; the Euclidean distance between distribution center and residential area is generated on the basis of a uniform distribution on [0,2]; the number of residential area is generated on the basis of a uniform distribution on [2,5]. According to actual situation, the fixed value is set in table 1:

Table 1 The Fixed Value

Variable	ω_1	ω_2	ω_3	R	τ	c	α	β
Value	0.30	0.45	0.25	2	2	1.5	50	100

Based on the data determined, the optimal results are shown in Table 2.

Table 2 Operation Results

Variable	C1	R1	E	Z
value	21705.60	29.70	20.38	7689.38

From the above table, we can see that the construction cost of the hazardous materials logistics centers is 2105.60, the value of risk is 29.70 and the risk equity value is 20.38. According to the results of the program operation, the 4 and 5 potential distribution centers should be selected to establish logistics centers, and the 4 potential distribution center is responsible for the 3 and 10 customer. The potential distribution center 5 is responsible for the rest.

The traditional method of selecting the location of hazmats logistics centers often takes the construction cost and the economic benefits of the enterprise as the main consideration. If only consider the cost, the optimal value is 21149.60 in this case. And the value of risk is 30.38 and the risk equity value is 26.81, which poses huge environmental and social risk to residents. Comparing these results, we can see that the risk and risk equity are lower than primary, even though the cost is higher. The traditional method of site selection only pays attention to economic benefits while ignores the risks and the sustainable development of logistics enterprises, but the proposed model as a further addition to the method would avoid these disadvantages.

4 Conclusion

Based on the analysis of the factors affecting site selection, taking cost, risk and risk equity as three main objectives of location models, a multi-objective model for location selection of hazmats logistics center is established. The decision-makers' preferences for three objectives are reflected by weight. Finally, the location model of hazmats logistics center is solved by lingo software, and the feasibility of the model is verified. Compared with the research on location selection of other hazmats logistics center, the main innovation of this study is that we study the comprehensive problem with the consideration of total storage and transportation risks and risk equity. It minimizes the risks and potential economic losses as much as possible. For decision makers, the proposed model reflects their references among three objectives and provides the solution about the location of optimal distribution centers and the optimal transportation routes. Futhermore, mathematical programming software plays an important role o in the location planning of hazmats logistics center.

But in the process of research, the factors that affect the location and the design of the model parameters may not be comprehensive. For the location of hazmats logistics center, the reality is often more complicated than theory, so we need to further study and improve the model. There are still many risks that cannot be predicted in the transportation process, the problem will become very complicated if all the considerations are built into the site selection model. Due to the limited research level, the model does not take into account the risk between the manufacturer and logistics distribution center. In addition, in the location of the distribution center, it is generally believed that the distribution center's transportation route to the customer is radial. The vehicles will return to the logistics center once each time they visit a customer. Therefore, it is easy to neglect consideration of the itinerary route, and the risk degree is closely related to the choice of the path. How to combine site selection with path planning is the main direction of next research.

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Supply Chain Management and Operational Performance: At FDI Companies

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Abstract: Business companies are shifting competition among companies to supply chains. As a result, supply chain management (SCM) has become important strategy to improve operational performance of companies. This study was conducted to identify effect of SCM on operational performance at Foreign Direct Investment (FDI) companies in Addis Ababa, Ethiopia. The study has used operation managers and engineers as respondents and the data was collected through questionnaires. The data was analyzed by using multiple regression method by employing Multiple Linear Regression. To predict the effect of SCM on operational performance, the study has used four dimensions of SCM as independent variables; strategic supplier partnership, customer relationship, level of information sharing and quality of information sharing, and internal lean practices. The result of the study identified that SCM has significant effect on operational performance the selected companies. The effect of strategic supplier partnership, customer relationship and internal lean are significant and positive. But effects of level of information sharing and information sharing quality is insignificant. Therefore, it is recommended to improve SCM to enhance operational efficiency.

Keywords: Supply chain management; Operational performance; Supplier partnership; Customer relationship and internal lean

1 Introduction

Operational performance of business companies is getting highest priority by business strategies. The competition in organizations has shifted from lowest priced product, highest quality or best-performing product to the ability to respond quickly to market needs and get the right product to the right customer at the right time. This shift toward speed has pushed organizations to compete with their entire supply chain (Storey, Emberson, & Reade, 2015). As a result, in the global arena, practicing SCM become an important strategy (Banerjee & Mishra, 2017). SCM becomes a crucial competitive parameter that create business relationships with customers, suppliers and other strategic partners anchored on trust and long term commitment (Lazarevic, 2007). Consequently, organizations realize that in addition to improving efficiencies within an organization, it is important to make the whole supply chain competitive. Therefore, SCM is an essential to stay competitive in global market and to enhance profitability through efficient operations (Storey, Emberson, & Reade, 2015). SCM has been used as tool of operational performance strategies. SCM affects overall organizational performance and the operational performance. SCM improve an organization's competitive advantage through price/cost, quality, delivery dependability, time to market, and product innovation (Chang, Ellinger, Kim, & Franke, 2016). In FDI companies in Addis Ababa, various level of operational performance was observed regarding quality of products, cost of production delivery, time to market and product innovation. These companies are role model companies for Ethiopian companies. Thus, it is important to identify the effect of supply chain management of FDI companies to provide lesson to local companies. Therefore, this study was aimed to identify the effect of SCM on operational performance of FDI companies in Addis Ababa. Specifically, the study aimed to identify effect of supplier partnership management on operational performance; to

examine effect of customer relationship management on operational performance; to assess the effect of information sharing on operational performance; analyze an effect of internal lean practice on operational performance; and to identify the effect of quality of information sharing on operational performance.

2 Literature Review and Research Framework

Christopher, (2003) stated supply Chain as a network that various organizations involved through upstream and downstream linkages in their activities and processes. It is the task of integrating organizational units and coordinating materials, information and financial flows to fulfill customer demands. The key elements of supply chain and its management are the upstream parties, the downstream parties and the integration of all the organizations involved, together with the internal function of an organization itself.

Liu, Wei, Ke, Wei, & Z, (2016) defines SCM practices activities undertaken by an organization to promote effective management of its supply chain. As a multi-dimensional construct, it includes upstream and downstream sides. SCM activities include outsourcing, supplier partnership, information sharing, cycle time compression, and continuous process flow (Donlon, 2006). Tan, Kannan, & Handfield, (2008) stated that SCM is represented by quality, purchasing, and customer relations. According to (Alvarado & Kotzab, 2011) SCM is an inter-organizational system use, core competencies, and elimination of excess inventory through postponement. The key areas of SCM are supply chain integration, information sharing, customer service management, geographic proximity, and Just in time (JIT) capability. Aspects of SCM that are key to creating supply chain responsiveness are outsourcing, strategic supplier partnerships, customer relationships, information sharing, and product modularity (Liu, Wei, Ke, Wei, & Z, 2016).

The efficient supply chain is indicated by various factors such as strategic alliances, customer relationship, information sharing and its quality, and internal lean practices. Effective partnerships with suppliers is a critical factor that guide a SCM (Liu, Wei, Ke, Wei, & Z, 2016)(Truong, et al., 2017). A good relationship with customers is needed for successful implementation of SCM programs (Sundram, Chandran, & Bhatti, 2016). Close customer relationship allows an organization to differentiate its product from competitors, sustain customer loyalty, and dramatically extend the value it provides to its customers ((Chang, Ellinger, Kim, & Franke, 2016). Supply chain partners that exchange information regularly are able to work together as a single company that the information sharing provide integration and coordination across supply chain. Hence, they understand the needs of the final consumer and respond quickly to changing market (Liu, Wei, Ke, Wei, & Z, 2016). The failures can occur in case of information delays, shortage or distortion across the supply chain. Internal lean practice optimizes production process by reducing waste and other inefficient factors (Moslem& Elham, 2018).

Christopher, (2003) and Liu, Wei, Ke, Wei, & Z, (2016) define operational performance as a firm's performance which is measured against standard on prescribed of effectiveness, efficiency and environment responsibility such as cycle time, productivity, waste reduction, and regulatory compliance. Operational performance is a source of competitive advantage for the enterprise to differentiate itself in the eyes of the customers from its competitors by operating at a lower cost and hence at a greater profit. Competitive priorities, which are realized by operational performances, are the extent that an organization is able to create a state of defense against competitors and includes a feature that allows an organization to distinguish itself from its competitors.

Practice of SCM have an effect on different aspects of operational performance of an organization. Among the practices of SCM, strategic supplier partnership improves supplier performance and reduce time to market and increase the level of customer responsiveness and satisfaction. It enables an organization to work more effectively with a few important suppliers who are willing to share responsibility for the success of the products (Moslem & Elham, 2018). Strategically aligned organizations can work closely together and eliminate wasteful time and effort. Information sharing leads to high levels of supply chain integration by enabling organizations to make dependable delivery and introduce products to the market quickly. Information sharing and information quality contribute positively to customer satisfaction (Liu, Wei, Ke, Wei, & Z, 2016) and partnership quality (Christopher, 2003). Customer relationship comprises the entire array of practices that are employed for the purpose of managing customer complaints, building long-term relationships with customers, and improving customer satisfaction (Tan, Kannan, & Handfield, 2008).Close customer relationship allows an organization to differentiate its product from its competitors, sustain customer loyalty, and dramatically extend the value it provides to its customers (Alvarado & Kotzab, 2011).Supply chain partners who exchange information regularly are able to work as a single entity. Together, they can understand the needs of the end customer better and hence can respond to market change quicker (Moslem & Elham, 2018).

Figure 1 below shows conceptual framework for the study. The framework indicates that practices of supply chain have impact on operational performance of the companies in the study. It suggests supply chain practices directly affect the operational performance. The SCM is indicated by 4 practices; strategic supplier partnership, customer relationship, level and quality of information sharing and internal lean practices.

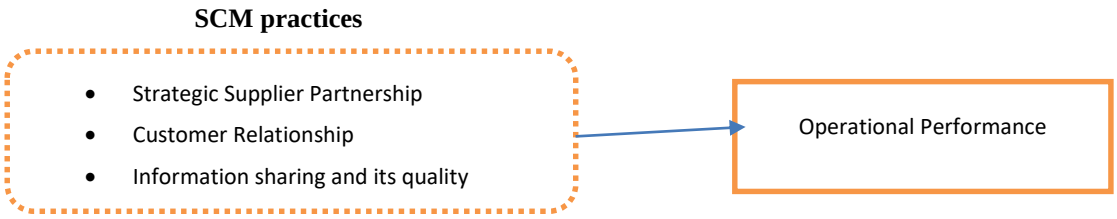

Figure 3 Research Framework

3 Data and Methodology

3.1 Data

This is a survey research on effect of practices of SCM on operational performance. The research data was collected from both primary and secondary sources. The primary data was collected through structured questionnaires.

3.2 Population and sampling methods

This study has targeted FDI companies in Addis Ababa, Ethiopia due to convenience to the researcher and existence of majority of FDI companies in Addis Ababa. There are 24 companies in different sector especially in manufacturing. The study population included supply chain and operation managers and their deputies that they have frequent experiences with supply chains and operations in the organizations. Therefore, 4 respondents were targeted in each company. Consequently, total population of the study is 96 respondents.

Since the size of the target population is small the study has not computed sample size rather total target population was used. Thus, 94 respondents were for the study.

3.3 Research instrument

The research instrument was prepared in the form of questionnaire and divided in to three sections; demographic information, SCM practices and operational performance. The demographic information was about gender, age, education, and experience in SCM and operations. This information is collected based on nominal scales. Questions about SCM and operation were arranged based on ordinal scales of five levels of rating scale: strongly disagree (1), Disagree (2), Neutral (3), Agree (4) and Strongly Agree (5). The reliability of the instrument was determined by using Cronbach alpha and all Cronbach alpha indexes are above 0.7.

4 Result

4.1 Descriptive analysis

The data were analyzed by using descriptive and inferential statistics. In particular descriptive statistics such as frequencies, mean and standard deviation were used for general analysis about the respondents and level of SCM and operations. The result is presented by using graphs and tables. Further, Multiple Linear Regression was used to identify the effect of SCM on operational performance.

Table 1 Gender and Age Information about Respondents

Information	Category	Frequency	Percent
Gender	Male	64	72.7
	Female	24	27.3
Age	Less than 30	11	12.5
	31-40	50	56.8
	41 – 50	27	30.7

As depicted in Table 1 above, majority of the respondents were male that includes 64(72.7%) of the respondents. but only 24(27.3%) of the respondents were females. This indicates Supply chain and operations in the companies were mainly managed by males. Further, the general information shows, 11(12.5%) of the respondents were at age level ‘Less than 31 years’. majority of the respondents were at age category of ’31-40 years’ that includes 56.8% of the respondents; and followed by respondents age level of ‘41-50’ years.

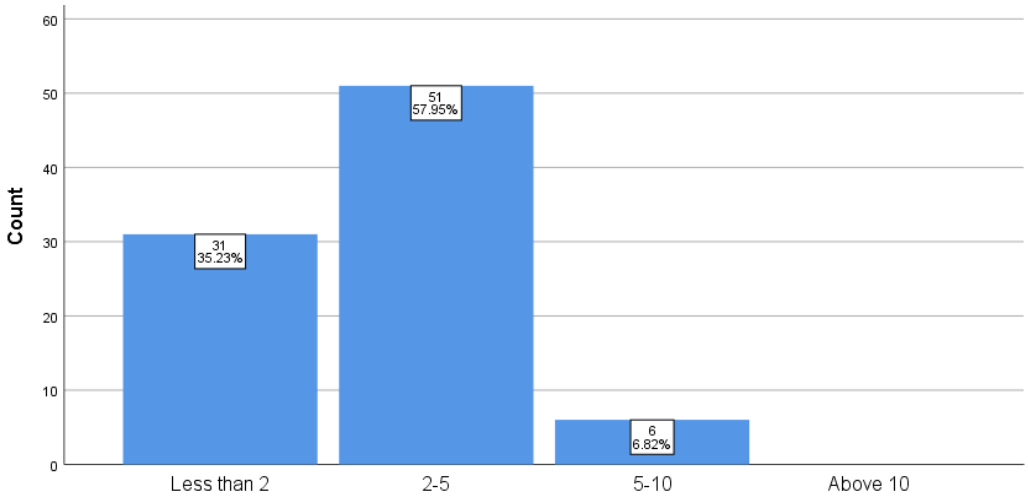

Figure 2 Experience

As shown in figure 2 above, majority (57.95%) of the respondents have an experience in SCM and operations for 2 to 5 years and it is followed by respondents who have the experience for less than 2 years.

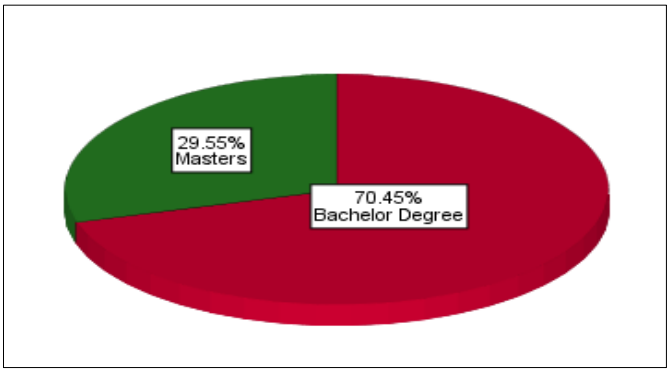

Figure 3 Educational Level of Respondents

As presented in Figure 3 above, majority of the respondents have highest educational qualification of bachelor's degree and only 29.55% of the respondents have Master's degree. This suggests SCM and operations in the companies are mainly managed by first degree holders implying there is weak educational background for the responsibilities.

Table 2 Descriptive Statistics on SCM and Operational Performance

	N	Mean	Std. Deviation
Strategic Supplier Partnership	88	3.8371	.31153
Customer Relationship	88	3.7841	.50307
Information Sharing	88	3.7545	.61456
Internal Lean Practice	88	3.8864	.65485
Operational Performance	88	3.8949	.29293

As shown in the Table 2 above, the mean score values are at the range of agree for SCM practices and operational performance. This indicate SCM is practiced in the FDI companies and the operational performance of the companies is at efficient and effective level.

4.2 Regression analysis

The result of regression analysis by using multiple linear regression is presented in Table 3 below.

Table 3 Regression Analysis

	Un standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.059	.380		2.788	.007
SSP	.226	.075	.241	3.025	.003
CRM	.363	.046	.624	7.949	.000
ILP	.197	.037	.440	5.376	.000
LIQ	-.046	.039	-.097	-1.191	.237

R = .713 R Square = 0.508 Adjusted R Square = 0.483 F-value = 21.398 Sig = 0.000

As shown in the Table 3 above, the value of R is positive and its squared value is 0.508. The adjusted R-square value is 0.483 and the F-value is significant at 0.01. This indicates that SCM has significant positive effect on operational performance of the companies. Operational performance varies due to variation in practices of SCM. Specifically, 48.3% of variation in operational performance comes from variation in practices of SCM Independent variables such as strategic supplier partnership, customer relationship, and internal lean practice have positive coefficients that are significant at 0.01. But level of information sharing is statistically insignificant. This indicates strategic supplier partnership, customer relationship, and internal lean practice have positive contribution to operational performance of the companies. On the other hand, level of information sharing has not effect on operational performance of the companies. As indicated by coefficient of 0.624 and t-statistics value of 7.949, the operational performance is mainly dependent on customer relationship management and followed by internal lean practice (t = 5.373). Strategic supplier partnership has lowest effect among the important factors for operational performance.

5 Conclusions

The effect of supply chain management is positive and significant on operational performance of FDI companies in Addis Ababa. Regarding the individual effect of the practices of the supply chain management, the operational performance of the companies is mainly affected by customer relationship management practices. In addition, lean practices have significantly affected the operational performance of companies. The finding about customer relationship management suggest interacting with customers, evaluating customers and determining the future expectations helped FDI companies in Addis Ababa to boost their operational performance. In addition, the companies have a good practice of reducing process set-up time, implementing continuous quality improvement programs and focusing on demand of the customer. As a result, internal lean practice of the companies enabled to increase operational performance. Finally, selecting supplier with criteria of quality supply enabled to reduce wastage in production process. The companies jointly solve with suppliers when problems exist and the key suppliers are involved at continuous improvement programs, in planning and goal setting, and new product development process. Consequently, strategic supplier partnership helped FDI companies to increase their operational performance. Therefore, this study revealed that SCM is important to improve operational performance.

Based on conclusions reached, this study recommends companies in Ethiopia and FDI companies with weaker operational performance to focus on SCM that enables to efficient and effective production. In addition, to improve operational performance, effective reduction of operating and input costs, and increase of revenue that reduce inventory shortage, shorten logistics time and improve service level are important.

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Commodity Traceability and User Cooperation Mechanism Based on Blockchain

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Abstract: The unreal records of commodity circulation information and centralized supply chain management will expose the supply chain to corruption, fraud and tampering. This paper integrates blockchain and supply chain technology and proposes the concept of blockchain, designing tracking system and multi-layer structure of blockchain supply chain. While ensuring the real traceability of commodity circulation information, it also uses blockchain decentralization to reduce the cost of cooperation and trust between users. It lays a foundation for further promoting the application of blockchain technology in the development of supply chain.
Keywords: Blockchain; Supply chain management; Traceability system; Hierarchical architecture

1 Introduction

The application scenarios of blockchain are more and more extensive, especially in the aspect of supply chain. Different researches have been carried out at home and abroad.

The application scenarios of blockchain are more and more extensive, especially in the aspect of supply chain. He Chao and Liu Yifeng put forward the concept of block supply chain, and realized a new model of high data openness, strong contract execution and deeper cooperation by using decentralization ideas and smart contracts (He Chao,Liu Yifeng., 2020). Ding Qingyang and others put forward the consensus mechanism of traceability license chain based on two-tier architecture, and the development and design of traceability system based on license chain (Ding Qingyang, Zhu Jianming, et al., 2019). Zhao citizen and others built a supply chain trust management mechanism integrating the blockchain contract layer, consensus layer and data layer to solve the supply chain trust crisis brought by the new opportunism (Zhao citizen, Wan Qiangqiang, et al., 2020). Liang Xiaoying and Wang Lijun analyzed the feasibility of the application of blockchain technology in clothing supply chain from three aspects: object dimension, attribute dimension and function dimension, so as to provide reference for the transformation and upgrading of clothing supply chain (Liang Xiaoying, Wang Lijun, et al., 2020). Zhang Hongbo and Feng Huixin put forward a method to trace the whole process of commodities based on the alliance blockchain (Zhang Hongbo, Feng Huixin, 2020).

Rita Azzi et al. describe how to integrate the blockchain into the supply chain architecture to create a reliable, transparent, trusted and secure system. In order to achieve this goal, we also studied the benefits of introducing blockchain into supply chain and the challenges encountered in the supply chain management ecosystem based on blockchain (Azzi, R., et al., 2019). Samuel Fosso Wamba et al. conduct a survey based on the literature of India and the United States on the adoption of supply chain performance technology and emerging blockchain to review the opinions and views on supply chain. The results show that the application of blockchain can improve the supply chain (Fosso Wamba, S., et al., 2020). Mahtab Kouhizadeh et al. use technology organization environment framework and force field theory, and use decision-making test and evaluation laboratory for analysis. It shows that supply chain and technology are the most critical barriers to the integration of blockchain and supply chain (Kouhizadeh, M., et al., 2020). Sanjeev Kumar Dwivedi et al. propose an information security sharing scheme based on blockchain and a system with smart contract and consensus mechanism for drug delivery. The scheme also provides a technology of using smart contract to distribute the required encryption key to all participants safely (Dwivedi, S. K., et al., 2020). Petri Helo and Yuqiuge Hao study the application of blockchain in the field of operation and supply chain, and programs and tests the reference implementation of BLMs. The purpose is to provide solutions for package tracking in the supply chain to support immutable history of each transaction (Helo, P. and Y. Hao, 2019).

In the above domestic and foreign research on the integration of blockchain and supply chain, there is research on tracking in commodity circulation, but there is a lack of more perfect description on tracking equipment. The integration of the blockchain and the supply chain also has the extensible advantage of promoting the cooperation between the participants in the supply chain. The research goal of this paper is to improve the tracking equipment and expand the cooperation between enterprises on the basis of the original integration of supply chain and blockchain. This paper will elaborate on this in detail and provide new ideas for the integration and development of blockchain and supply chain.

2 Design of Tracking System

Traceability system is an important part of the supply chain, which is related to the transparency of the whole process of production and circulation of goods. A good traceability system is designed to minimize the production and distribution of unsafe or poor quality products by improving the labeling and tracking system. The tracking system designed in this paper consists of three tracking components: tag, sensor and tracker. A tag is a tag placed on the top of a product or package to identify products, such as passive radio frequency identification (RFID) and quick response code (QR code). A tracker is a substance introduced into a product or its natural characteristics, which is used to provide information about the process or process of a product, so as to prove its quality. Sensor is a kind of equipment to detect environmental changes (such as light, heat, etc.). The detected events are then sent over the network to other electronic devices for processing. The tracking system is shown in Figure 1.

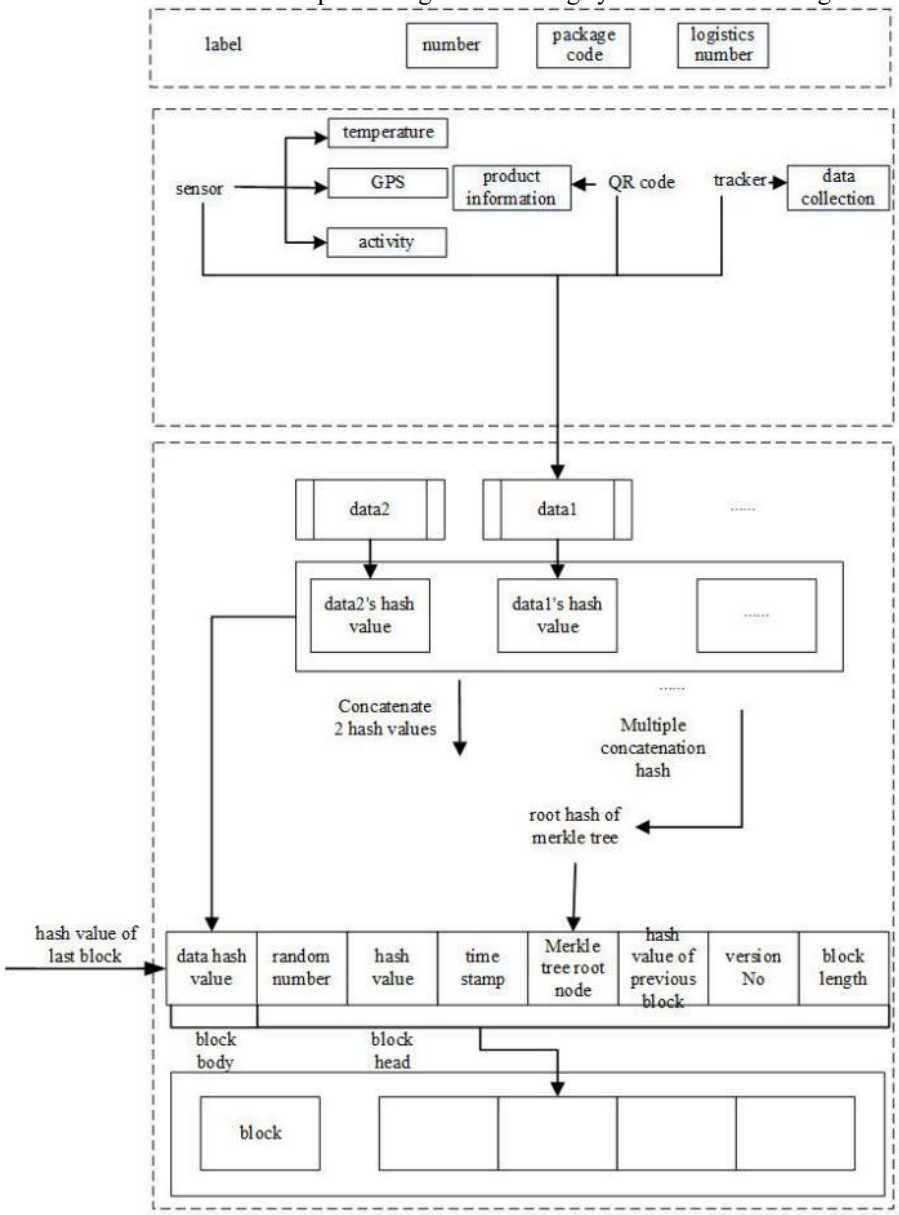

Figure 1 Traceability System

Among them, the label is used to ensure the authenticity of the product. The two-dimensional code is a matrix barcode, which contains information related to the attached product. All the data obtained from the product related to QR code correction and collected by the sensor are summarized into QR code. The sensor ensures data integrity as it will detect any open containers to check temperature and GPS movement during transport. Cameras can be used to record all activities that occur until the product is shipped. All of these sensors are connected together and then connected to the QR code. The sensor and

QR code sign the data that will be collected. It is then sent to the blockchain. Tracker, the data collected by the tracking device will be processed and sent to the storage system or blockchain.

All tracking devices are authenticated with a public-private key encryption. Each block contains at least three elements, a hash, the timestamp of the most recent valid transaction, and the hash value of the previous block. Different data traced back by the tracking system will have its own unique hash value. Two adjacent hashes are combined into a sub hash value. Based on this calculation, a root hash value, namely Merkle root, will be obtained.

Merkle root will exist in the block header where data is stored together with the current block hash value, block header hash value, enterprise hash value, version number, and time stamp involved in product production or circulation. In addition, the block body mainly stores the block hash value and digital signature of different enterprise private chains at the current time point, in which the time stamp proof data must exist. The previous block hash value links the blocks together and prevents any blocks from being changed or inserted between two existing blocks. In this way, each subsequent block will strengthen the verification of the previous block, thus enhancing the verification of the whole blockchain. This method makes the blockchain change obviously, and gives the key properties of invariance.

3 Multi-layer Structure Design of Block Supply Chain

By integrating blockchain and supply chain, the natural advantages of blockchain can make the product information on the supply chain transparent and reduce malicious behaviors. At the same time, participants in the supply chain can also take advantage of the block chain to reduce the cost of trust between each other, so as to promote cooperation. The multi-layer structure of cooperation between merchants in the supply chain is shown in Figure 2.

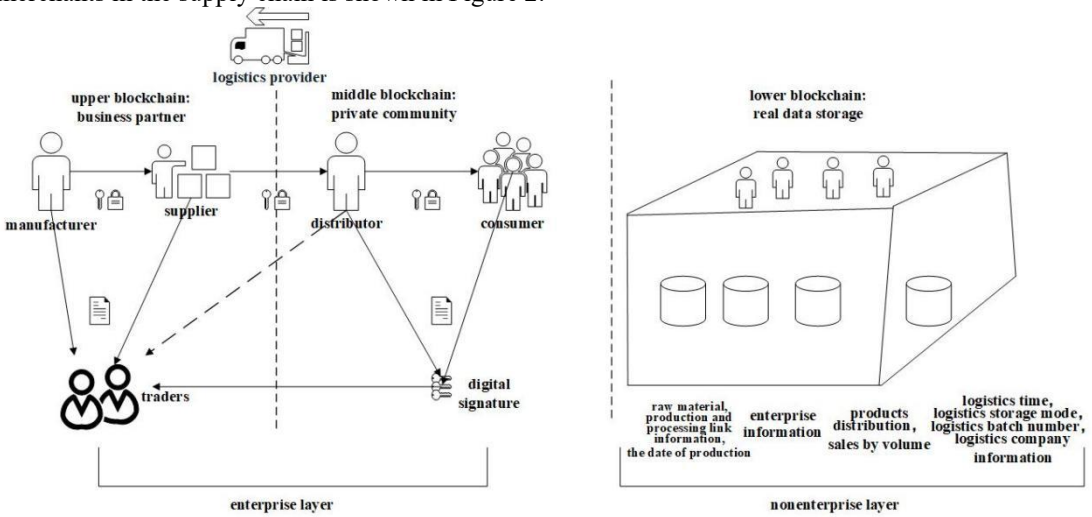

Figure 2 Multi-layer Design of Block Supply Chain

Firstly, participants are divided into three layers in vertical dimension. The upper layer is the enterprise layer, the middle layer is the private community, and the lower layer is the data storage layer. The upper blockchain records transactions between traders in the production and processing stages, and the middle blockchain records transactions between traders in the sales and consumption stages. Secondly, different consensus mechanisms are adopted at different levels according to different deployment methods of blockchain.

On the one hand, the upper class is a public community. At this level, participants look for potential business partners. At this level, it is important to find good partners from a variety of choices. So, the community has to be open. In the upper production stage, a serial number is assigned to the raw material. At each stage, participants verify the digital signature of the previous stage and create a new digital signature. In addition, they record information about each stage of distributed storage. If necessary, the goods can be tracked by parcel code, QR code, serial number, etc. Customers can search products by serial number on the lower and higher blockchains. On the other hand, the middle level is a private community, consisting of retailers and customers who sign contracts. At this level, retailers will hold customer personal information, such as name and address, in order to accurately deliver products to customers, forming a small range of product direct sales. So, the community must be closely connected, and there should be a certain degree of confidentiality. The lower layer is the data layer, which stores the real information, including the production and distribution information of commodities or the

information of each participant in the supply chain.

It should be noted that the enterprise layer is all alliance blockchain, that is, it has the characteristics of weak centralization to realize the selective sharing of information. There is no need to store detailed information for the data in the alliance chain block, as long as the data path used for traceability and the hash value of the block in the private chain of the relevant enterprise are stored in the data block. The class center node in the enterprise chain is responsible for building blocks, in which the specific product traceability information of product production, logistics and other links is stored in the private chain of the data storage layer, and the data storage layer deploys the information involving the specific production and sales of products with a large amount of data storage in the private chain, and connects with the enterprise layer through the hash pointer. The data in the enterprise level alliance chain is only the hash value of the private chain block. As a result, a large amount of data is stored in the lower blockchain, and the data transmission volume in the process of enterprise layer consensus will be greatly reduced, so as to improve the data throughput and reduce the delay time.

When the supply chain information is transferred from the upper layer to the lower layer, the upper layer users will digitally sign. The digitally signed message guarantees to the receiver that the message really comes from the claimed sender, and they enforce non repudiation. Secondly, the digitally signed message guarantees the recipient that the message will not be changed during the transmission between the sender and the recipient. This prevents malicious and unintentional changes. Digital signature algorithm relies on the combination of two main concepts, public key cryptography and hash function.

These private chains and storage information form the data base, and the data of each private chain is connected with the alliance chain of the enterprise layer through the hash pointer. The enterprise layer provides the convenience for consumers to query the traceability information by providing external interface through the consensus data. That is to say, the information of the private chain of these enterprises can be independently retrieved.

4 Conclusion

In this paper, combining block chain and supply chain, on the basis of the original literature research, the commodity information flow in supply chain, improve the tracking system is mainly to add the sensor, tracking and goods, to ensure the authenticity of information and real-time, and blocks in the supply chain of a multi-layered structure design, ensure the cooperation between enterprises, vendors, customers and maximize information stored in data space. At the same time, the design of alliance chain and the design of supply chain private chain can maximize the protection of user privacy and realize the selective sharing of user data. Product information traceability also ensures the response of user requirements. The research content of this paper extends the research on the establishment of tracking, tracing and multi-layer architecture integration based on the block supply chain, and also provides reference and reference for the actual project implementation.

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Game Theory Between Flood Control Supplies Reserve Enterprises and Government Regulation

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Abstract: Due to the periodicity and rhythm of flood disasters, the government needs to carry out regulation on the reserve enterprises to ensure the regular maintenance and update of flood control supplies. However, due to information asymmetry, the regulation effect is not ideal. In this paper, the Markov game model of government and reserve enterprise is established, and the equilibrium solution of government enterprise game is obtained by using Q-learning algorithm. The feasibility of this method is proved by the analysis of an example, and some suggestions are put forward for the substitute storage mechanism of flood control supplies.

Keywords: Flood control supplies; Maintenance and update; Markov game; Q-learning algorithm

1 Introduction

Flood disaster are natural disaster that every region of the world has to face every year. In recent years, more attention has been paid to flood control.

Sufficient reserve of flood control supplies is the prerequisite for the smooth progress of flood prevention. In order to make full use of social resources, reduce costs, make rational use of resources, make timely response to disasters, and avoid inventory risk. According to the reserve requirements and supply and demand characteristics of supplies (Zhang Youheng, 2017), the government can select and evaluate the relevant enterprises (Guo Ying, 2015), and authorize some emergency supplies to the relevant enterprises (Mu Yueyun, 2012). The government should sign reasonable incentive contract to enterprises to improve their efforts (Huimin Li, 2020). For example, Xiaoning Gao designed the incentive contract of the emergency supplies production capacity storage system entrusted by the government when the information is asymmetric (Xiaoning Gao, 2018). In the process of supplies recovery and storage, supplies need to be maintained and updated (Zhang Lin, 2018). Omshi proposed a dynamic adaptive predictive maintenance strategy (E. Mosayebi Omshi, 2020). When the government and the enterprise sign the contract of escrow, because of the information asymmetry, it needs to regulate the enterprise. The government can regulate itself or entrust the third-party regulation organization to perform the regulation responsibility of the enterprise (Zhaoying Zuo, 2018, Li Fujun, 2019).

In this paper, under the premise of inconsistent goals between the government and the enterprises, considering that the flood control supplies need to be maintained and updated in the reserve process, the strategic choice of the government and the enterprise is analyzed to maximize the social benefits.

2 Model Design

2.1 The description of problem

Considering the periodicity of flood disaster and the loss of flood control supplies, it is necessary to maintain and update flood control supplies periodically. The balance between the effectiveness of regulation and the cost of regulation are very important. The storage of supplies for flood control can be modeled as a cyclic binary Markov game process between government and enterprise.

2.2 Symbol meaning and variable description

- s : Supplies status. There are three states of supplies, sufficient, restricted and defective.
- ε: Whether the government find the supplies is restricted.
- δ: Whether the government find the supplies is defective.
- σ : Whether the public find the supplies is defective.
- I_{t+1}^{p}: Government information set, $I_{t+1}^{p}=(\varepsilon_t,\ \delta_t,\ \sigma_t)$.
- I_{t+1}^{a}: Enterprise information set, $I_{t+1}^{a}=(\varepsilon_t,\ \delta_t,\ \sigma_t,\ s_t)$.
- C_r^M: When the state of restricted supplies is discovered by the government, government punishment for enterprise.
- C_d^M: When the state of defective supplies is discovered by the government, government punishment for enterprise.
- C^A: When the state of defective supplies is discovered by the public, social punishment for enterprise.
- C^P: When the state of defective supplies is discovered by the public, social punishment for government.
- π_M: The level of government regulation.
- π_A: Whether the enterprise rotates supplies.
- c_p: The cost of regulation.
- c_A: The cost of maintaining and updating supplies.

2.3 Single stage game process

In each stage of the game, the government and the enterprise make decisions based on their own known information, in which the government determines the level of regulation and the enterprise decides whether to maintain and update supplies. Taking the *T* period as an example, the government and enterprise income are shown in Equation (1) and Equation (2).

$$r_t^p = -c_p\pi_{M,t} + \varepsilon_t C_r^M + \delta_t C_t^M - \sigma_t C^P - M \tag{1}$$

$$r_t^a = -\pi_{A,t}c_A - \varepsilon_t C_r^M - \delta_t C_t^M - \sigma_t C^A + M \tag{2}$$

The probability matrix of regulatory signals can be determined according to the level of government regulation and the actual state of supplies:

$$\begin{bmatrix} 0 & 0 & 0 & \cdots \\ p_2^1 & p_2^2 & p_2^3 & \cdots \\ p_3^1 & p_3^2 & p_3^3 & \cdots \end{bmatrix} \tag{3}$$

2.4 Multi-period model building

After the government and enterprises make decisions in each period, they will predict the current income expectation according to the state transition probability. The expected income of the government and enterprises in the *T* period are:

$$M_t^p\left(I_t^p,\ \pi_{M,\ t}\right)=r_t^p+\gamma\sum_{I_{t+1}^p}p\left(I_{t+1}^p,\ I_t^p\right)M_t^p\left(I_{t+1}^p,\ \pi_{M,\ t+1}\right) \tag{4}$$

$$M_t^a\left(I_t^a,\ \pi_{M,\ t}\right)=r_t^a+\gamma\sum_{I_{t+1}^a}p\left(I_{t+1}^a,\ I_t^a\right)M_t^a\left(I_{t+1}^a,\ \pi_{A,\ t+1}\right) \tag{5}$$

Where γ is a discount factor, the closer γ is to 0, the greater the impact of current returns, otherwise the greater the impact of future returns (Aguirregabiria V, 2020).

According to the expected income, the prospective income can be obtained. The prospective income of the government and enterprises in the *T* period are:

$$P_t^p\left(I_t^p,\ \pi_{M,\ t}\right)=r_t^p+\gamma max M_t^p\left(I_{t+1}^p,\ \pi_{M,\ t}\right) \tag{6}$$

$$P_t^a\left(I_t^a,\ \pi_{A,\ t}\right)=r_t^a+\gamma max M_t^a\left(I_{t+1}^a,\ \pi_{A,\ t}\right) \tag{7}$$

The Q-learning algorithm can be used to define a kind of expected memory returns. The expected memory returns of governments and enterprises are:

$$Q_t^p\left(I_t^p,\ \pi_{M,\ t}\right)\leftarrow Q_t^p\left(I_t^p,\ \pi_{M,\ t}\right)+\alpha_t\left[P_t^p\left(s_t,\ a_t\right)-Q_t^p\left(I_t^p,\ \pi_{M,\ t}\right)\right] \tag{8}$$

$$Q_t^a\left(I_t^a,\ \pi_{A,\ t}\right)\leftarrow Q_t^a\left(I_t^a,\ \pi_{A,\ t}\right)+\alpha_t\left[P_t^a\left(s_t,\ a_t\right)-Q_t^a\left(I_t^a,\ \pi_{A,\ t}\right)\right] \tag{9}$$

This kind of memory update process will produce a change path of the state of supplies under an optimal strategy. At the same time, the government and enterprise's memory expected income update process is carried out under their respective maximum income decisions. In order to avoid dimensional disasters, the current mean square error is used. To determine whether the game process has reached equilibrium, When Equations (10) and (11) tend to 0 for a long time, it means that the game has reached equilibrium (Pakes A, 2016).

$$G=\frac{1}{T}\sum_I \hbar_I E\left[\frac{\mu(Q_{iI})-P_I}{P_I}\right]^2 \tag{10}$$

$$F=\frac{1}{T}\sum_I \hbar_I E\left[\frac{\mu(Q_{iI})-\frac{\sum_j^i \mu(Q_{jI})}{i}}{P_I}\right]^2 \tag{11}$$

3 Example Analysis

3.1 Parameter description

The supplies status is $s=(1,\ 2,\ 3)$.The cost of the enterprise is c_A=70. The enterprise strategy is $\pi_A=(0,\ 1)$, which represents maintenance supplement and non-maintenance supplement. The government's regulatory intensity is $\pi_M=(1,\ 3,\ 6,\ 10)$, and the regulatory cost coefficient is $c_p=100$. When the supplies status is 2 and is found by the regulation, a regulatory signal $\varepsilon=1$ will be generated, and the government will punish the enterprise by C_r^M. When the supplies status is 3 and is found by the regulation, a regulatory signal $\delta=1$ will be generated, the government will punish the enterprise by C_d^M. When the supplies status is 3 and it has not been discovered by government regulation, no regulatory signal will be generated, but a social signal of $\sigma=1$ will be generated. At this time, the enterprise will receive a greater penalty of C^A, and the government will cause Social loss, C^P=100000. Discounting factor $\gamma=0.9$, the learning rate is $\alpha_t<0.5$, and the government subsidy *M* = 60 to the storage agent. The number of a single iteration is *T*=500, and the total number of each iteration is at most 20000. The probability matrix of regulatory signal generation under different government regulatory intensity and supplies state is as follows:

$$p=\begin{bmatrix}0 & 0 & 0 & 0\\ 0.1 & 0.3 & 0.5 & 0.8\\ 0.2 & 0.4 & 0.6 & 0.9\end{bmatrix} \tag{12}$$

3.2 The influence of punishment intensity on game equilibrium

In this subsection, the government's punishment for enterprises has two parameters: C_r^M and C_d^M. This section will consider the effect of C_r^M on game equilibrium. C_r^M is assigned to 80 and 160 respectively, and $C_d^M = 200$, $C^A = 500$.

3.2.1 The influence of lower punishment on game equilibrium.

When the government's punishment to enterprises is low, the government has to choose medium and high-level regulation in order to prevent enterprises from being lazy. Especially when the supplies status is restricted, the government will choose high-level regulation, which will increase financial expenditure. Enterprises will be lazy as much as possible in order to maximize their profits. The information of game equilibrium between government and enterprise is shown in table 1:

Table 1 Equilibrium 1

Government			Enterprise		
Last signal	Regulation strategy	Expected return	Last signal	Update strategy	Expected return
(0,0,0)	6	-3568.3	(0,0,0,1)	0	-468.7
(1,0,0)	10	-5873.1	(0,0,0,2)	1	-587.2
			(1,0,0,2)	1	-589.3

3.2.2 The influence of higher punishment on game equilibrium.

There are two equilibrium states (equilibrium 2, equilibrium 3), and it can be seen from the income that equilibrium 2 is better. When the government punishes enterprises with greater punishment, due to the great punishment, the government's regulation can be appropriately reduced. In order to avoid high punishment, enterprises will reduce laziness. However, as the profits of enterprises become lower, the enthusiasm of enterprises will decrease. Therefore, it is necessary for the government to increase the subsidy intensity to mobilize the enthusiasm of enterprises.

Table 2 Equilibrium 2

Government			Enterprise		
Last signal	Regulation strategy	Expected return	Last signal	Update strategy	Expected return
(0,0,0)	1	-2834.6	(0,0,0,1)	0	-526.5
(1,0,0)	3	-3045.1	(0,0,0,2)	1	-603.7
			(1,0,0,2)	1	-605.6

Table 3 Equilibrium 3

Government			Enterprise		
Last signal	Regulation strategy	Expected return	Last signal	Update strategy	Expected return
(0,0,0)	3	-3478.3	(0,0,0,1)	0	-556.5
(1,0,0)	6	-3856.2	(0,0,0,2)	1	-634.5
			(1,0,0,2)	1	-634.9

3.3 The influence of social loss on game equilibrium

In this subsection, the government's punishment for enterprise are $C_r^M = 100$ and $C_d^M = 200$. C^A is assigned to 400 and 800 respectively.

3.3.1 The influence of lower social loss on game equilibrium.

There are two equilibrium situations in the game under low-level social losses (equilibrium 4, equilibrium 5). It can be seen that equilibrium 4 is the best choice for the government and the enterprise. When the signal of the last period is (0, 0, 0), the government can choose a lower level of regulatory intensity, and use a high level of regulatory intensity when the last signal is (1, 0, 0). Although the

government adopts high-level regulation in the short-term to avoid the lazy behavior of the enterprise, when the high-level regulation is adopted for a long time, the enterprise may continue to be lazy, resulting in the supplies reaching a defective status.

Table 4 Equilibrium 4

Government			Enterprise		
Last signal	Regulation strategy	Expected return	Last signal	Update strategy	Expected return
(0,0,0)	3	-3589.4	(0,0,0,1)	0	-534.5
(1,0,0)	10	-5632.7	(0,0,0,2)	1	-565.1
			(1,0,0,2)	1	-566.3

Table 5 Equilibrium 5

Government			Enterprise		
Last signal	Regulation strategy	Expected return	Last signal	Update strategy	Expected return
(0,0,0)	6	-4638.8	(0,0,0,1)	0	-553.7
(1,0,0)	6	-4647.2	(0,0,0,2)	1	-564.5
			(1,0,0,2)	1	-565.9

3.3.2 The influence of higher social loss on game equilibrium.

Under a high level of social losses, equilibrium 6 is the best choice for the government. The government can choose a low level of regulation to reduce the financial expenditure. At the same time, it can be seen that the regulation of the society has a key auxiliary role in government regulation.

Table 6 Equilibrium 6

Government			Enterprise		
Last signal	Regulation strategy	Expected return	Last signal	Update strategy	Expected return
(0,0,0)	1	-2845.4	(0,0,0,1)	0	-529.5
(1,0,0)	1	-2846.7	(0,0,0,2)	1	-535.7
			(1,0,0,2)	1	-536.1

Table 7 Equilibrium 7

Government			Enterprise		
Last signal	Regulation strategy	Expected return	Last signal	Update strategy	Expected return
(0,0,0)	1	-3445.4	(0,0,0,1)	0	-528.3
(1,0,0)	10	-4334.8	(0,0,0,2)	1	-534.6
			(1,0,0,2)	1	-535.4

3.4 Comprehensive analysis

In the simulation process, there are fewer equilibrium times of low-level punishment compared with high-level punishment. This is because high-level punishment can give enterprises more deterrent power, avoid enterprises' lazy behavior, and reach the equilibrium state more quickly. The same can be said of high levels of social loss.

Table 8 Proportion of Equilibrium State Generated by 1000 Simulations with Different Parameters

Parameter	C_r^M =80	C_r^M =160		C^A =400		C^A =800	
Equilibrium	1	2	3	4	5	6	7
Proportion	32.3%	26.4%	21.9%	17.4%	22.7%	29.6%	30.5%

During the simulation process, the learning speed of enterprise is faster, because the enterprise has information advantages; for the government, it needs longer time to learn and discover the maintenance

and supplement strategies of enterprise to determine its optimal strategy selection. In each equilibrium, the enterprise's strategy is relatively single, while the government's strategy is relatively diversified, which is also because of the interference of government information disadvantage on its own strategy choice in the game process.

4 Conclusion

Aiming at the maintenance and supplement process of flood control supplies, this paper takes into account that supplies storage is a multi-cycle game process and has Markov property. The multi-period evolution model of flood control supplies storage based on Markov game is established. The equilibrium model in the case analysis is in line with the real situation and can be explained, which reflects the rationality and effectiveness of using Markov game to describe and solve the principal-agent problem. The main conclusions and countermeasures of this paper can be concluded as follows:

(1) Government learn more slowly than enterprise because it has an information disadvantage. In order to alleviate the government's information disadvantages, it is necessary for the government to improve the regulatory system and narrow the gap of information disadvantages.

(2) Social supervision has a greater influence on the government's strategic choices. The government can encourage the public to participate in the flood control supplies storage work.

This paper only studies the game between the government and the enterprise, but the flood control supplies storage system involves multiple participants. The follow-up study can consider the Markov game of multiple game players.

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Study on the Cost Management of Book Publication

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Abstract: As a cultural enterprise, book publication has the commercial features of most enterprises and the pursuit of economic interests. In the face of fierce market competition, strengthening the cost management of book publication is the inevitable requirement to improve the core competitiveness of the enterprise. Therefore, Effective cost management of book publication is an extremely important work. Based on expounding the contents and characteristics of book publishing cost management, this paper puts forward some improving measures and suggestions in view of the existing problems existing in book cost management

Keywords: Book publishing; Cost management; Problems; Measures and suggestions

1 Introduction

In the era of mobile internet, the traditional printed books have been affected by multiple factors like online reading, and the circulation of single-variety books is showing a downward trend. In addition, the continuing uprising labor costs and paper prices in recent years have significantly compressed the profit margin of books. Therefore, how to implement effective cost management on book publication and raise management level of publishing enterprises has become the only way to enhance core competitiveness and maintain the sustainable development of the enterprises.

2 The Content and Characteristics of Book Publication Cost Management

2.1 The content of book publication cost management

Cost management is a central link of operation and management as well as a crucial financial element to publishing enterprises. Thus, It is of great significance to improve the financial management of publishing enterprises, improve the level of management and core competitiveness, and realize the unification of social and economic benefits.

The cost management of publishing enterprises mainly focuses on the cost management of book publication, therefore executing good cost management of book publication has become the main content of the cost management of publishing enterprises.

As a special commodity, books have the properties of general commodities. The cost of books is the total sum of all kinds of consumption in the process of publishing. These consumptions can be divided into direct costs and indirect costs according to their relationship with the book products.

Direct cost refers to the cost that can be directly included in the cost of the book such as editing fee, proofreading fee, typesetting fee, printing fee, manuscript fee etc. Among them, the printing cost (including the cost of materials such as paper) is generally about 38% of the total cost of books, accounting for the highest proportion in the total cost and direct cost of books. The same printing number and different format printing costs are different (Example 1). For the same or different print runs, there are also different printing unit prices for new editions and reprints (Example 2).

Example 1, the book of 300,000 characters with 250 grams coated paper and 70 grams of double-glue paper for the text is printed in 3000 volumes, if monochrome printing price is 35 yuan per volume,

the book code yang (total price) =3000 volumes ×35 yuan/volume =105000 yuan. Referring to the current calculation standard of "Hubei Province Books and Periodicals Printing Wages (1995)"and "Hubei Province Books and Periodicals Printing Guidance Wages (2009)", the comparison of printing costs in different format is shown in Table 1.

Table 1 Comparison of Printing Costs in Different Format

Format	Product size/mm	Paper specifications /mm	Plate core / characters	Total sides	sheets	Price of sheets /（Yuan/Sheet）	Total printing price / Yuan	Printing fee/ Code yang /%
Small 16 mo	170×230	787×960	35×35	244	15.25	0.295	13496.25	12.85
Is 16 mo	185×260	787×1092	40×39	192	12	0.339	12204	11.62
Big 16 mo	200×270	850×1168	42×41	176	11	0.392	12936	12.32
Special 16 mo	210×297	880×1230	45×45	148	9.25	0.419	11627.25	11.07
Special 32 mo	148×210	880×1230	30×32	314	9.815	0.415	12219.68	11.64

Example 2 , the book made by 250 grams coated paper and 70 grams of double-glue paper for the text in size of 16 mo and 15 sheets, the following Figure 1 shows a comparison of the printing prices of new and reprinted books for 1000-5000 volumes.

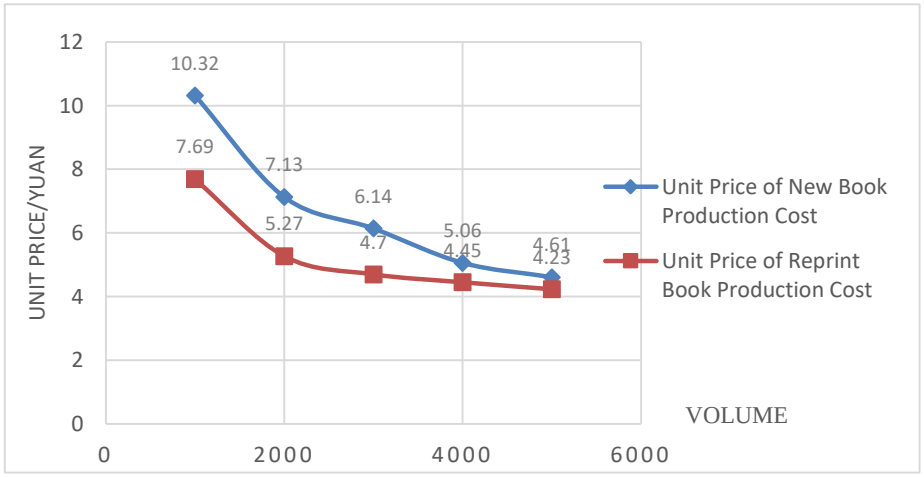

Figure 1 Comparison of Unit Prices of New and Reprinted Books with Different Volume

Indirect cost refers to the expenses that need to be apportioned into books. mainly referring to three period expenses, namely operating expenses, management expenses, and financial expenses.

Generally speaking, publishing cost management includes the following two parts: the first one is to reduce costs, which means to produce and sell books at the lowest possible cost.. The second is reasonable expenditure cost. Cost control is implemented in terms of the overall goal of the internal management of publishing enterprises and can also be decomposed as the basis to determine the cost occupation ratio of single book variety.[1] In the publishing process, expenses and costs continue to occur. Therefore, cost management and process management in publishing are inseparable. Strengthening cost management is not only the foundation of publishing management, but also can facilitate the business activities of publishing companies to a great extent.

2.2 Features of book publishing cost management

2.2.1 Cost management runs through the entire publishing process.

Cost management runs through the whole publishing process. From topic planning, manuscript preparation to inviting authors to write expert review; from the first review by the responsible editor to

book proofreading; from typesetting and printing to book publicity, promotion, maintenance and revision; every step in the publishing process will have an impact on the economic benefits of books, either directly or indirectly.

2.2.2 Editors are an important cost management subject.

The publishing of every book variety is a "project engineering", and editors are in charge of it. From the cost planning and budget before publishing, to the various spending in the process; and cost accounting, profit drawing afterwards, each of these tasks requires the editor′s decision or participation. Hence, it can be said that editors are not only the cost management decision-making bodies, but also a crucial organizational and executive one, whose impact and importance in cost management ise self-evident.

2.2.3 Cost management is fundamental to publication management.

Development is the ultimate goal, management is the basis and guarantee of development, and effe ctive cost management is fundamental. [1] In order to ensure that there is no deviation from market goals in publishing operations, companies must carry out strict internal control management, the basis of which is to establish an internal control system, allocate publishing resources reasonably, and obtain maximum benefits with minimal investment.

3 Problems Existing in Book Publishing Cost Management

Having been managed and operated as cultural institutions for a long time, the "transformation to enterprises and restructuring" of publishing enterprises has just been completed in recent years. So, publishing enterprises, compared with those in other industries, still have a long way to go in many aspects of cost management.

3.1 Lack of cost management planning

Due to the short period after "transformation to enterprises and restructuring", the cost management awareness of publishing companies from leaders to employees is relatively weak, and quite a few companies are still at the primary stage of cost accounting, meaning that they just have the narrow perception of direct cost accounting. Others simply add up direct and indirect costs incurred in production and operation. Even though some publishing companies have realized that cost is the key to the survival and development of the company, the comprehensive cost management has just begun, which is in lack of a comprehensive and scientific plan [2]. The prevailing situation is: the cost management of book focuses on the summary of costs after publication, ignoring the planning and budget before publication. It focuses on the calculation of the cost of a single book variety, neglecting the overall, full-process, and systematic cost management planning. It also still concentrated on the financial and production departments, short of full-staff cost management concepts, etc., which directly hinders publishing companies from carrying out effective cost management activities.

3.2 Lack of cost management monitoring

In the process of controlling book cost , although having formulated corresponding cost management plans, many publishing companies did not track and monitor them in time, which results in the discrepancy between actual cost and the original planned cost, thus leading to cost overruns, arbitrary expenditure listings, and even economic losses[3]. The common practice focuses on the production process of cost management and control, adopting a method that only works after economic transactions, which makes it difficult to accurately reflect the true book cost in time. This conventional cost management method is obvious a backward one in view of controlling, making it difficult to adapt to the

fierce competition in the book market.

In addition, the direct book cost in the production process is controlled by the editor, and indirect cost is determined by the sales and management departments. Due to the guiding effect of the publishing company's performance appraisal, editors often only focus on personal performance, workload and other aspects, without fully considering companies' overall benefits and awareness of indirect costs, thus resulting in the deviation of book costs and efficiency incentives, which has affected the improvement of enterprise cost management.

3.3 The unscientific cost allocating method

Many publishing companies use department as the cost unit to attribute editing costs in the cost accounting process, and then allocate the costs to various books according to the corresponding indicators. Although this method allows each department to pass the performance appraisal, due to the differences in book prints, difficulty coefficients, workloads, etc., the book cost reflected in this way shows great gap from the actual cost. the cost of some books becomes higher[4], even higher than the fixed price, thereby making it difficult to truly reflect the cost data of various books. And it may induce the withdrawal from market of some books that have high market value and good economic benefits, causing huge losses.

3.4 Relatively outdated cost accounting system

With the progress of society and the development of technology, network technology has widely penetrated into all aspects of people's work and life. In contrast, due to the short period of time for the " transformation to enterprises and restructuring ", the cost accounting systems of some publishing companies are still in a backward state, and relevant financial software in service can only deal with relatively low-level forms, such as balance sheets and income statements. Other more complicated ones, such as input-output tables, cost calculation tables, etc., cannot be generated automatically. In addition, due to the lack of communication between various departments of publishing companies , resources and information cannot be shared, which makes work inefficient and causes waste of human, material resources and financial resources. In today's fast-paced, resource-sharing society, this closed working method is obviously not conducive to the development of publishing enterprises.

3.5 High inventory management costs

Reducing the direct publishing cost of a single book is currently a cost management method commonly adopted by book publishing companies. That is to say, publishing companies choose printing factories with relatively low market prices when printing books while increasing the quantity of books printed, thereby achieving the goal of reducing cost [5]. Expanding the number of books printed can certainly reduce the cost of individual books, thus enhancing the economic benefits of book publishing companies. However, from the actual situation, the number of books in the inventory of publishing companies remains high, and inventory management cost is rising, mostly because publishing companies are affected by market competition, homogenization, and the "bullwhip effect" of the book supply chain. It is also caused by the lack of book cost management concepts, neglect of market demand prediction, and blindly expanding printing quantity. This situation has seriously affected the economic benefits and sustainable development of publishing companies.

4 Countermeasures and Suggestions for Strengthening Book Publishing Cost Management

The profit calculation formula is "profit equals selling cost minus expense". It can be seen from this

equation that the way to gain profit is to increase the selling price and reduce the cost. In the current market economy environment, the book publishing market is highly competitive. It is difficult for most books, especially homogenized books of the same quality and content to increase their prices, so the main source of profit can only be to lower costs.

4.1 Enhancing cost management awareness and perfecting cost management system

4.1.1 Enhancing cost management awareness

First of all, the leaders of publishing companies should be in a strategically advantageous position, completely abandon the original management methods of cultural institutions, establish modern business management concepts, and attach great importance to cost management. Secondly, it is necessary to strengthen the training of publishing company employees, especially editors, to raise their awareness of the importance of cost management, so that they can truly realize that only by using the least consumption to obtain the maximum profit can the company increase efficiency and personal income. Third, it is necessary to build up the concept of total cost management. Total cost management refers to the joint management of costs carried out by all departments, links, and all employees. It is essential to abandon the notion that book publishing cost management is only related to financial, editing, publishing and other department and view book publishing cost management from the full-scale perspective of the publishing enterprise, letting the book publishing cost management concept interiorize[6]. Finally, companies should do good publicity and give proper guidance, change the traditional book publishing cost management mode, assume primary responsibility of cost management, and alter the practice of focusing cost management on printing and after printing, thus strengthening cost control in the planning and design phase before publishing and fortifying responsibility through all lines of production along with each specific personnel in cost management.

4.1.2 Effective cost management planning

In the book publishing process, starting from the topic selection and implementation stage, the relevant departments, especially the editorial department, should make detailed cost plans as well as supporting specific measures to save costs that may be generated in subsequent steps including soliciting contributions, editing and processing, procurement, graphic design, warehouse management, marketing etc.so that problems that may occur in each procedure can be found in time and avoided, thus reducing expenses and saving costs while controlling risks. Meanwhile, formulating a scientific and impeccable cost management plan can also enable book publishing companies to have consistent goals, clear directions, and a unified pace. This can enhance the ability of teamwork within the company while strengthening book publishing cost management, so as to lay a solid foundation to complete the book publishing work improve efficiency and profit . Without a comprehensive book cost management plan, it is difficult to make a scientific estimate of costs and profits and to measure the economic value in a statistical way, which will lead to unavoidable detours in the development of enterprises. Therefore, it is very important and necessary to establish a comprehensive book publishing cost management system.

4.1.3 Developing an effective cost supervision system

After a comprehensive plan for book publishing cost management has been formulated, in the process of implementation, the relevant departments, especially the editorial department, must closely supervise and control the actual producing situation to prevent hidden problems in book production and management. If not, the actual cost is extremely likely to be higher than the planned cost, more possibly causing economic losses to the book publishing company. For that reason, publishing enterprises must establish a set of systems that can effectively restrict each cost responsible unit and responsible person,

scientifically allocate cost budgets based on cost items, and execute cost control for each routine that constitutes the publishing company's operation process[7]. At the same time, it is necessary to analyze cost behaviors not included in the scope of accounting to reinforce total cost management.

4.1.4 Establishing a thorough cost accounting method and system

First of all, publishing enterprises must strictly abide by relevant financial system regulations and cost management requirements; strengthen and perfect the corresponding cost planning (programming), cost control, cost accounting, cost analysis, and the cost accounting methods of single-category books. For instance, publishing companies can solve the problem of incomplete and unreasonable cost allocation by establishing and improving the "one book, one account" and activity-based costing method. To be specific, by combining the characteristics of book publishing with cost accounting, different departments and different books are classified and unified standard that evenly allocating costs are avoided. During the process of cost allocation, the accountants must further analyze the causes and flow direction of expenses so as to gradually improve the accounting and analysis system of book cost.

Second, publishing firms should integrate existing resources and fully fuse with Internet technology, by which method the existing cost accounting system can be upgraded, an efficient and flexible digital cost management model can be built, and a powerful and complete cost management system can be generated, ultimately promoting the development of the enterprise and the improvement of economic benefits.

4.2 Cost management measures of each link in book publishing process

The publication of a book needs to go through multiple stages including review, proofreading, typesetting, design, printing, and distribution. It is a project that can only be completed through the coordination of various departments of publishing enterprise. Therefore, the staff in each department should not only establish the concept of comprehensive cost management concept, but also be a good implementer of cost management and control within his work range (especially for editors, they should participate in the whole process) [8], which is essential for saving costs and improving profits.

4.2.1 Successful topic selection and planning is the key to reduce costs

To cut down the publishing cost of books, the first thing is to choose a good topic. Cost management of topic selection is the most vital cost management for publishing enterprises.

For publishing companies, a great topic selection is the basis for success. Faced with the rapid development of science and technology, and the updating frequency of knowledge, editors should have strategic vision and a sense of advancement when designing topics. They should research the potential needs of readers and market, look for market blank points, and meet market needs. Besides , they should try to achieve the aim of reducing costs and maximizing profits while guaranteeing the quality of books, making corresponding predictions about market demand, seizing the best publishing opportunities and formulating a variety of plans are also required.

4.2.2 Strengthening the cost management of editing and proofreading

Managing editing cost is an important part of cost management. First, the editors should be "complete, clear and definite" when editing and publishing, which can greatly shorten the typesetting cycle and help to control printing costs subsequently. Second, in the process of editing and proofreading, major changes to manuscripts or increased revisions will increase typesetting costs. Therefore, the editor should communicate with the author more before publishing, and try to make changes before publishing, so that the typesetting and editing costs can be effectively controlled. Third, books with substantial content, high-quality editing, and beautiful binding are the first choice for readers. After these books are

recognized by readers, they can be reprinted or even republished. With the number of sales increasing, the main cost of books—the printing cost is greatly reduced naturally, the profit is considerable.

4.2.3 Effectively control of printing cost

Printing cost makes up a largest proportion of book cost and it is also an important reference basis for book pricing. Therefore, effective control of printing cost is an important approach for publishing companies to increase revenue, reduce expenditure and raise profits. Specifically, the following measures should be adopted:

(1) Reasonable choice of format: Different format will lead to different effective utilization rate of the paper and different printing cost. It can be seen from the calculation results in example 1 that although the price of sheets using special 16 mo is the highest (0.419 yuan/sheet), the printing cost accounts for the lowest proportion (11.07%) of book code yang in this size. In the case of small 16 mo, the price of sheets is the lowest (0.295 yuan/sheet), but the printing cost account for the highest proportion (12.85%) of book code yang in this size. It is easy to see that a reasonable choice of book printing format is very important to save costs.

(2) Careful design of the layout. Editors should follow the principle of "beautiful and practical" when designing the layout, accurately calculate the sheets, reduce zero pages and blank pages, in order to achieve cost-saving, beautiful and practical effects[9].

(3) Reasonably determining the number of prints. It can be seen from example 2 that the unit price is different for different printing volume. The less the number of prints， the higher the unit price, and the more the number of prints, the lower the unit price. For the same number of prints, the printing unit prices of new books and reprinted books are also different. When determining the number of books to be printed, editors and printing managers must be cautious but not too conservative. They should scientifically predict the market sale volumes and decide the printing number and try not to adopt a small number of multiple printing.

(4) Choosing suitable paper size. The cost of paper generally accounts for more than 50% of printing costs. Saving paper is the key to reducing book cost. So, appropriate paper size should be selected according to different book type sand book effects by editors.

(5)Reasonable selection of printing process. . The traditional printing process is more reasonable for books with a large print volume (more than 500 copies), and the unit price will gradually decrease with the increase of print volume. For academic works with less printing number (less than 500 copies), it is reasonable to adopt CTP or pod technology, and the printing unit price is not sensitive to the number of copies. Therefore, in the actual work, the corresponding printing process should be adopted according to different print volume.

(6) Flexible use of printing price. It means arranging book printing tasks in the off-season production of the printing factory and negotiating the printing price based on the principle of mutual benefit between the factory and the enterprise.

(7) Good control of post-press cost. Post-press work mainly includes reprinting, packaging, transportation, and preservation of film and typesetting files. Although these tasks are relatively simple, they are easily overlooked. The effect of preserving film and typesetting files will directly affect the quality and cost of reprinted books.

4.2.4 Strict control of marketing costs

Choosing the right marketing strategy is very important for cost control [10], but the premise is to do a solid market research and to have a true understanding of the market demand. Good marketing strategy

can quickly open the market and win profits for the company. This also requires publishing companies to subdivide the market, select target markets, and formulate corresponding marketing strategies for specific readers to control marketing costs and maximize profits.

4.2.5 Ensuring safety stock

The inventory of books has become an unbearable burden for the book industry. It not only takes up a large part of cost of capital, material costs, labor costs of publishing companies, puts the survival and development of the enterprises in trouble, but also leads to faulty decision-making and problematic strategic planning. In addition, it also causes conflicts and economic disputes between publishing companies and distributors. Therefore, on the one hand, publishing companies must adopt corresponding strategies for inventory management, make full use of the advantages of big data, establish system to analysis, process and share information. Under the premise of ensuring the publishing companies′ own effective inventory, they should control distributors′ safety inventory, establish and improve effective inventory delivery and communication mode. On the other hand, publishing companies should establish a reasonable and effective inventory sharing responsibility system in the book supply chain, decompose the inventory risk and make distributors and publishing enterprises share the responsibility of inventory risk, thereby forming a supply chain cooperating mechanism that can balance cost, benefit, and risk taken by each side. By this means the "bullwhip effect" in the book supply chain is weakened [11], enabling enterprises to avoid overstocking, reduce costs, and increase income.

5 Conclusion

Competition in today's book market is fierce. To remain invincible in the competition, publishing enterprises must exploit their own professional characteristics and advantages to the fullest while strengthening the management of book costs. It is too late for companies to realize the importance of cost control when they are in trouble. Neglecting cost control is suicidal. This sentence reminds us that cost is price. Effective cost management is an important measure to improve the competitiveness of publishing enterprises. It is the responsibility of publishers, especially editors to control the book cost.

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Analysis of the COVID-19 Epidemic in Sichuan

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Abstract: The research on COVID-19 epidemic in Sichuan county is based on the data of 531 cases of cumulative diagnosis published on February 26, 2020. The external influencing factors of the COVID-19 epidemic in Sichuan province has been analyzed by geographical detector model from the natural, locational and populational factors on the scale of counties. The characteristics of the emergence, development and change of the COVID-19 epidemic in Sichuan province were studied in depth. The results indicate that the transmission intensity of the epidemic among the plain, hilly, mountainous area, ethnic areas and municipal districts differed. Meanwhile, the responses of the epidemic transmission to the meteorological, geographical and populational factors were different. Therefore, conclusions can be drawn that the development and dynamic evolution of the COVID-19 epidemic is not only affected by the biological characteristics of the disease and control measures, but also related to the external factors in a certain region. These findings have important implications for specific early warning and targeted prevention measures according to the evaluation of the potential risks and development trends of epidemic based on different regional features.
Keywords: The COVID-19 epidemic; Geographical detector; Influencing factors

1 Introduction

The current COVID-19 epidemic has spread to almost all countries and regions in the world, and has formed a new global "public health emergencies". At present, novel coronavirus pneumonia epidemic scale changes have been analyzed and studied (Wang Xia et al., 2020; Zhao S L et al., 2020; Batista M Batista 2020), and the impact of population mobility and distribution, transportation network and prevention and control policy has been considered (Yuan H Y et al.,2020;Ai S et al.,2020). However, the spread of the epidemic is not only reflected in scale and time scale（Chaolin Huang et al.,2020）. The spatial diffusion is also worthy of attention and research. At present, most of the studies are based on the time series of case data, and lack of discussion on the spatial characteristics of cases. On the research scale, most of the studies analyzed the temporal and spatial distribution of the number of cases at the provincial and municipal level, lacking of more detailed scale discussion, so the guidance for the differentiated epidemic prevention and control at the district and county level is weak. On the whole, the existing research focuses on the scale change and spatiotemporal spread of infectious diseases, and it is of great significance to further combine the transmission of infectious diseases with relevant geographic technologies. However, there is still a lack of comparative analysis of the influencing factors of major infectious diseases in different types of regions.

Therefore, this paper selected Sichuan Province as the research area to explore the spatial differences of the COVID-19 epidemic situation in different types of regions and its relationship with meteorological factors, geographical location factors and population factors.

2 Data Sources and Research Methods

2.1 Data sources

The COVID-19 epidemic in Sichuan province at the county scale is based on the data of 531 cumulative cases of 2020-2-26 confirmed by the Sichuan health and Health Committee. Natural, demographic, social and economic data are from China Statistical Yearbook, National Economic and Social Development Statistical Bulletin and China Health Statistical Yearbook. The meteorological data come from the meteorological data of China Meteorological Administration received by the College of atmospheric science, Chengdu University of information engineering.

2.2 Research methods

The spatial distribution characteristics of novel coronavirus pneumonia in Sichuan province were analyzed by GIS spatial analysis method, and the spatial distribution map of Sichuan epidemic area was drawn. This paper draws on the geographic detector model to detect the spatial analysis of the interaction

between the various outbreak influence factors. （Wang Jinfeng et al., 2017）

3 Factors Influencing the Spatial Disparities of COVID-19 Epidemic at County Level in Sichuan Province

3.1 Establishment of index system

In order to analyze the factors affecting the spatial distribution of the epidemic situation in counties of Sichuan Province, this paper selects eight indicators of three dimensions, meteorological factors, geographic location and population factors, and analyzes their impact by using geographic detectors.

Table 1 Influencing Factors of Spatial Disparities of the COVID-19 Epidemic in Sichuan Province

Metric dimension	Detection factor	Indicator interpretation
Meteorological factors	X1 temperature	Temperature in each county in February26, 2020
	X2 altitude	Average altitude of each county
	X3 the relief degree of land surface (RDLS)	Calculated from extracted DEM data by spatial analysis module in ArcGIS
Geographic location	X4 precipitation	County Precipitation in February 2020
	X5 location advantages	County location advantages calculated by location advantage model
	X6 population density	County permanent population density
Demographic factors	X7 urbanization rate	County Proportion of urban population
	X8 floating population	County floating population

3.2 Results

Due to the different sources of each detection factor, the paper standardize the data of each detection factor in the analysis process, and use SPSS17.0 to perform multi-collinear analysis on the number of cases and various influence factors in Sichuan province The VIF value of each influencing factor is less than 10, indicating that there is no multicollinearity problem. Geographic detectors were used to calculate the *q* value of the decisive power of each factor to the spatial differentiation of the five major regions in Sichuan Province.

Table 2 The Results of the Factors Influencing the Spatial Disparities of COVID-19 Epidemic in Five Regions of Sichuan Province by the Geographic Detectors

Influence factor	Plain area	Hilly area	Municipal	Mountainous	Ethnic area
X1 temperature	0.4446*	0.1168	0.2861*	0.0714	0.0632
X2 altitude	0.1095	0.0827	0.1677	0.1231	0.0482
X3 the relief degree of land surface (RDLS)	0.3340	0.1798*	0.3182**	0.1395	0.0458
X4 precipitation	0.2254	0.1333	0.1312	0.0585	0.0439
X5 location advantages	0.3899*	0.1801*	0.2363*	0.0374	0.0354
X6 population density	0.6358**	0.1778	0.3330*	0.0369	0.0236
X7 urbanization rate	0.5991**	0.0719	0.2609*	0.0851	0.0332
X8 floating population	0.4874**	0.0467	0.2592*	0.0850	0.1263

4 Discussion

4.1 Plain area

Plain area: The plain area is a typical densely populated area in Sichuan Province (Lin Jing et al., 2018). It is highly economically connected to cities such as Wuhan and Chongqing. According to the analysis of geographic detectors, among the factors that passed the significance test, the most explanatory factor for the spatial distribution of the epidemic situation in the plain area was population density, followed by the proportion of urban population, floating population, temperature, and location advantages. Among the influencing factors of the epidemic situation in the plain area, the greater the population density, the faster the epidemic spreads. At the same time, the effects of the location advantage is significant. The plain area is a large city gathering area. Each county (city, district) is close to the central city and the epidemic spread distance is short. Therefore, the epidemic spreads faster.

4.2 Hilly area

Hilly area: The hilly area of Sichuan is the link between the two core economic development poles

in the west (i.e. Chengdu and Chongqing) (Chen Yulan et al., 2014). Through the analysis of geographic detectors, only the relief and location advantages have passed the significance test. The topography of hilly areas is gentler than that of mountainous areas and ethnic areas, the degree of urbanization is relatively high, and the population is relatively concentrated. The lower the topography of hilly areas, the more the epidemic spreads; the lower the mobility of population and economic factors, the less the epidemic will spread.

4.3 Municipal area

Municipal Area: The economic development level of the municipal districts is relatively high, with a large floating population. The municipal area has a high location advantage and high mobility of economic factors within and outside the region. The geo-detector analysis found that population density has the greatest influence. The influencing factors of the spatial distribution of the epidemic situation in the municipal jurisdiction are generally similar to those in the plain area. The main reason is that the municipal jurisdictions are almost located in the plain area of the city or the flat land between the mountains.

4.4 Mountainous area and ethnic area

Mountainous area and ethnic area: The mountainous areas of Sichuan Province are typical border areas with lower economic levels. The ethnic areas are mainly distributed in the form of "large mixed settlements and small settlements"（Lei Xuan et al.,2019）According to the analysis results of geographic detectors, among the factors affecting the spatial distribution of the epidemic situation in ethnic areas and mountain areas, all the factors failed the significance test. The possible reasons are twofold: First, the geographical features of high mountains, deep valleys and complex terrain in the ethnic area, its spatial distribution of the COVID-19 epidemic is less affected by social and economic factors. The location advantage is lower in mountainous areas, thus the risk of the transmission of COVID-19 epidemic is lower. Second, the level of coordinated development of urbanization of population, economy and lifestyle in ethnic areas is low. There are no cases in most districts and counties in ethnic areas and mountainous areas. However, due to the transmission of special cases in Daofu County, as many as 66 people have been diagnosed, which largely shows that once there are imported cases, the local customs of frequent visits to relatives and friends during festivals, as well as the combination of public awareness of protection and local prevention and control ability, will have an important impact on the spread of the epidemic.

4.5 Summary

According to the analysis results of geographic detectors as shown in Table 2, all the influence factors of ethnic areas and mountain areas have not passed the significance test. The population density has the most explanatory power to the plain area and the municipal area. ln plain areas and municipal areas, population factors and geographic location are important factors for the spatial distribution of the epidemic. The temperature also has a certain influence on the distribution of the epidemic in the plains and municipal jurisdictions. In the epidemic situation in hilly areas, the relief of the terrain has a strong explanatory power to the epidemic situation.

5 Conclusion

The level of prevention and control of major infectious diseases in the region is mainly determined by the ability of the government, society, the public and medical resources. Due to the availability of research time and data, this paper only analyzes the differences of epidemic influencing factors in different regions from the perspective of nature, location and population level.

In terms of natural factors, temperature is a significant factor in the plains. According to relevant research results, the new coronavirus has a temperature of 22-25 ° C, a humidity of 40-50%, and a rainfall of less than 30ml It is the easiest to survive in the month (Mao Wang et al., 2020), and its spread will be stronger. The winter temperature in Sichuan is roughly the same as this. It can be seen that the temperature has a certain effect on the production and dissolution of the epidemic.

In terms of geographic location, topography and location advantage are significant factors in hilly areas and municipal areas, and location advantage is a significant factor in plain areas.

In terms of demographic factors, population density, proportion of urban population and floating population are significant influencing factors in plain areas and municipal areas.

It can be seen that municipal jurisdictions, hilly areas and plain areas are the most frequent epidemic areas, which are obviously affected by natural factors, geographic location factors and population factors. The salient features are roughly consistent with the distribution characteristics of the five regional epidemic situations. Overall, the spread of Sichuan epidemic situation presents different spatial and temporal characteristics in different regions. There are two reasons: first, the spread of infectious disease pathogens follows the population movement, and the epidemic spreads faster in areas with large flows;

second, Sichuan 's own complex topography and the distribution characteristics of nature, population, and economic society Differences lead to spatial differences in the spread of the epidemic.

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A Proposed Model to Solve Cybercrime in Sierra Leone

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Abstract: The growing threats posed to the cyberspace requires adequate knowledge to identify those threats. Therefore, this paper discusses the factors such as; cyber legislation, cyber education, cyber research and development, cyber training, and cyber awareness programs- as solutions to cybercrime in Sierra Leone. The paper proposes a suitable model for Sierra Leone and concludes by summarizing the most critical actions that both public and private institutions should take to improve the cyberspace.
Keywords: Cyber legislations, Cyber education, Cyber research and development, Cyber training, Cyber awareness programs

1 Introduction

Cyberspace is becoming more hostile as new technological grounds are discovered in telecommunication technology, making it difficult to conduct online activities for the government as well as for businesses. As a result, cybersecurity is employed to combat this hostility. Cybercrimes are on the increase even though robust measures are adopted by public and private institutions in recent years. Cybersecurity provides a secured and safer cyberspace, constituting policy framework, software requirements, and hardware components used to deter cybercrime. Effective cybersecurity policies are required for business growth and continuity (Furnell, Steven, & Clarke, Nathan, 2012).

In this paper, we look at cyber legislation, cyber education, cyber research and development, cyber training, and cyber awareness programs as antidotes to cybercrime in Sierra Leone. To achieve this, stakeholders should enact cybersecurity policies, which demand knowledge-intensive tasks (Ben-Asher, Noam, & Gonzalez, Cleotilde, 2015). The Cyber Security Breaches Survey 2019 Report indicates that cyber-attacks will continue to grow and will not be prevented with common sense alone and require action (Cybersecurity breaches survey, 2019). The paper provides a synopsis and international perception of fighting cybercrime and suggests recommendations that would help minimize cybercrimes in Sierra Leone.

2 Literature Review

In recent years, there have been growing works of literature in cyber-attacks increase (Fowler, K., 2016, & Olapido, 2015), and developing countries are not exempt (Olapido, 2015). Nowadays, cybercriminals are finding it challenging to penetrate large organizations because they have better cybersecurity, and have now turned their attention to vulnerable victims such as small businesses and home computer-users (Krebs, 2017), both of whom do a great deal of their computing using smartphones (Asadullah Khaskheli & Bhuiyan, 2017).

The World Economic Forum in 2017 indicates that the new technological revolution would profoundly change the way people live and work. This change, if not incorporated and foreseen, could minimize, or even derail, the potential it has for development and innovation in developing countries.

According to the International Telecommunication Union (ITU), 53.6% of the global population, or 4.1 billion people, will use the internet by the end of 2019 (ITU Statistics, 2019).

In Finland, Lehto surveyed to assess education and research in cybersecurity at nine universities and research centers and summarizes the approaches and areas of strength in each. Findings show that while cybersecurity education is improving in Finland, the cyber educational system lacks strategic objectives. Universities provide education based on particular initiatives and efficiency in collaboration, as well as a solid structure to bolster cybersecurity research. However, institutional initiatives in cybersecurity education do not envision national strategic proficiencies (Lehto M, 2015).

In another study, Newmeyer addresses elements for a national cybersecurity strategy for developing nations, which includes education and cybersecurity awareness (Newmeyer K, 2015). Muller suggests areas in which developing countries find challenges to build cyber capacity. These include institutional stability, building knowledge, legal framework, and private sector cooperation. When adopting strategies from advanced countries, developing nations should consider their ability (knowledge, capacity) to practical strategies on time (Muller L, 2015).

Similarly, Von Solms and Von Solms in 2015 propose a cyber-safety curriculum for children (based on videos) in order to educate and help them protect their privacy on the internet (e.g., social networks). Emphasis is placed on the fact that some African governments do not necessarily devote resources to this educational endeavor as in developed economies (Von Solms R, Von Solms S., 2015).

The United Kingdom (U.K.), for example, recommends curricula for early education to include Information and Communications Technology as an introductory skill (Education and Training Foundation, 2019). Also, there are several moves to ensure that children are taught about online safety and how to identify fake news (Cockburn, 2019). ICT use is now interwoven with Internet use. Note that with respect to who is. It then follows that anyone using the internet, whatever their age, also needs to know how to secure their devices because forewarned is forearmed (Renaud et al., 2016). Safety and security are semantically different concepts (Waldron, 2006), requiring different kinds of knowledge and skillsets. Smartphone users, of all ages, should know that their phones are vulnerable to attack, and also know how to enhance device security. Because education is at the heart of security awareness and capability (Siponen, 2001), cybersecurity education must reach all of society and all ages.

Nevertheless, the U.S. still struggles to develop the cybersecurity workforce effectively. A study by the SEI reports concerns regarding the appropriateness of cybersecurity practices applied by the workforce in the workplace as well as concerns related to the workforce readiness to protect I.T. infrastructure (Baker M, 2016) effectively. In lieu of the above, given that cybersecurity is a new concept in Sierra Leone. Most of the literature in this field is based on the U.S. setting, this paper, therefore, proposes a model for Sierra Leone to aid both the public and private entities to set up cyber regulations for its effective implementation as shown in figure 1.

3 Methodology

In order to discuss issues relating to cybercrimes in Sierra Leone, the research primarily uses data obtained through an online questionnaire to provide solutions to the challenges faced by Cybersecurity in Sierra Leone. The questionnaire was designed based on the proposed model. The questionnaire was distributed to respondents working at the Office of the National Security (ONS) and the Cyber Security Unit of the Sierra Leone police force. With a total population of 300 (Statistics, Sierra Leone, 2019), a

sample of 200 respondents was chosen. Based on the information gathered, the research proposes the conceptual framework in figure 1 that would help minimize cybercrimes in Sierra Leone.

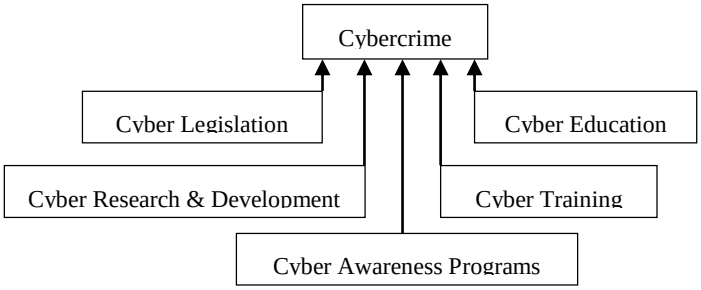

Figure 1 Proposed Model

3.1 Analysis of questionnaire results

Out of the 200 questionnaires administered to the respondents, a total of 176 usable questionnaires were filled in which translated to an 88% response rate. This praiseworthy response rate was achieved because the researcher persistently revisited the shared links to remind the respondents about the importance of the research. We commence the analysis by testing for multicollinearity using the Correlation Matrix, where the determinant among the set of independent variables should not be greater than 0.7 (Field, 2000). Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy was used to find out whether data collected on the Likert scale was appropriate for factor analysis. KMO statistic is a measure of sampling adequacy both overall and for each variable (Field, 2000). High values of between 0.5 and 1.0 indicated that factor analysis was appropriate (Muganda, 2008). To evaluate the proposed model that the variables are not correlated in the population, Bartlett's test of sphericity was used. Significant Bartlett's Test of Sphericity means that factor analysis is appropriate as a method of data reduction.

As highlighted, we made use of SPSS to run the data, and the primary analysis was done via correlation and regression analysis after computing for each variable of the study.

Table 1 Reliability and Sample Adequacy Results

Construct	No. of items	Alpha	KMO
Cybercrime	3	0.784	0.795
Cyber Legislation	4	0.856	
Cyber Education	3	0.749	
Cyber Research & Development	5	0.831	
Cyber Training	3	0.737	
Cyber Awareness Programs	4	0.835	

As indicated in table 1, the Reliability test for the final study, Cronbach's alpha coefficient were all above 0.7 for all the variables. This indicates that the questions that were on the Likert scale were testing what they were expected to test. The Mayer-Olkin (KMO) results from 0.795 also show data adequacy, which means the data set was adequate for analysis. Consequently, the results from the questions were used for further analysis in the study.

3.2 Descriptive statistics

Means, standard deviations, and correlations, as summary statistics of all variables are presented in Table 2.

Table 2 Descriptive Statistics, Correlations

Variable	Mean	SD	1	2	3	4	5	6	7	8

1CC	3.64	0.84	1.00							
2CL	3.27	0.53	-.214**	1.00						
3CE	3.55	0.71	-0.347*	-0.053	1.00					
4CRD	3.48	0.65	-0.406**	.269**	-0.057	1.00				
5CT	3.09	0.77	-.195*	.271**	-0.004	.219**	1.00			
6CAP	3.17	0.63	.068	0.033	-0.103	0.028	-0.012	1.00		
7Age	32.73	4.62	0.075	-.118*	0.022	-0.029	0.093	.030	1.00	
8Education	1.86	0.34	-.160**	0.062	-0.102	0.029	0.012	.080	-.180	1.00

Note N= 176, CC = Cybercrime, CL = Cyber Legislation, CE = Cyber Education, CRD = Cyber Research & Development, CT = Cyber Training and CAP = Cyber Awareness Programs. Notes: ** and * indicate significance at the 1%, and 5% respectively.

The result shows a significant negative relationship (r = -.214, p<.01) between Cyber Legislation and Cybercrime as well as between Cyber Education and Cybercrime (r =-0.347, p<.05). So, there is a higher magnitude of negative correlation among these sets of variables.

The result also shows a significant negative relationship (r = -0.406, p<.01) between Cyber Research and Development and Cybercrime as well as between Cyber Training and Cybercrime (r = -.195, p<.05). So, there is a higher magnitude of negative correlation among these sets of variables.

However, the correlation relationship between Cyber Awareness Programs and Cybercrime was found to be positive and statistically insignificant (r = .068, p>.05). The results of the correlation coefficients among the sets of independent variables were all below 0.7, which shows the absence of multicollinearity in the model.

3.3 Testing of the proposed model

We conducted multiple linear regressions using SPSS (25) to test our proposed model. The results in Table 3 present the effects of the control variables (age and education) and the independent variables (cyber legislation, cyber education, cyber research and development, cyber training, and cyber awareness programs) on the dependent variable (cybercrime). As stated, our study also tested the impact of control variable on cybercrime and found positive and significant effects of education (β = 0.329, p < 0.01), while age (β = -0.124, p > 0.05) have insignificant effect on cybercrime.

Table 3 Regression Results

Variables	**Cybercrime**				
	B	S.E	β	T	Prob. (Sig.)
(constant)	0.837	0.289		2.899	.007***
Age	-0.124	0.093	-0.317	-1.330	.241 ns
ducation	0.329	0.069	0.354	4.761	.000***
Cyber legislation	-0.257	0.125	-0.276	-2.063	.041**
Cyber Education	-0.246	0.056	-0.233	-4.391	.000***
Cyber Research and Development	-0.286	0.074	-0.248	-3.882	.000***
Cyber Training	-0.115	0.048	-0.163	-2.418	.031**
Cyber Awareness Programs	0.144	0.216	0.088	.664	.507ns
F			246.511		.000***
R^2			0.736		
Adjusted R^2			0.675		

Note: Entries are unstandardized coefficients (B), standardized coefficients (β), and standard errors (S.E.), ** p < 0.05, *** p < 0.01, ns = non-significant

The results presented in Table 3 further reveal that cyber legislation is statistically significant and negatively associated with cybercrime ($\beta = -0.257$ $p < 0.05$), which means if cyber legislation improves by 1 percent, cybercrime will reduce by 0.257. A country without cyber legislature and policy risked everything, as digitalization has virtually engulfed the global community. Also, a community without police to protect its activities is a breeding ground for criminals. Therefore, the Parliament of Sierra Leone should endorse the draft cyber legislation that awaits its approval. Everyone should police cyber laws.

The results also reveal that cyber education is statistically significant and negatively associated with cybercrime ($\beta = -0.246$ $p < 0.01$), which means if cyber education improves by 1 percent, cybercrime will reduce by 0.246. For any country to be cyber resilient, cyber education should be the core foundation starting from elementary schools, colleges to universities.

The results further reveal that cyber research and development is statistically significant and negatively associated with cybercrime ($\beta = -0.286$ $p < 0.01$), which means if cyber research and development improves by 1 percent, cybercrime will reduce by 0.286. The government, through its education ministry, should provide a grant for cybersecurity and its related disciplines for colleges and universities to carry out research.

The results also reveal that cyber training is statistically significant and negatively associated with cybercrime ($\beta = -0.115$ $p < 0.05$), which means if cyber research and development improves by 1 percent, cybercrime will reduce by 0.115. The government should implement regular training on cybersecurity and information security issues for strategic departments and agencies on a bi-yearly schedule.

However, the results reveal that cyber awareness programs are statistically insignificant and positively associated with cybercrime ($\beta = -0.144$ $p > 0.05$), and thus insignificant for the study. Public and private institutions should embark on massive sensitization on the effects of cybercrimes and its related offenses through the print and electronic media, thereby building a harmonize culture for a secured cyber environment.

4 Cyber Best Practices

4.1 Cybersecurity best practices

Public and private institutions should ensure that cybersecurity best practices are instituted into their core principles (Michal Tonhauser et al., 2019). These best practices will improve cyber resilience for critical infrastructure, crisis management, and physical infrastructure security.

4.2 Cyber education and training

The 21st-century education sector heavily relies on technologies; unfortunately, they do not essentially receive formal cybersecurity training (Bennett, S., Maton, K., 2010). The Sierra Leone curriculum makes no provision for cyber education, cyber research and development, cyber training, and cyber awareness. Therefore, it should be a shared duty of the public and private entities to create more awareness of cybercrimes. They should highlight the potential threats, nurture effective cyber hygiene, and minimize the impact of cyberattacks. To achieve this, public and private entities should build their procedures for training employees properly, according to their job classification and the current security threats posed to the cyberspace.

4.3 Fighting cybercrime

An effective way to thwart cyberattacks is to deter potential adversaries. Governments must build a robust legislative framework and the necessary capabilities to support law enforcement departments and

prosecutors (Michal Tonhauser et al., 2019). They should cooperate with the public and private entities to track and identify cybercriminals. Unfortunately, the cybercrime unit of the criminal investigation department of the Sierra Leone Force is faced with a herculean task to fight cybercrime due to the non-existence of cyber legislation. The government should provide a secure and safer cyber ecosystem that would safeguard the Sierra Leone cyberspace. They should also join regional and international treaties that would help to prosecute cyber criminals attacking from different geographical locations and creating a global approach to cyber issues.

4.4 Research and development

Research and development bring innovation, new products, new tools, and importantly a competitive edge against cybercriminals. It helps to transfer know-how, build partnerships, and generate resources for strengthening cyber resilience. Investment in research and development must be on a broader perspective. To adequately understand the potential research and development capabilities, industries and educational institutions should create the Computer Security Incident Response Team (CSIRT) for research capabilities in academia to support the financial services, thereby avoiding significant financial and other losses from cyberattacks.

4.5 International cooperation

International cooperation is a cross-cutting topic. For instance, the European Union is a union deeply rooted in cooperation and coordination. They even have a slogan "United in diversity." The E.U. (2016) has developed a cybersecurity framework that would help enhance security standards and information exchange to promote a shared global approach to security issues.

Creating a shared space with compatible standards and approaches among like-minded countries in West Africa and Africa as a whole will help to foster cyber resilience even further. There are several possible ways to broaden international cooperation regarding Cybersecurity (Zanicka Holla, K. & Moricova, V., 2011).

Therefore, public and private institutions should strengthen their cybersecurity commitment by raising awareness around the issue and open up for collaboration at national, regional, and international levels.

5 Conclusion and Recommendation

5.1 Conclusion

The cybersecurity landscape has immensely changed over the past decades as new technological grounds discovered frequently. As these technologies advance, so also, the challenges posed by cybercriminals. Unfortunately, there is no evidence to show that cyber legislation, cyber education, cyber research and development, cyber training, and cyber awareness programs are in Sierra Leone. This makes it even more challenging to fight cybercrime, more so, as only a few cybersecurity experts exist in the country. The government is currently trying to legislate effective cyber laws and policies, with the ministry of information and communication as the advocator.

The innovation of cybersecurity as an emerging topic imposes new challenges in our society because it requires new abilities to match those challenges. Therefore, introducing cybersecurity courses into schools, colleges, and universities, using the proposed model, will help to develop best practices that would create awareness and possibly mitigate cyberattacks in Sierra Leone.

Also, the article provides the necessary steps, as indicated in the proposed model, that should be taken at the national level to increase the cyber resilience of both public and private institutions when

using the cyberspace. Cybersecurity requires collaboration to fight effectively and tackled cybercrime, as it has no geographical boundary. Curbing cybercrime requires stringent and effective cyber legislation, effective cyber education, and training that would guarantee safer cyberspace in Sierra Leone. Furthermore, research and development provide a lead way to discover new grounds that would make the national government proactively defense its cyberspace against cybercriminals. Finally, aligning with the global community helps to better police cybercriminals who may try to inflict or cause havoc to our society.

5.2 Recommendations for managers

In order to sanitize the cyberspace in Sierra Leone, to improve on the socio-economic stability, and opportunity for a real, concrete digital transformation; the government, as well as the private institutions, need to develop a robust cybersecurity culture that would raise cyber awareness among its population. In this context, these institutions should develop a national computer incident response team, national cybersecurity strategy, incorporate cybersecurity curriculum in schools, colleges, and universities, and legislate strong cybersecurity laws. Also, huge investment should be made in cybersecurity research, establish a cyber-forensic laboratory to investigate cybercrimes, and finally provide the required training to its security apparatus with the aid of the proposed model.

Finally, cybersecurity knowledge should be shared and transferred among all the various stakeholders, including all public and private institutions in the country, the ECOWAS region, and the international community.

Acknowledgment

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Evaluating Actions of Palestine to Combat the Spread of Covid-19 among Countries in the Middle Eastern Region

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Abstract: Corona Virus Disease 2019 (COVID-19) is a global systemic pandemic that has been affecting human health, economies and societies in unprecedented ways around the globe. Rapid spread occurred due to human movement and interactions. Gaza Strip and West Bank under control (occupation) of state of Israel remain with unsolved and longstanding problems. For instance, demolition and confiscation of property results huge number of refugees, economic crisis, and population density problems. In this work, we evaluate the actions of state of Palestine to combat the spread of COVID-19 by comparing the estimation of the final size of pandemic and the long duration to enter start of steady growth phase in Palestine with Middle Eastern countries. We adopted SIR logistic model proposed by M Batista to estimate the final size and start of steady growth duration of COVID-19. Prediction number of susceptible individual *S*, infected individual *I*, and recovered *R* in particular time is the core information need to be discovered either to ease or tighten the action in combating the rapid spread of COVID-19. In this manner, we apply SIR logistic model to analyze data COVID-19 in Middle Eastern Region. SIR logistic model is an important tool in analyzing the spread and control of infectious disease due to its capability to predict total number of infected and long duration to enter disease steady growth phase. Experimental results showed the state of Palestine to have third shortest duration of steady growth after Yemen and Tunisia with duration 87 days, 62 days and 52 days respectively and the smallest prediction final size of COVID-19 among countries in Middle Eastern, with total number of infected cases of approximately 722 cases until the end of pandemic. Data ran by SIR - model demonstrates per 30 May 2020 confirmed cases in Palestine was start to steady growth and decision to ease the lockdown per 25 May 2020 by Palestinian government due to economic reasons is reasonable based on scientific analysis.
Keywords: Evaluation; Corona Virus Disease; COVID-19; SIR – model

1 Introduction

The ongoing outbreak of coronavirus disease 2019 (COVID-19) declared by the World Health Organization (WHO) late January 2020, has been unprecedented due to its evolution from a health shock to an economic and social crisis. The United Nations has called the COVID-19 pandemic "the greatest" making it clear that it is more than a public health emergency, instead it is a systemic crisis that is already affecting social dimensions of development (Human Development Perspective, 2020).

COVID-19 reported has been infecting 213 countries and territories around the world and 2 international conveyances with 7.553.182 cumulative confirmed cases and 423,340 deaths toll per 13 June 2020, including 597 cumulative confirmed cases and 3 deaths in West Bank, 72 cumulative

confirmed cases and 1 death in Gaza Strip (Organization WH, 2020)[78]. COVID19 drastically spread across the globe carried out by people travelling from China, which most cases were scattered and some linked to the Huanan Seafood Wholesale Market (J.T. Wu et al., 2020, Wu JT et all., 2020) and declared originally from bat (Zhou p et all., 2020). Each country aims to limit further transmission in countries with imported cases due to COVID-19 ability in person – to – person transmission (Chan JF et all., 2020). Strategies, preparedness and response plan outlines of the public health measures for the international community have been issued and updated many times based on the newest research, and developments updates to be implemented to all countries and territories with no exception such as advice for the public, health workers, and country and technical guidance (Organization WH, 2020)[79]

Most countries have made tremendous progress dealing with relative frequent shocks, by means of continuous learning and preparedness through policies and social norm. However, the ability to respond to very rare or even new shocks is much lower and unequally distributed. This ability to respond differs from one country to another and critically depends on the ability to detect the pathogen at early stage, the ability to organize COVID-19 emergency response plan and the ability to implement appropriate policies. Some examples of these appropriate policies could be lockdown and curfew implementation, ban and suspending domestic and international movement, prohibition of mass gathering, imposing mandatory quarantine and physical distancing practice.

The vulnerability factor of the infection is also different from one country to another which depends on demographics, population density, economic and political stability. COVID-19 reported has disrupted livelihoods (Bogoch II et all, 2020). This situation is worse in some countries, especially countries under conflict and war, which are considered especially vulnerable to any pandemic. For Instance, Gaza Strip has been suffering from a Blockade by land, sea and air since 1990 under the control of the Israeli Government. The Blockade has been more intensive since June 2007 following the military takeover of Gaza Strip by Hamas coup d'etat, where the movement of people and goods to, from and within Gaza Strip was severely restricted. In June 2020, approximately around 2.6 million Palestinians are being locked inside the Gaza Strip area of 365 km^2 (OCHA, 2020)[80]. Whereas, 60 per cent of the West Bank area is considered Area C which undergoes massive demolition and confiscation over Palestinian properties by Israeli authorities, including houses, land agricultural and public facilities. United Nations Office for Coordination of Humanitarian Affairs (OCHA) reported that between year 2009 to year 2020, Israeli authorities have demolished 6.695 structures e.g. homes, apartment buildings, shops, animal shelters, walls, and warehouses, which forced 10.273 Palestinians to flee their homes (UNRWA,2020)[81]

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Restrictions on access to sea, land and air in Gaza Strip and movement restriction, demolition and confiscation in West Bank by Israeli authorities impact the socio-economy and humanitarian consequences. The socio-economic situation in Gaza Strip remained bleak, as a direct result of the continued severe economic contraction. Clean water and electricity supply are undermined due to a sharp decrease in revenues for service providers due to a limited financial capacity of beneficiaries. The availability of electricity supplied in Gaza Strip only 12 – 15 hours a day on average in 2019. Moreover, unemployment rates in the territory are by some margin the highest record anywhere in the world. Large proportions of the population are living in poverty and food insecurity with 73% of total Palestinian population is registered as refugees in Gaza Strip and 28.5% of total Palestinian population is registered as refugees in West Bank (UNRWA ,2020).[4]

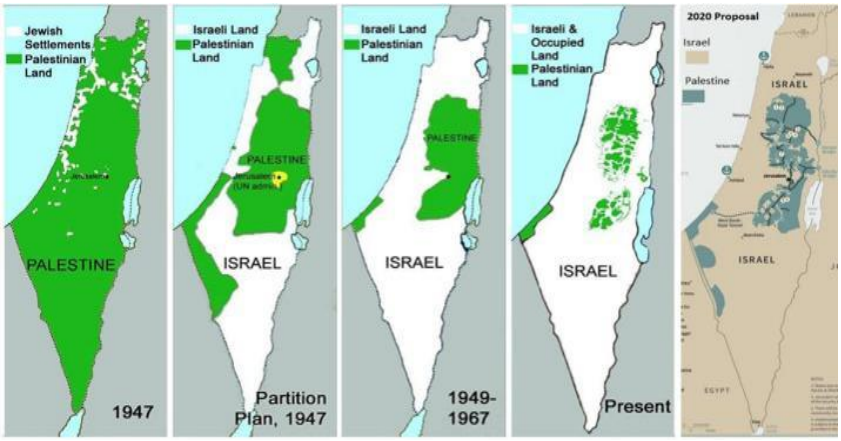

Figure 1 Palestine Under Occupied of Israel

Despite the ongoing socioeconomic crisis in Palestine, Government of Sate of Palestine has been taken control preventive measures as a response on the COVID-19 emergency by imposing lockdown, closure of the public and private facilities prohibition of public gathering and strict movement prohibition.

This article aims at evaluating the actions taken by the Palestinian Government in combating the spread of COVID-19 and comparing them to some Arab countries. We adopted SIR logistic model proposed by (Batista, 2020) to estimate the final size of COVID-19 and long duration taken to enter start of steady growth in Palestine and we will compare the final size and long duration taken to enter start of steady growth in Palestine with countries among Middle Eastern Region. We will also evaluate the decision taken by government which decided to end the lockdown per 25 May 2020 in Palestine.

The article is structured as follows. In sect. 2, we give a bright review of COVID – 19 timeline in occupied Palestinian Territory. In sect. 3, we will introduce SIR logistic model and evaluation technique. In sect. 4, we conduct an analysis of SIR – model results. Finally, in sec. 5, we offer conclusions and suggestion for extensions.

2 COVID-19 Pandemic Palestine

The COVID-19 pandemic first case was reported on 3 March 2020 in West Bank, Greek tourists contracted with the virus visited the hotel in late February, whereas the first two cases were detected in Gaza Strip Strips on 21 March who were identified among 1,400 returning citizens from Egypt and Israel and they were kept under mandatory quarantine.

Although no successful management of COVID-19 in the world, El-Nahhal proposed a scientific methodology throughout blood or balsam transfusion from immune individuals to COVID-19 patients. This method has successfully been implemented in many countries such as China, Iran, Israel and USA (El – Nahhal, 2020).

Palestine Government declared a state of emergency two days after the first announced case in West Bank and COVID-19 Emergency - response plans took place. Furthermore, as part of the COVID-19 response, Palestine Government in co-operation UNICEF, WHO and the private sector activated its risk communication plan, which aims at disseminating public health awareness messages and addressing uncertainty and misinformation (OCHA, 2020)[82]

On 22 March, The Palestinian Authority (PA) imposed a curfew in the West Bank for 14 days, obliging people to stay at home, a full closure for gathering community and complete lockdown movement of all the villages in the north-western Jerusalem governorate, PA also blocked all access routes to and from the city, except one to bring food and commodities. In Gaza Strip, restrictions have been gradually tightening, such as closing weekly market and public gatherings and shutdown land borders since 12 March 2020 (OCHA, 2020)[83][84][85] The PA has been gradually scaling up access restrictions and social confinement measures across the West Bank, including a suspension of all educational activities, a prohibition to public gatherings, a closure of Bethlehem urban area, closure of the main crossing points with neighboring countries and a halt in Palestinian employment in Israel settlements since 6 March. On 22 March, PA announced a comprehensive curfew for 14 days. In Gaza Strip, the exit of people from Gaza Strip to Egypt via the Rafah crossing has been halted by Egyptian authorities as of 15 March; since 23 March, entry of people to Gaza Strip has been suspended (OCHA, 2020)[86][87]. PA works together with international aids funding aims to conduct a massive laboratory samples tested for COVID-19, build a number of quarantine centers and all health services equipment. As reported at June 3, 57.688 samples tested for COVID-19, 23,000 people in mandatory quarantine. By June 13, number of confirmed cases are 669 and number of death are 5 (OCHA, 2020)[88][89].

3 Method

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3.1 Model

An optimal disease control needs to determine a feasible scheme, policy, plan, strategy or campaign to achieve the optimal possible result of the system. Number of susceptible, infected and death or removed individual in population are highly depended to scheme, policies, plans, strategies or campaign implementation. SIR model firstly proposed by Kermack and Mckendrick (MW.O. Kermack, A.G.Mckendrick, 1927), has become a very important tool in controlling the spread of disease due to its ability to predict the estimation of size pandemic and the time to enter the start of steady growth by the number of infected in particular interval of time using daily accumulative infected COVID-19 data.

The modeling framework used in this paper is estimation of the final size of pandemic and long duration to enter start of steady growth phase and the comparison of the result with countries among Middle Eastern Region. The final size of pandemic is estimated as the total number of infected persons until the pandemic stated to be ended. Start of steady growth is the date when daily infected number steady growth over the interval of time assuming that probability of exposure of each person is the same, which is not age or gender based.

Final size of pandemic estimation is approached by SIR model using the following differential equations:

$$\frac{dS}{dt} = -\frac{\beta}{N} IS \quad (1) \qquad \frac{dI}{dt} = \frac{\beta}{N} IS - \gamma I, \quad (2) \qquad \frac{dR}{dt} = \gamma \quad I \quad (3)$$

with t related to time, $S(t)$ related to susceptible individual at time t, $I = I(t)$ related to number infected individual at time t, and $R(t)$ related to number recovered individual in time t. β is the contact rate, $\frac{1}{\gamma}$ is the average infection period. From equation 1, 2 and 3, the total population size N

$$N = S + I + R = const \quad (4)$$

By setting the initial conditions $S(0) = S_0, I(0) = I_0, R(0) = R_0$ and eliminating I from equation 1 and 3, the following equation is yield.

$$S = S_0 \exp\left[-\frac{\beta}{N\gamma}\left(R - R_0\right)\right] \quad (5)$$

In the limit $t \to \infty$ the number of susceptible people left S_∞ is

$$S_\infty = S_0 \exp\left[-\frac{\beta}{N\gamma}\left(R_\infty - R_0\right)\right] \quad (6)$$

where R_∞ is the final number of recovered individual. By assuming the final number of infected people is zero and using equation 4, we have

$$N = S_\infty + R_\infty \quad (7)$$

From equation 6 and 7, final number or recovered individual is

$$R_\infty = N - S_0 \exp\left[-\frac{\beta}{N\gamma}\left(R_\infty - R_0\right)\right] \quad (8)$$

In order implement the model, we must estimate model parameter β, γ and the initial values S_0 and I_0 from available data. We assume set $R_0 = 0$ and $I_0 = C_1$. Now the available data is a time series of the total number of cases C since its onset

$$C = I + R \tag{9}$$

We can estimate the p parameter β, γ and initial values by minimizing the difference between the actual and predicted number of cases, i.e., by minimizing

$$\left\| C_t - \overline{C}_t(\beta, \gamma, S_0) \right\|^2 = \min, \tag{10}$$

where $C_t = (C_1, C_2, ..., C_n)$ are given number of cases in times $t_1, t_2, ..., t_n$ and $\hat{C}_t = (\hat{C}_1, \hat{C}_2, ..., \hat{C}_n)$ are corresponding estimates calculated by the model as a final size of pandemic. A MATLAB code for programming $\hat{C}_t$ is available from the author uploaded to online platform in.

3.2 Scenario comparison

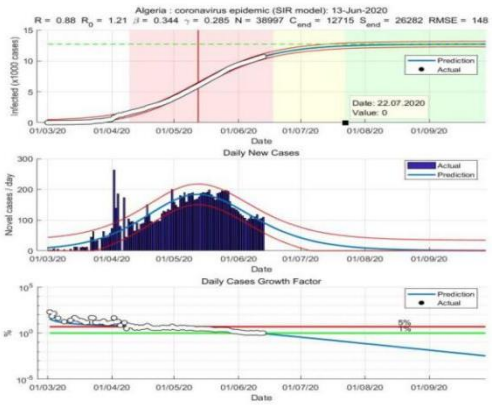
The process to develop the scenario comparison is started by generating model to estimate the total number of the confirmed cases or final size of pandemic using SIR logistic model, including estimation of long duration of the cases start to steady growth. Steady growth means cases are entering a phase where its steady growth or constant time to time implemented some measurement to stop the rapid spread of COVID-19, such as restriction of movement, lockdown or curfew implementation, closure of public or private facilities, massive laboratory sample test taken or physical distancing practice. Start of steady growth will be shown as a graphic goes to the constant number in *y* over interval of time. In the other hand, start to steady growth, is a phase where government is about to succeed in handling the pandemic and some restriction might be changed to ease. We will compare number of days that will be taken to enter start of steady growth in Palestine with countries among Middle Eastern Region. Moreover, we will cross check if the decision of Palestine to open the lockdown per 25 May 2020 is close to the date of case start to steady growth resulted by SIR model computation.

3.3 Data source

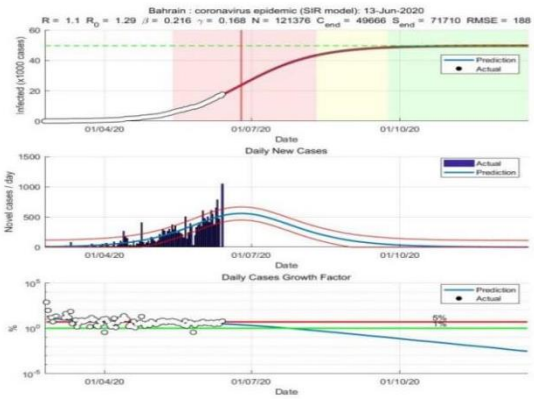
All the data were obtained from the official website (Organization WH, 2020)[1] start from the first onset to 13 June 2020 of each country in the region. Length of each data will be different since each country has different onset time. However, the experimental is considered compatible because duration to start growth of steady is measured since the first onset to particular date, which closed at 13 June 2020.

4 Results and Discussion

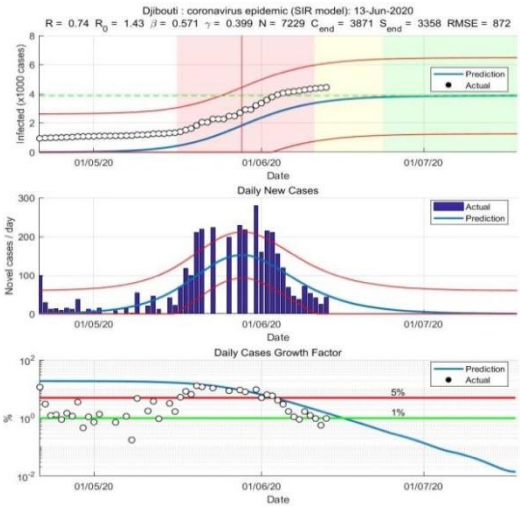
We adopted SIR-model proposed by Batista (M, Batista 2020) and for practical calculation we use Matlab2017a. Algorithm failed to obtain parameters while running dataset of Libya, which may be explained by the unstable condition due to rival warring. For the COVID-19 in Middle Eastern Region, we estimated the model parameters based on the first data onset of each country to 13 June 2020. The daily confirmed number cases are strongly related to population density, health services and government actions such as restriction of movement, lockdown or curfew implementation, closure of public or private facilities, massive laboratory sample test or physical distancing practice. The parameters such as reproduction number *R* are generated from daily confirmed case using SIR-model as Figure 2 bellow.



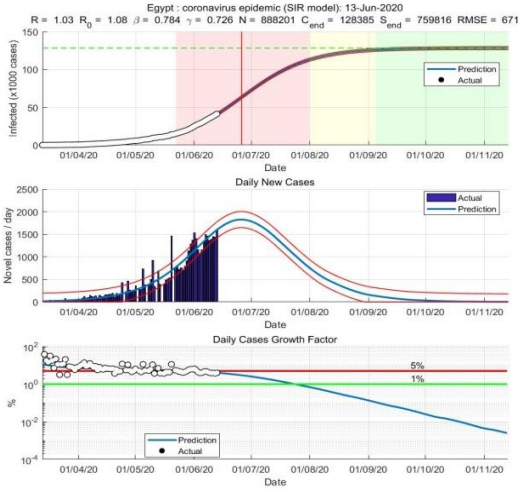
1. Algeria



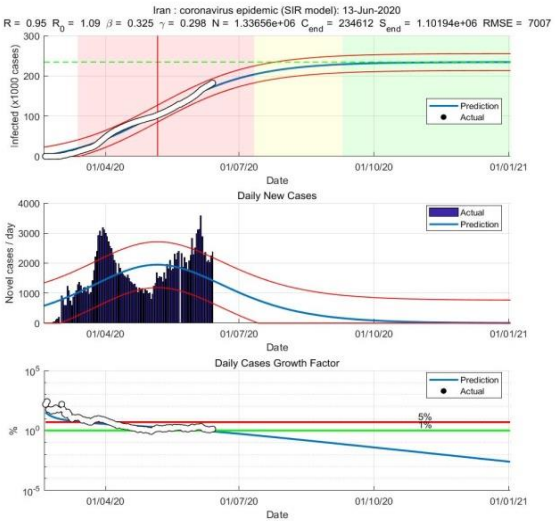
2. Bahrain



3.Djibouti



4.Egypt



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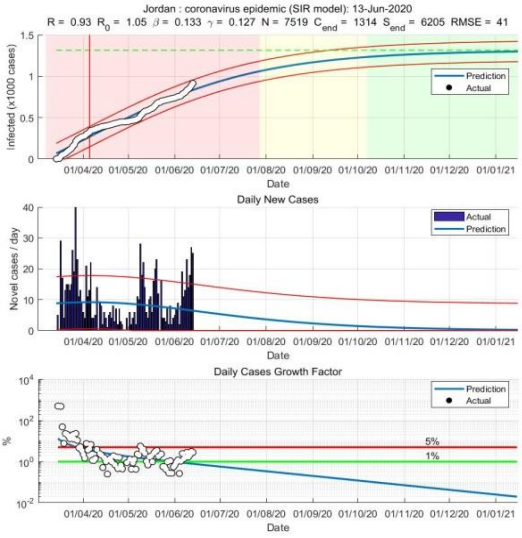
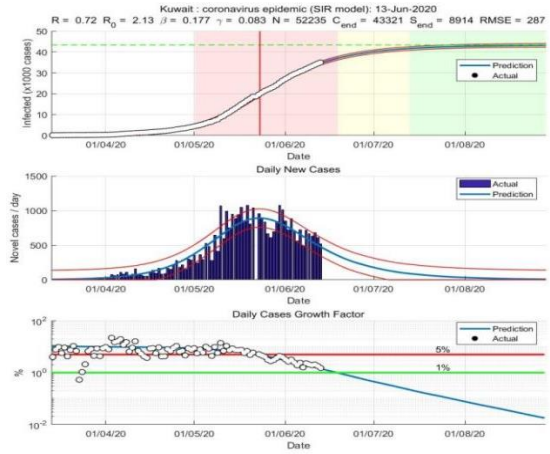
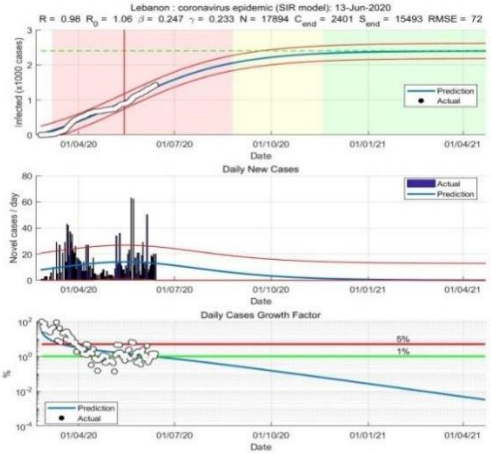


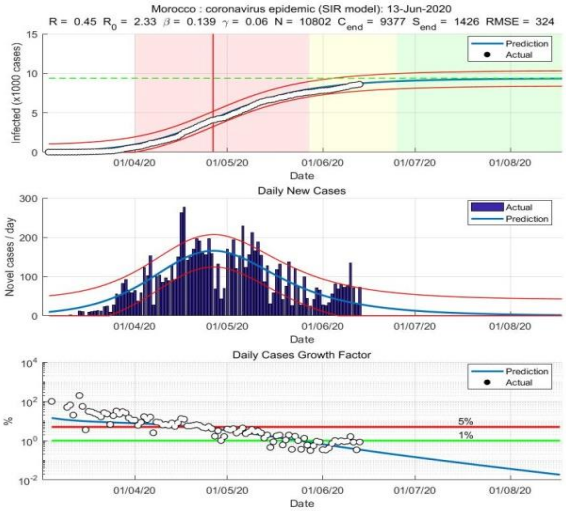
6. Jordan



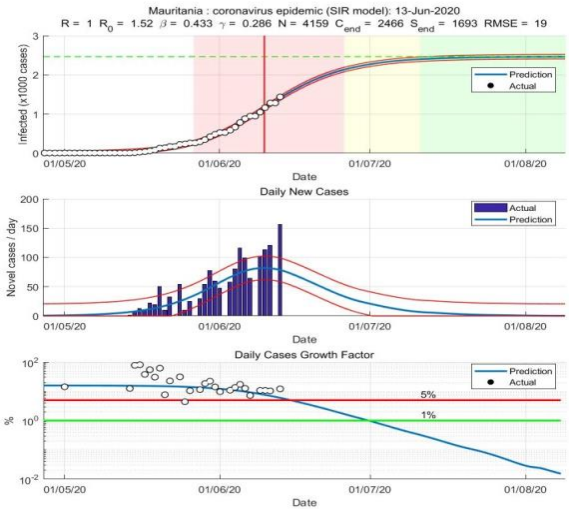
7. **Kuwait**



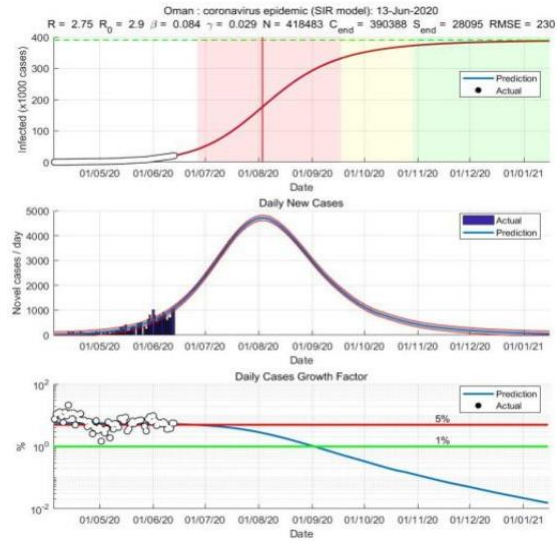
8. Lebanon



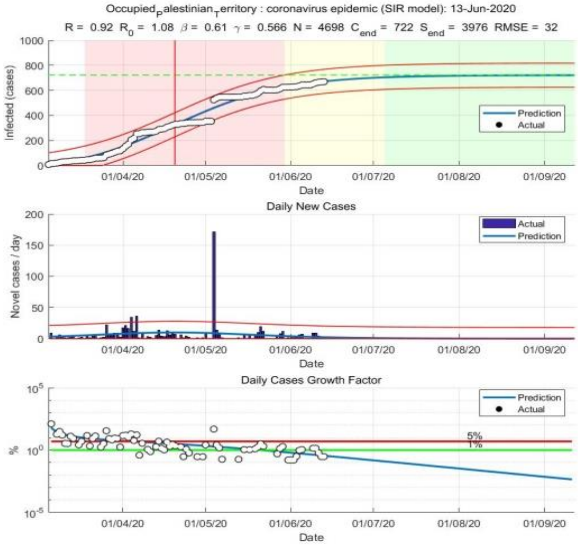
9. Morocco



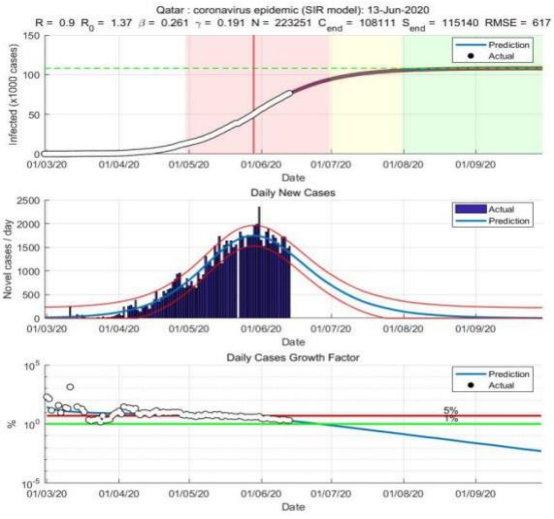
10. Mauritania



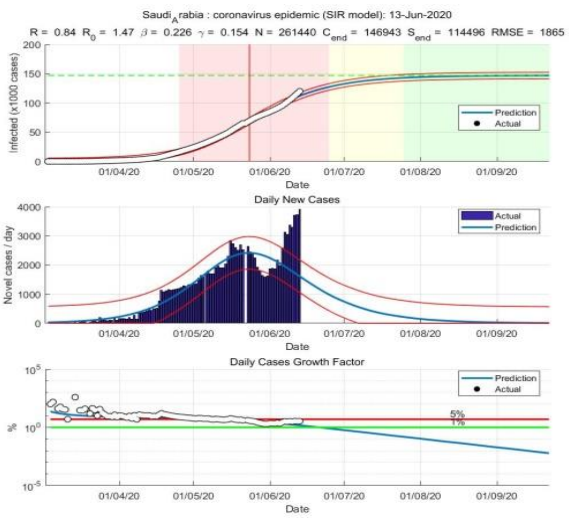
11. Oman

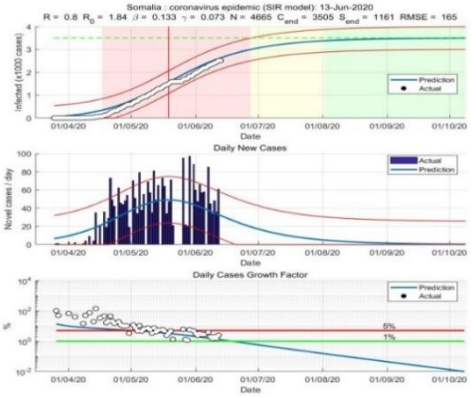


12. Palestine

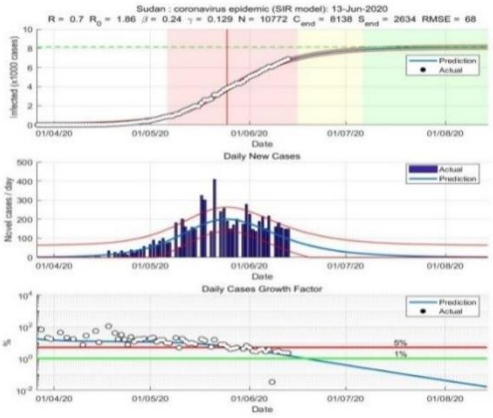


13. Qatar

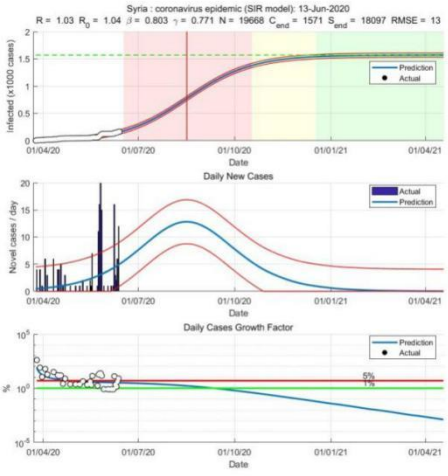




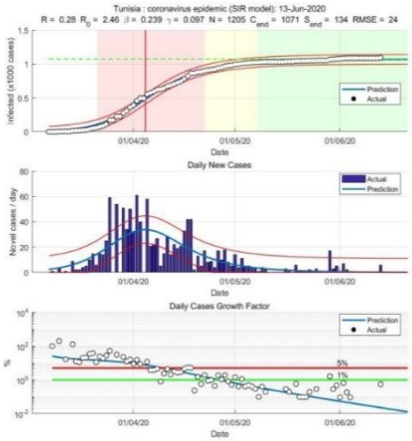
15. Somalia



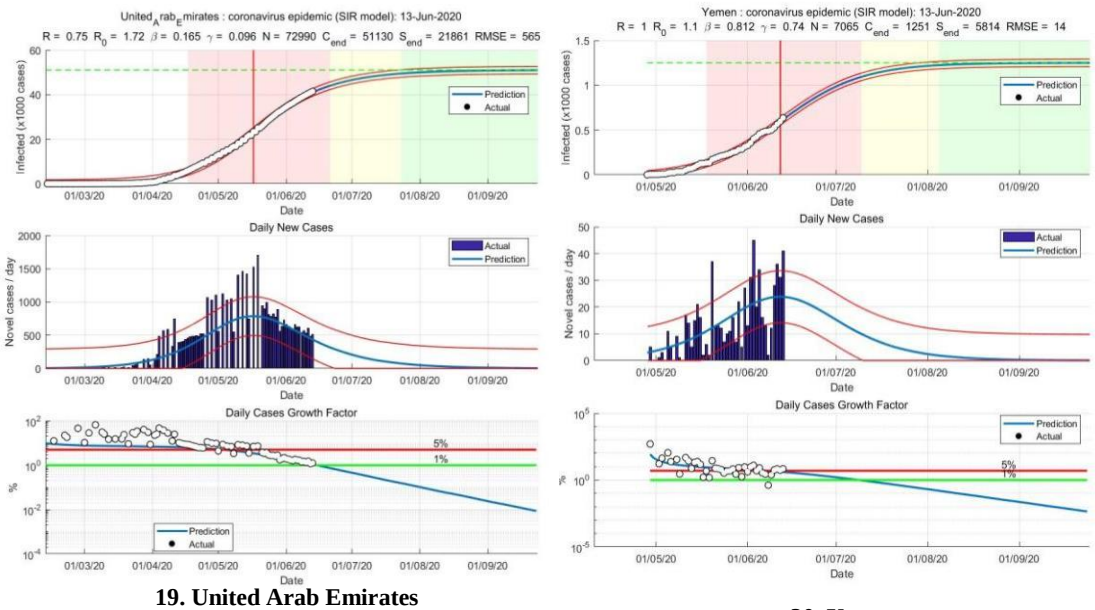
16. Sudan



17. Syria



18. Tunisia



19. United Arab Emirates **20. Yemen**

Figure 2 Estimation of Final Size and Long Duration of Pandemic Generated by SIR –Model in the Middle East Region

SIR – model results in Fig. 2 confirms that date of lockdown and curfew implementation impacts to duration to steady growth, e.g. Tunisia, Yemen and Palestine. They are countries with shortest duration to enter the steady growth phase, which are 52, 62, and 87 days respectively. Tunisia decided to lockdown the country at day 21 when average daily cases are 3 or 4 people, while Yemen decided to implement curfew and prohibited movement far before first cases occurred. Similar to Palestinian authority directly shutdown the crossing point of Gaza Strip and West Bank 2 days after first cases found. Although Palestine needs 87 days to enter the steady growth phase, but final size of pandemic in Palestine only reach 722 total confirmed cases estimation until pandemic started to be done, while in Tunisia is estimated around 1,071 and in Yemen around 1,251.

As shown in Fig. 2 no 12, SIR model shown that Palestine will be start to enter the steady growth phase per 30 May 2020. In order hand, it is predicted that per 30 May 2020 COVID-19 confirmed cases are under control according to scientific analysis. At the same time, Palestine Government decided to end the lockdown off electively started at 25 May 2020, by means 5 days differences. Furthermore, we can claim that the decision taken by Palestine in combating the spread of COVID-19 is success, reasonable and logic in mathematics. Estimated the SIR model parameters substantially depends on governmental actions. Thus, the estimated results are relatively changeable for the particular time, which shall be further investigated in future studies.

In this work we focus only on the duration spread of COVID-19 in Middle Eastern region. SIR logistic model concern to the estimation of final size pandemic and the duration to enter the steady growth phase, where COVID-19 claimed under well control with some measurements applied. Details result is shown at Table 1 bellow.

Table 1 COVID-19 Control Measurements in Middle Eastern Region

No	Country	Reproduc-tion	Estimation Infected C_{end}	First-cases	Start of	Duration to steady growth	Government Action

		Number R			Steady - growth		
1	Algeria	0.344	12,715	Feb 15	Jun18	115	- Mar 10 Restriction of public mass gathering. - Mar 12-19 Closure of Land, sea, air borders, restriction some flights, and Curfew of 9 provinces - **Apr 24 - Jun 13 National lockdown**
2	Bahrain	1.1	49,666	Feb 24	Aug 10	169	- Feb 22 closer of public and private facilities - Feb 26 Examination of travelers from red zone countries - Restriction of public mass gathering
3	Djibouti	0.74	3,871	Mar 18	Jun 11	101	- Mar 18, Suspension all commercial passenger and public transportation - Mar 23 - May 8 **National lockdown**
4	Egypt	1.03	128,385	Feb 14	Aug 01	170	- Jan 27, control measures at all ports and entry restriction from red zone countries, - Closure of public and private facilities and banning of public gathering - Mar 25 – May 30, **Curfew time implementation**
5	Iraq	2.99	10,026,100	Feb 14	Nov 13	254	- Mar 13, curfew time in Kurdis Regional (Continue lockdown at April 4) - Closure of public and private facilities - Suspension of flight and banning travelers from red zone countries - Government work with WHO, UNOCHA, UNICEF, UNHCR, and UNFPA
6	Jordan	0.93	1,314	Mar 2	Jul 28	149	- Mar 14, closure of private and public facilities - March 17, Government **Lockdown**, Completely shutdown of borders and airports
7	Kuwait	0.72	43,321	Feb 24	Jun 19	117	- Mar 15, suspension of all flight, closing the public and private facilities, close land borders - May 10, **National lockdown**
8	Lebanon	0.98	2,401	Feb 21	Aug 25	187	- Feb 29, closure of public and private facilities - Mar 15, closure of airport. seaports and land entrances - Mar 15 – May 24, National lockdown - Government work with WHO, UNOCHA, UNICEF, UNHCR, and UNFPA
9	Morocco	0.45	9,377	Mar 02	May 25	88	- Mar 13, suspension of any entry from red zone countries - Mar 16, closure of private and public facilities - Mar 16 – Jun 10, National lockdown
10	Mauritania	1	2,466	Mar 14	Jun 26	105	- Early April, closure of private and public facilities, travel bans and curfew time implementation
11	Oman	2.75	390,388	Feb 24	Sep 17	207	- Mar 12, stopping of any entry from all countries - Mar 14, closure of private and public facilities - Mar 19, suspension of all public transportation
12	**Palestine**	**0.92**	**722**	**Mar 03**	**May 30**	**87**	- Mar 5, declaration of state of emergency - Mar 6, closing all educational institution and controlled all entrances to West Bank - Mar 12, shutdown Erez crossing for most permit holders - Mar 23, shutting down all checkpoints of entry or departure from Gaza Strip - Implementation of mandatory from abroad starting Mar 23 - Government work with WHO, UNOCHA, UNICEF, UNHCR, and UNFPA
13	Qatar	0.9	108,111	Feb 29	Jun 30	123	- Mar 5, suspension of the use of ID cards for entry and exit from state of Qatar - Mar 9, closure of school and universities, placed a travel ban from 15 red zone countries - Mar 13, Closure public and private facilities - Mar 17, National Lockdown
14	Saudi Arabia	0.84	146,943	Mar 02	Jun 25	116	- Feb 6, ban travel to China - Feb 27, temporary suspension of entry to perform Umrah (Islamic religious rituals - Feb 28, temporary suspension of entry for GCC citizens to Mecca and Medina - Mar 8, closure of all institutions - Mar 14, closure of public and private facilities - Mar 19, suspension of daily and Friday prayer in and outside the two mosques in Mecca and Medina - Mar 20, suspension of public transportation - Mar 24, National curfew time between 7 pm – 6 am - Apr 4, 24 hours curfew implementation in 9 cities

15	Somalia	0.8	3,505	Mar 16	Jun 27	104	- Mar 15, banning of passenger who have been from red zone countries in the past 14 days and implementing mandatory quarantine - Mar 17, closure of school and universities and prohibit large gathering - Mar 18, suspension of all international flights - Government work with WHO, UNOCHA, UNICEF, UNHCR, and UNFPA
16	Sudan	0.7	8,138	Mar 14	Jun 16	93	- Mar 12, banning of international flights from 8 red zone countries - Mar 24, Partial curfew time - Apr 13, lockdown Khartoum city - Government work with WHO, UNOCHA, UNICEF, UNHCR, and UNFPA
17	Syria	1.03	1.571	Mar 23	Oct 17	209	- Mar 14, suspension of schools, universities and religious cites - Mar 21, closure all of public and private facilities - Mar 23, curfew time implementation and prohibition of movement among sub-regions Syria - Government work with WHO, UNOCHA, UNICEF, UNHCR, and UNFPA
18	**Tunisia**	**0.28**	**1,071**	**Mar 02**	**Jun 21**	**52**	- Mar 22 – Apr 27, National lockdown - Apr 28 – May 3, Curfew time
19	UEA	0.75	51,130	Jan 29	Jun 21	134	- Feb 5, banning all travel to red zone country - Mar 3, closure of universities and schools - Mar 15, Domestic restriction, banning of all international flights - Mar 31, lockdown of the most populated city Al – Aras - Apr 4, Dubai Lockdown - Apr 14, inter – city bus cervices suspending
20	**Yemen**	**1.1**	**1,251**	**Apr 20**	**Jul 10**	**62**	- Mar 23, Imposing curfew and prohibition movement among sub-region - Imposing quarantine mandatory - Closure of land borders and seaports - Government work with WHO, UNOCHA, UNICEF, UNHCR, and UNFPA, provision of 34 quarantine spot centers and 13 treatment centers and 5 lab centers

4 Environmental Consequences of COVID-19 Outbreak

Several authors revealed the ecological consequence of COVID-19 outbreak for instance El-Nahhal reported several ecological such as formation of organochlorine compounds, damage to aquatic live and formation of halomethane theat emerged from the emissive use of disinfected (El-Nahhal I et al., 2020) Additionally, Nabi et al (2020), reported the potential risk to urban life emerged from Massive use of disinfectants against COVID-19 poses potential risks to urban wildlife

5 Conclusion

The SIR – model proposed in this paper is based on daily confirmed cases data, and assuming that daily confirmed cases are related to policy makers' strategies, including lockdown and social distancing. Our simulation results, achieved by combining the model with the available data about the COVID-19 in Middle Eastern Region, suggest that enforcing strong restrictions on movement of individual is a must. The earlier the lockdown is implemented, the faster pandemic controlled. This result was obviously shown by the comparison of about 21 Arab countries. Although Palestine needs 87 days to enter the steady growth phase, but final size of pandemic in Palestine only reach 722 total confirmed cases estimation until pandemic started to be done, while in Tunisia is estimated around 1,071 and in Yemen around 1,251. Thus, in conclusion, it has been shown according to the data and our SIR model the Government of state of Palestine has managed to succeed. Furthermore, the development of an optimal treatment method for COVID-19 seems to a promising one, whereas using massive chemicals to control the outbreak seems to be risky to human life and ecosystems as well.

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Re-recognition of College Counselors' Role in Major Public Health Emergency —Based on Keyword Analysis of News Reports During the COVID-19 Epidemic

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Abstract: College counselors play a pivotal role among students in the prevention and control of COVID-19 epidemic. Therefore, it is significant to comb through the responsibilities of college counselors and further clarify the role of college counselors in major public health emergency for college epidemic prevention and control. Based on the co-word analysis of the keywords in news reports involving college counselors during the epidemic, this paper maps the counselors' major job and depicts the expected role that counselors should play in a public health emergency. It provides a theoretical reference and practical reference for both colleges' current work against the epidemic and further stimulation on counselors' role in future public health emergency.
Keywords: Public health emergency; College counselors; Key roles; News reports; Co-word analysis

1 Introduction

In December 2019, a sudden novel coronavirus disease raged across the country and represented a significant threat to the public safety and health of China. General secretary Xi Jinping emphasized: 'This all-out people's war with the epidemic is a major test for party organizations, members and cadres at all levels.' The epidemic broke out in winter vacation when the vast majority of students are not in school, and thus the colleges and universities avoided the large crowd and high risk of infection. However, how to protect the college students from the infection is still a non-negligible subject. Throughout the prevention and control of the epidemic, college counselors played a critical role in information collection, psychological instruction, thought guidance, behavior control, etc. (Sun, 2020)

In the case of major public health emergencies, such as the COVID-19 epidemic, counselors face a significantly changed working environment, working methods, working focus, and job objectives. Thus, how to play the role correspondingly in a short time, especially for the counselors, is a new proposition also an enormous challenge. In other words, it is necessary to recognize the role of college counselors.

1.1 Analysis of the counselors' role

The word 'role' originates from dramatic performance and refers to a specific character played by the actor on the stage according to the script.

The social psychologist G.H. Mead first introduced the concept of 'role' into sociological theory and expanded its connotation, generally referring to the identity and behavior of individuals perform in the stage of society. Most role theorists believe that role refers to the individual's identity in a specific social relationship and the sum of the behavioral norms and behavioral patterns (Kaplan, 2017).

There are numerous of studies on counselors' role in the view of role theory, which aims to optimize the work method and growth path of counselors based on the role conflict theory. (Ruiz, 2018) Li Hua believes that the dual responsibilities of education and management counselors may result in the role dilemma and functions in disorder (Li, 2014); Kong Xiameng considers that counselors struggle in their dual role of teachers and cadres, which casts them into a series of problems such as the identity swing, role norm conflicts, role positioning conflicts and so on (Kong, 2019); Xu Jun proposes that the diffuseness and ambiguity of the role make counselor confused about their responsibilities range and job target, and the role of the counselor should be re-cognized (Xu, 2007). Some scholars have also revealed the image of the counselors, such as the guardians of love, guide of professional development, stage builders, and theoretical explorers through analyzing the stories of model college counselors (Liu, 2018).

1.2 Analysis of counselors' role in major public health emergency

The major public health emergency is a relatively extreme representative of emergencies, which is characterized by sudden occurrence, diverse causes, groups threatening, massive impact and stage development, etc. (Allington, 2020) Judging from the job responsibility 'response to campus crisis incident' stipulated by the regulations, a role counselor have the responsibility to deal with major public health emergencies. However, as for the campus crisis response mentioned in the stipulation of the regulations and the related keywords retrieval in the database of CNKI (China National Knowledge Infrastructure), the focus is mainly on less influential temporary incidents, such as personal safety, public opinion, crowd gathering, food poisoning, etc. But the role orientation of the counselor in major public health emergencies is rarely mentioned. Only few articles have made a preliminary probe into counselors' role in public health emergency (Zeng, 2017).

Among the searching results of the keywords 'SARS & Counselor' in CNKI, there is only one piece of news mentioning the symposium themed on SARS prevention between counselors and the former secretary of the Party Committee of Tsinghua University, named Chen Xi (Zhou, 2003).

Since the outbreak of the novel coronavirus epidemic, various mainstream websites and WeChat public accounts have launched comprehensive coverage on the anti-epidemic deeds of college counselors. From this information, it can be seen the important role college counselors played in major public health emergencies. Limited to the genre of news reports, most of them only show one or several aspects of the role of college counselors. Combined with what the counselors have done, to refine the job responsibilities counselors shouldered in major public health emergency from news report with scientific approaches and comprehensively portray the role that college counselors should play great guiding significance for victory on the prevention and control of epidemic among students and winning this all-out people's war.

2 Research Methods

Co-word analysis is an important information research method. It is a kind of content analysis method and derives from bibliographic coupling and co-citation analysis. Co-word analysis has been widely applied to revealing subjects in a certain research field, illustrating relationships between the subjects and the evolution of the subjects. By means of co-word analysis, plentiful fruits can be achieved in many research fields (Leung, 2017). The common co-word analysis takes literature subject words as the analysis objects, and simplify the intricate co-word network relationship between various analysis objects to intuitive values or graphics, through various statistical analysis methods such as tolerance coefficients and cluster analysis (Altuve, 2018).

3 Research Process

3.1 Data set.

The data are from all kinds of sources, such as ideological and political websites of colleges and universities, online platforms for college counselor, WeChat public accounts and website of some colleges and universities, China Education Daily, China Daily, and the Paper News. The time of such coverage as data ranges from February 1st to February 20th in 2020. A total of 102 news reports about the counselors during the new coronary pneumonia epidemic were collected. One irrigated to counselors' job eliminated, 101valid pieces were left.

3.2 Keyword extraction.

When utilizing text analysis tools to extract keywords, a large number of irrelevant high-frequency words were extracted and the presentation of what counselors did is fragmented. Considering the effectiveness and validity of keyword extraction, the author read through the 101 news reports under scrutiny in detail and manually extracted the keywords about the counselor's job.

After the screenings of keywords and merging of synonyms, 40 keywords were eventually extracted, as shown in Table 1.

Table 1 Keywords about College Counselors' Work During the COVID-19 Epidemic (40 in total)

Information Investigation	Focus on Key Students	Family-school Linkage	Life Couching
Psychological Counseling	Voluntary Service	Emergency Preplan	Implementation of Measures
Thought Instruction	Denial of Rumors	Anti-epidemic Supplies Raising	Implement of Specific Work
Propagandizing knowledge of Covid-19	Student Mobilization	Study Promotion	Inter-connected Working Mechanism
Information Submission	Career Mentor	Organizing Fund-raiser	Quick Response
Caring and Consoling Students	Emotional Company	Attention to Epidemic Data	Donations
Informing Policies and Notifications	Safety Education	Organization and Coordination	Logistic Support
Caring Students Stranded in School	Charge Ahead	Study Supervision	Caring Key Students
Urging Students in Study	Public Opinion Supervision	Interviewing and Inspecting	Duty on Phone
Behavior Control	Answer questions and Solve Problems	Liaison with Donators	Special Work Group against Covid-19

3.3 Co-word analysis

In this study, the BICOMB 2.0 (Bibliographic Items Co-occurrence Matrix Builder) is used to count the frequency of keywords shown in coverages so that a text matrix as well as a co-word matrix can be constructed. Besides, UCINET 6.0 and its internal integrated visualization tool Net Draw are utilized to draw the knowledge map of the counselors' job keywords (as shown in Figure 1), and calculate the degree centrality of each keyword (as shown in Table 2). In Figure 1, the larger the block area in which the keyword is located, the greater its centrality degree is, the more frequently it appears in news reports, and the more closely related it is to other keywords. Namely, that keyword is more important in counselors' work during the Covid-19 epidemic.

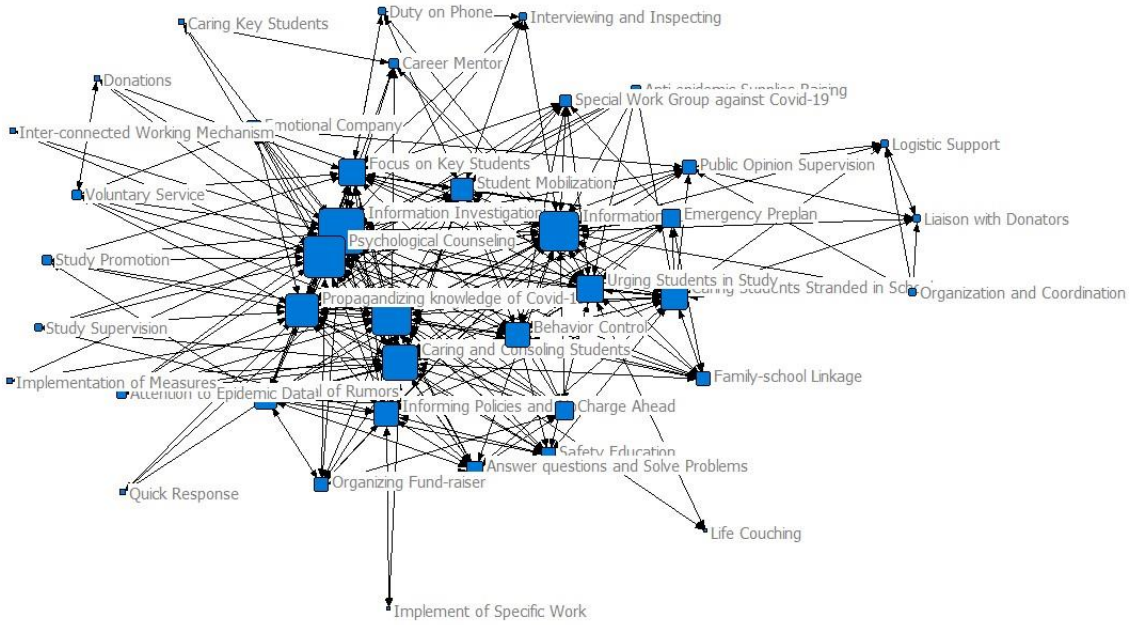

Figure 1 Knowledge Map of College Counselors' Job During the Epidemic

Table 2 Rankings of Keywords Degree Centrality of Counselors' Job During the Epidemic（Top 20）

No.	Keywords	Degree Centrality	No.	Keywords	Degree Centrality
1	Information Investigation	174	11	Focus on Key Students	32
2	Psychological Counseling	167	12	Student Mobilization	23
3	Thought Guidance	153	13	Rumor Denial	23
4	Propagandizing knowledge of Covid-19	106	14	Emergency Preplan	19
5	Information Submission	93	15	Charge Ahead	18
6	Caring and Consoling Students	85	16	Answer questions and Solve Problems	18
7	Informing Policies and Notifications	58	17	Family-school Linkage	16
8	Study Promotion	51	18	Safety Education	15
9	Caring Students Stranded in School	48	19	Public Opinion Supervision	14
10	Behavior Control	46	20	Emotional Company	14

4 Result Analysis

Based on the clustering analysis results of the job keywords above and the actual work counselors undertake, the role orientation and role connotation of college counselors in major public health emergencies can be summarized as follows.

(1) Information statistician

Clear information makes clear polices. Statistics on the basic situation of students are the basis for decision-making in school epidemic prevention and control. Whether in the affected area or not, the most important job of college counselors is information statistics and reporting, which is reflected by keywords in news reports like 'information investigation', 'information submission', 'student mobilization', 'focus on key students' and so on. When major public health emergencies occur, online statistics are the safest and convenient way for collecting information. The news reports also prove that various online platforms and statistical software have become the main means of statistics. For the students who need more

concern, peer-to-peer communication online helps counselors to have a more comprehensive and accurate knowledge of their situation.

(2) Psychological counselor

Psychological counseling is an indispensable part of epidemic prevention and control. After the disease outbreak, the whole country is shrouded by varying degrees of panic. The college students, who are merely about 20 years old and have never experienced such a major epidemic, inevitably suffer psychological fluctuation. Especially students in seriously infected areas and students infected with Covid-19 may suffer various physical and psychological stress reactions, such as anxiety, fear, helplessness, anger, etc. Such unhealthy emotions will do harm to students' mental health along with the Covid-19 epidemic.

College counselors shoulder the responsibility of psychological counseling in different aspects. In macro level, they should constantly promote mental health knowledge to students, provide psychological counseling access for students and give them instructions on how to deal with negative emotions and improve psychological immunity; In macro level, counselors can comprehensively investigate students' mental state through home-school linkage, peers' care, remote condolences, online inspections and other methods to provide targeted assistance in time; In micro level, counselors ought to adopt various resources and approaches to provide students who suffering mental problems with timely treatment and assistance. Judging from the keywords in the news reports, 'condole students', 'care students in school', and 'link school and student family' have become important part of college counselors' job.

(3) Thought instructor

Where there is a disaster, there is a rumor. Since the outbreak of the epidemic, with the overwhelming various rumors, the instructions on students' thought and opinions has become an important part of the job of college counselors.

The keywords of news reports mainly include 'ideological guidance', 'informing policies and notifications', 'resisting network rumors', 'answering questions' and 'public opinion supervision'.

Facing the obstruct of time and space, college counselors should innovate the work methods accordingly. Utilizing online platforms, they can inform students with epidemic prevention knowledge, relevant policy as well as rumor denial. In addition, they can also evocate students' patriotism by introducing heroes in war with novel coronavirus and telling China's anti-epidemic story.

(4) Security administrator

The pivot of epidemic prevention and control lies in prevention and control. With the vast majority of students distributed throughout the country during the vacation, it is difficult for colleges and universities to carry out daily management and publicity among all students. Then how to manage students and carry out effective safety education are particularly important for colleges and universities. This part of counselors' role can be seen from keywords in coverages like 'publicity of epidemic prevention knowledge', 'safety Education', 'behavior administer', etc.

During the epidemic, college counselors need to comprehensively utilize online and offline approaches to inform students with relevant policies or notifications from colleges or administrations, to propagandize and popularize related knowledge of Covid-19, and to conduct safety education. In addition, for students stranded in school, counselors should exert school management force to supervise their behavior. For students back home, they should seek for family assistance.

(5) Resource coordinator

The implementation of policies and measures for epidemic prevention and control among students is a direct test for college counselors' competence of coordination. Keywords in this category include 'logistics support', 'organization and coordination', 'liaise with donators' and 'raise protective materials', etc. The keyword 'concern and condole with students' also suggest counselors' part in implementing school policies coordinating funds and supplies to express solicitude for students. It also exemplifies the role of counselors as terminal implementer in distributing and coordinating resources during the epidemic.

(6) Career mentor

Lead students to achieve the personal development is always one of the core responsibilities of counselors. Keywords in this category include 'inspire students in the academicals career' and 'direct students in the professional career'. The news reports under scrutiny are only from February 1st to February 20th when most colleges and universities were on the winter vacation and Covid-19 entered the critical period. Therefore, college counselors paid less attention to students' personal development and news reports in this respect were relatively less.

With the approaching of scheduled starting of school, the Ministry of Education proposed that the closed school does not mean suspended teaching or learning. Colleges and universities across the country begin online teaching, and online learning has become the main way for students to continue their academic career. Meanwhile, following the promulgation of results for postgraduate entrance exam the

spring recruitment season comes. Hence, the focus of counselors' work will turn to students' employment.

In respect of online learning, college counselors should play the role of mentors for students' development in academic career. Firstly, they should assist the educational administration department in organizing and managing students to attend online classes, solve problems and difficulties of students in online learning, and help students adapt to online education as soon as possible. Secondly, they should assist students to make career planning and guide graduates to establish a correct outlook on employment and development. Thirdly, counselors should function in family-school communication and unite students' families to solve the problems students encounter in learning and development together.

(7) Communist model

The essence of a college counselor is a communist. During the Covid-19 epidemic, college counselors should not only do their jobs like student education, management and services, but also try their best to play a pioneering role as a communist in their residence. Where there is a need, there are counselors. That is, whenever work comes, they should act quickly; whenever lacking knowledge, they should learn; whenever the masses are in difficulty, they meet their needs. Keywords in this category include 'charge ahead in epidemic control', 'volunteer service', 'quick action', 'learning improvement', etc.

5 Conclusion

Based on the above analysis, counselors play important roles in major public health emergency, including information statistician, psychological counselor, thought conductor, security administrator, resource coordinator, career mentor and communist model. It meets the need of Covid-19 control as well as the counselor's pursuit of personal development. Recognizing overall the role of counselors in major public health emergencies, colleges and universities should provide counselors with more comprehensive and timely professional training, which is also essential for colleges and universities to further improve their governance capabilities.

Acknowledgement

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Application of Social Media Optimization in Disaster Management

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Abstract: The persistent occurrence of disasters in our society is of great concern. These unpredictable disasters are either caused naturally or due to man's interference with the environment. These disastrous situations usually caused a colossal loss in lives and properties. To address this situation, we propose four factors, namely, disaster resilience, ICT knowledge, social media applications, and identifying the challenges that will lead to effective disaster management. Disaster management is an organized response action taken to mitigate the loss of lives and damage to properties and infrastructure. In this paper, we seek to use the factors mentioned earlier to control disasters in the country. Our motivation is to have a proposed model whereby we can alert and inform the government as well as the public in forestalling disasters.

Keywords: Disaster management; Social media applications; ICT Knowledge; Disaster resilience

1 Introduction

Disaster is a severe disturbance of the functioning of a community or a society at any scale due to dangerous situations networking with circumstances of exposure, vulnerability, and capability, causing one or several of the following: human, material, economic and environmental damages and effects (Assembly UG 2016). Sierra Leone has faced numerous disasters in the past. These disasters are on the increase, because of man's continuous interference with nature. To facilitate an effective controlled mechanism to mitigate the impact of disasters in our society, we propose a model in Sierra Leone context that would help the government to manage disasters using social media applications, ICT knowledge, disaster resilience, and counter-measures to the underlying challenges faced in disaster management operations. Whether the disasters are natural and human-made, people often use social media applications such as Facebook, Twitter, WhatsApp, Skype, and LinkedIn to share information (Imran, Castillo, Diaz, & Vieweg, 2015) that can potentially be useful for disaster response. Social media applications are internet-based applications used to communicate by sharing resources and information through conversation and interaction (Guan, X.; Chen, C., 2014). Social media application has a substantial number of users globally. This platform allows users to post, comment, and repost messages (text, audio, and video) within a few seconds to reach a billion users worldwide. Based on these reasons, social media applications have emerged as a dominant tool for collaboration and sharing of information during disasters. This information includes details of injured and dead people, urgent needs of affected people, reports of missing and found people, and reports of unrest and looting, among others (Imran et al., 2015). Social media applications not only contain useful information, but it also breaks stories and events faster than much other traditional information or news sources such as TV.

Several works on social media applications used during disasters have increased yearly. Several studies have indicated that social media application is becoming an excellent means of crisis response (Xiao, Y.; Huang, Q.; Wu, K., 2015, and Jurgens, M.; Helsloot, I., 2018). Government and emergency humanitarian organization use social media applications as communication channels during disaster

management operations to publish pertinent information including regular updates, warnings, and provide relief operations, and eliminate rumors, de-information, misinformation, and malinformation through centralized social media applications (Rotondi, L.; Zuddas, M.; Marsella, P.; Rosati, P., 2019). Social media applications have been used at all phases of disaster preparedness and disaster management (Rotondi, L.; Zuddas, M.; Marsella, P.; Rosati, P., 2019, Jong, W.; Dückers, M.L.A.; Van, DVPG, 2016, and Carley, K.M.; Malik, M.; Landwehr, P.M.; Pfeffer, J.; Kowalchuck, M., 2016), response, mitigation (Rotondi, L.; Zuddas, M.; Marsella, P.; Rosati, P., 2019), and recovery. Effective disaster management response heavily relies on effective organizational communication to address issues and distribute relevant information.

During a public disaster situation, one of the most crucial issues is how to get to the affected victims. Government disaster management agencies, emergency relief organizations, and community-based organizations may want firsthand information that would help them to respond to the needs of the survivors adequately. Social media applications, basic ICT knowledge, disaster resilience, and the challenges for disaster management play a pivotal role throughout the disaster period. The article, therefore, the proposed model presents the potentials of social media applications in disaster management operations in Sierra Leone.

2 Literature Review

2.1 ICT Knowledge

Basic ICT Knowledge is an excellent source of knowledge in the information age. ICT offers the potential to share information and knowledge in diverse ways (texts, audios, videos, 3-D models, and virtual reality (VR)/augmented reality (AR)). ICT has become an essential tool, not only as a system to share knowledge but also as a platform for people to interact with each other.

2.2 Disaster resilience

Disaster resilience research is key to disaster management. Disaster resilience is a process and capability of the human system to handle disaster crisis, including disaster prevention and early warning systems, prompt response and recovery plans, and the capability to study and adapt to mitigate the impact of disasters. Essentially, to enhance disaster resilience means to design the system's self-organizing capability, and its construction path is closely related to the system pre-disaster capability and specific disaster situations.

This can be done through a practical engineering viewpoint (infrastructure and the built environment) or social sciences considering the 'human' and 'institutional' viewpoint. From the viewpoint of the system theory, we need to focus on the system structure and hierarchy when upgrading the system functions. If the information relates within and between each level in the system are correctly designed, feedback delay will be reduced, and the information overload will decrease so that the operating efficiency and adaptability of the system will be significantly enhanced. To adequately manage disasters, critical information should be readily made available before, during, and after disasters. Government and emergency organizations should corporate and communicate critical issues to strategically build disaster resilience effectively.

2.3 Disaster management

Disaster management is an organized response action taken to mitigate the loss of lives and damage to properties and infrastructure (T. Simon et al. 2015). Disaster management involves the organization, planning, and application of measures preparing for, responding to, and recovering from disasters (United

Nations Office for Disaster Risk Reduction 2015). Dynes (1970) called both theoretical and practical aspects of the organized response (staffing, strategy, tasks, and relationships) between various relief organizations and the social environment itself. Information sharing and coordination are critical factors in disaster management, especially among relief organizations (Kamal, M.A. 2015). Disaster management can be effectively managed when all stakeholders in the community work together to address issues relating to disasters. Bharosa et al. in 2010 found that relief organizations prefer to receive information and are unwilling to share it with others. Also, even when formal information flows through the command structure, ad hoc and personal-basis channels are created to support multi-level information sharing.

2.4 Social media applications

With the progress of mobile technology such as smartphones, notepads, and tablets, the adoption of smartphones changed the way we work and interact (Hsiao, Chang, & Tang, 2016), and its increasing use is supported by the number of smartphones downloaded (Statista, 2017). The diversity of research on smartphone usability dimension has provided insights concerning its use in distinct contexts (Gao, Zhou, Liu, Wang, & Bowers, 2017 Banerjee A, Basak J, Roy S, Bandyopadhyay S. 2017 and Roy S. 2017). These applications have allowed social media applications to use in disaster management situations around the world.

People in disaster-prone areas prefer to share their thoughts and experiences using social media applications than websites (Yan et al., 2016). Nowadays, generation hardly goes without using social media via their smartphones (Xu, Frey, Fleisch, & Ilic, 2016), and smartphones have exceeded the role of traditional websites (He & Liu, 2017). Also, research indicates that about forty percent of the worlds' population actively use social media (Statista, 2018), social media applications outpace being at the top online destinations (Hodis, Sriramachandramurthy, & Sashittal, 2015). This reveals how indispensable social media applications are useful in our everyday life, especially during disaster crisis management.

Social media applications, including WhatsApp, Facebook, Twitter, Skype, and LinkedIn, may help prevent massive damage during a disaster by disseminating vital information to the public in the affected area. Its cost-effectiveness and popularity, has led to its universal applicability during disaster management.

2.5 Challenges

Social Media applications have significantly redefined communication nowadays. However, yet still, some challenges need to be adequately addressed for it to be effectively productive in disaster management operations, including: (1) The growing popularity of social media applications poses a significant concern for disinformation, misinformation, and malinformation, as evident in the coronavirus pandemic, (2) the lack of unified coordination among the key players relating to social media applications for disaster management is a hindrance to more collaborative ways of sourcing and processing information, (3) data privacy is a significant concern for the cyberspace, especially, social media applications, as there is no universal framework to police it, (4) harmonization of language and terminology is also a significant challenge, and (5) data disperse is a big challenge because a machine cannot understand the image, text, & video. The idea behind the data sparseness challenge is if more details are mined, and several dimensions are added to the classification category. Another challenge is to gain quick access to the information shared by eyewitness reports, especially during an ongoing disaster event, is thus useful but challenging to obtain (Imran, Mitra, & Srivastava, 2016).

3 Methodology

The study was carried out in Sierra Leone. A total number of 216 respondents were surveyed using an online questionnaire through surveyplanet.com as a research instrument for data collection. A proposed research model was designed to help the government to mitigate the impact of the disasters in Sierra Leone using disaster resilience, ICT Knowledge, social media applications, and the identification of challenges to handle disaster management operations better as seen in the proposed model in figure 1 below.

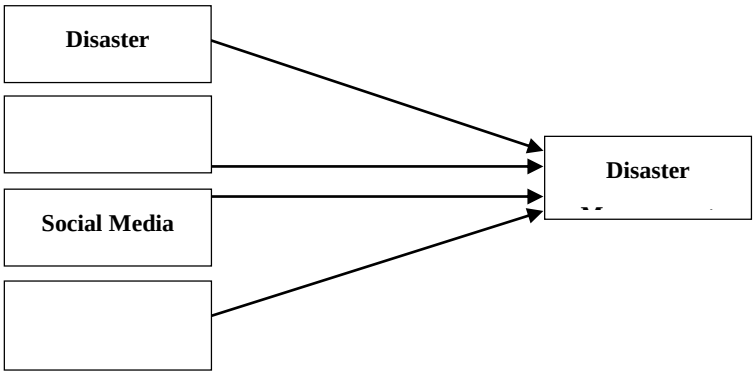

Figure 1 Social Media Disaster Management Model

Table 1 shows the social mediaapplication usage in Sierra Leone, with the number of respondents and percentage.

Table 1 Social Media Application Usage in Sierra Leone

Choices	Number of respondents	Percentage
Facebook	146	67.6
WhatsApp	212	98.1
Twitter	38	17.6
Wechat	29	13.4
QQ International	4	1.9
LinkedIn	33	15.3
Skype	25	11.6
SoftTalk	4	1.9

Source https://s.surveyplanet.com/3_48rpJrX3

3.1 Analysis of questionnaire results

Out of the 300 questionnaires released online, a total of 216 usable questionnaires were filled in which translated to a 72% response rate. The analysis was done to test for multicollinearity using the Correlation Matrix, where the determinant among the set of independent variables should not be greater than 0.7 (Field, 2000). The Kaiser-Mayer-Olkin (KMO) method of sampling adequacy was used to investigate whether the data collected by the Likert scale was suitable for the factor analysis. The KMO statistic is a measure of sampling adequacy both overall and for each variable (Field, 2000). High values of between 0.5 and 1.0 indicated that factor analysis was suitable. To evaluate the proposed model that the variables are not correlated in the population, Bartlett's Test of Sphericity was used. Significant Bartlett's Test of Sphericity means that factor analysis is a suitable method for data reduction.

As highlighted, we made use of SPSS to run the data, and analysis was done via correlation and regression analysis after computing for each variable of the study.

Table 2 Reliability and Sample Adequacy Results

Construct	No. of items	Alpha	KMO
Disaster Management	5	0.871	0.843
Social Media Applications	5	0.863	

Disaster Resilience	3	0.729
ICT Knowledge	5	0.820
Challenges	5	0.907

As shown in Table 2, the Reliability test for Cronbach's alpha coefficient was all above 0.7 for all the variables. This indicates that the questions that were on the Likert scale were testing what they were supposed to test. The Mayer-Olkin (KMO) result (0.843) also shows data adequacy, which means the data set was adequate for analysis. Consequently, the results from the questions were used for further analysis in the study.

3.2 Descriptive statistics

Means, standard deviations, and correlations, as summary statistics of all variables are presented in Table 3.

Table 3 Descriptive Statistics, Correlations

Variable	Mean	SD	1	2	3	4	5	6	7	8
1DM	3.29	0.72	1.00							
2SMA	3.43	0.84	0.41**	1.00						
3DR	3.60	0.78	0.32*	-0.15	1.00					
4ICTK	3.63	0.69	0.42**	0.32*	0.14	1.00				
5C	3.32	0.88	-0.23*	0.42*	0.23	0.15	1.00			
4Gender	3.42	0.72	0.06	0.03	-0.10	0.32*	0.18	1.00		
5Age	35.94	4.81	0.07	-0.11*	0.02	-0.04	0.07	0.33**	1.00	
6Education	2.45	0.38	0.16*	0.06	-0.10	0.37*	-0.27*	0.27	0.06	1.00

Note: N= 216, DM = Disaster Management, SMA = Social Media Applications, DR = Disaster Resilience, ICTK = ICT Knowledge, C = Challenges. Notes: ** and * indicate significance at 1% and 5%, respectively.

The result shows a significant positive relationship (r = 0.41, p<.01) between social media applications and disaster management as well as between disaster resilience and disaster management (r = 0.32, p<.05). So, there is a higher magnitude of positive correlation among these sets of variables. Also, the result indicates a significant positive relationship (r = 0.42, p<.01) between ICT knowledge and disaster management.

However, the correlation relationship between the challenges and disaster management was found to be negative and statistically significant (r = -0.23, p<.05). The implication of this is that the challenges associated with disaster management and ICT knowledge can hinder the progress of effective disaster management operations.

3.3 Testing of the proposed model

We conducted multiple linear regressions using SPSS software to test our proposed model. The results in table 4 present the effects of the control variables (gender, age, and education) and the independent variables (SMA, DR, ICTK, and C) on the dependent variable (disaster management). As stated, our study also tested the impact of control variable on disaster management and found positive and significant effects of respondents' level of education (β = 0.329, p < 0.01), while age and gender showed insignificant effects.

Table 4 Regression Results

Variables	Disaster Management				
	B	SE	β	t	Prob. (Sig.)
(constant)	0.837	0.289		2.899	0.007***
Age	-0.124	0.093	-0.317	-1.330	0.241 ns
Education	0.257	0.125	0.276	2.063	0.041**
Gender	0.144	0.216	0.088	0.664	0.507ns
Social Media Applications	0.373	0.102	0.296	3.642	0.000***

Disaster Resilience	0.286	0.074	0.248	3.882	0.000***
ICT Knowledge	0.625	0.180	0.568	3.464	0.002***
Challenges	-0.192	0.060	-0.176	-3.203	0.007***
F			143.62		0.000***
R^2			0.523		
Adjusted R^2			0.476		

Note: Entries are unstandardized coefficients (B), standardized coefficients (β), and standard errors (S.E.), ** p < 0.05, *** p < 0.01, ns = non-significant

The results presented in table 4 further reveal that social media applications are statistically significant and positively associated with disaster management (β = 0.373 p < 0.01), which means if social media applications improve by 1 percent, its effect on disaster management will increase by 0.373.

Also, the results reveal that disaster resilience is statistically significant and positively associated with disaster management (β = 0.286 p < 0.01), which means if the disaster resilience increase by 1 percent, its impact on disaster management will improve by 0.286.

Similarly, the results further reveal that ICT knowledge is statistically significant and positively associated with disaster management (β = 0.625 p < 0.01), which means if ICT knowledge increase by 1 percent, its impact on disaster management will improve by 0.625.

However, the results indicate that the challenges are negative and statistically significant (β = -0.192 p < 0.01) in influencing disaster management. The implication of this is that the challenges associated with disaster management and ICT knowledge can hinder the progress of effective disaster management operations.

4 Recommendations for the Government

The following recommendations are highlighted based on the research findings:

- That the government should incorporate social media strategies in managing disasters in Sierra Leone
- The government should establish a centralized online platform to manage disasters in Sierra Leone.
- The government should be proactive in responding to the disaster management crisis by providing continuous disaster warnings.
- The government should also use innovative strategies to create more awareness of the risks and mitigation factors on disaster management strategy in Sierra Leone
- The government should cooperate with the ECOWAS region and the global communities to mitigate the effects of disasters and also provide a sustainable recovery plan for the worst affected regions in Sierra Leone
- The government should legislate social media Acts for disaster management that would punish people spreading misinformation, disinformation, and malinformation during the public management crisis.
- The government should also work with all stakeholders, including community-based organizations and the fourth estate, to help create awareness on the impacts of disasters across the country.

5 Conclusion

Social media applications are valuable assets for government and disaster organizations in helping to mitigate the consequence that would have resulted from disasters. It has redefined communication, with its cost-effective communication across multiple devices. A user can connect to the internet to

interact and communicate with others on a one-to-one, one-to-many, and many-to-many ways. Relief organizations, disaster management organizations, and the government can share sensitive information on disasters to the public. People affected by disasters can relay information to those organizations wanting to help them. They can also watch YouTube videos or documentary on natural disasters and use those experiences to protect themselves from danger.

With social media applications, survivors can contact family members, share their stories with photos, audios, and videos. If adequately used alongside conventional disaster management platforms, it would help enhance the efficiency of the disaster management organizations, thereby reducing the fatality rate among the disaster-prone areas. Also, it is pertinent for the government to work with social media platforms developers to add more innovative and interactive tools to the existing social media sites that would improve on the effectiveness of those sites use in disasters. Social media applications can as well augment communication, thereby significantly increasing the ability to prepare for, responds to, and recovers from events that threaten lives and properties.

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Research on Application Mode of the BeiDou Navigation Satellite System in Mountainous Areas Safety Supervision

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Abstract: With an eye on the mountain's security, this paper combines the characteristics of the BeiDou Navigation Satellite System (hereinafter referred to as BDS), which has been independently developed and operated by China, with the demands of safety supervision in mountainous areas. According to the characteristics of natural environment and social environment of mountainous area, advantages of BDS applied in the mountain's safety is analyzed. The paper also discusses the application paths of BDS in mountain area involving safety environment monitoring, disaster information transmission, disaster field information acquisition, disaster relief materials and rescue team monitoring and dispatching, disaster emergency rescue, and special group safety monitoring. At last, based on the 3S+C+T, the technical framework of BDS mountain area safety supervision application is proposed, and a case of BDS application in mountain area safety supervision is discussed.
Keywords: BeiDou Navigation Satellite System (BDS); Mountainous areas safety; Navigation; Short message communication

1 Introduction

China is a country famous for its large mountain area and high mountain range. The mountain area accounts for 73.4% of the total land area, and the mountain population accounts for more than 1/3 of the total population of the country (CUI Peng, 2014). Mountain areas concentrate more than 95% of forest and hydropower resources, 85% of grasslands, more than 80% of minerals, 60% of oil, 80% of world heritage, more than 70% of nature reserves and national tourist scenic areas, and about 1500 of the more than 2100 counties in China are located in mountainous areas(Zhong et al. 2014).

It can be seen from this that the safety of mountain areas is a matter of national territory, the lives, production and life of the people, and social stability. It is also the primary issue facing the development of mountain areas in China (CUI Peng, 2014). Solving the mountain safety problem needs not only a long-term management mechanism, but also more importantly, mountain safety supervision, and the effective implementation of safety supervision requires the safe and reliable technical support. BDS has been independently developed and operated by China with an eye on the needs of the country's national security as well as economic and social development. As a temporal-spatial infrastructure of national significance, the BDS provides all-time, all-weather and high-accuracy positioning, navigation and timing services to global users. The advantages of BDS and its successful cases in the field of safety supervision provide new ways and methods for solving mountain safety problems.

The BDS navigation, positioning, short message communications and position reporting capabilities have provided services for the nationwide real-time disaster relief commanding and dispatching, emergency communications, rapid reporting and sharing of disaster information (Yuanxi, 2020). A tri-level platform covering the national ministries, the provinces, and cities and counties has been built to offer six-tier application services, with more than 45,000 terminals using BDS [90] (China Satellite Navigation Office, 2019). The Tourism Management System Based on Beidou Location Service in Siguniang Mountain which can reduces the safety hazards of outdoor sports was designed (HUANG et al. 2018). The emergency rescue guarantee system based on the functions of the locating and communicating from BDS can provide assurance for the geological personnel's life safety and technical support for emergency rescue (Ming et al. 2018). Based on BDS, monitoring and real-time early warning system of landslide are proposed for effectively monitoring the shape and variant in space and time, and detecting the change of its position in time, so as to make correct preventive measures for the possible situation in advance (Liu et al. 2019;Yongbo Wu et al. 2019), and the landslides in Gansu province have

[90] http://www.beidou.gov.cn/xt/gfxz/201912/P020191227337020425733.pdf, Development of the BeiDou Navigation Satellite System, 2019

been successfully forecast repeatedly, with time accuracy at the second level and deformation accuracy at the millimeter level (China Satellite Navigation Office, 2019). BDS combined with the Internet of Things is also used to monitor mountain deformation and ground stress abnormalities and other physical parameters closely related to mountain safety, and can be combined with the mobile phone mobile SMS text message and WeChat of the communication system to transmit these monitoring data and weather data to the management department and related personnel (Xuefeng LV, 2018; Rui et al. 2017). In addition, dedicated handheld or vehicle-mounted user terminals based on BDS have been widely used in security fields, such as mountain earthquakes, geological disasters, and rescue of missing persons (Haoyang et al. 2018; Lele et al. 2018).

2 Current Status of Mountainous Safety Supervision in China

Mountain security is affected by natural and human factors. On the one hand, with global climate change, extreme weather more and frequent occurrences, mountain areas are generally threatened by natural disasters. Mountain disasters have become the bottleneck of mountain security in China.

Figure 1 shows the grade and frequency of geological disasters in China from 2016 to 2019. As can be seen from the figure, the total number of geological disasters in recent years has the highest correlation with the frequency of small geological disasters, which shows a downward trend in the previous two years, and a steady rise in the recent two years. At the same time, the frequency of medium-sized geological disasters is about 300 times per year, but the frequency of large-scale and extra-large-scale geological disasters has remained basically unchanged. On the other hand, with the vigorous advancement of road and railway construction in China, the increasingly developed road traffic, the explosive growth of the number of tourists, and the growing trend of tourism in individualization, personalization, and self-guided, the new forms of tourism, such as such as hiking, self-driving, outdoor sports and so on, are constantly emerging, and traffic and personnel safety issues in mountain areas are becoming more normal. In addition, the unpredictability and uncertainty of various disasters in mountain areas, the outbreak of public health security incidents, and the increasing number of left-behind children and elderly people in mountain areas have laid hidden dangers for mountain security.

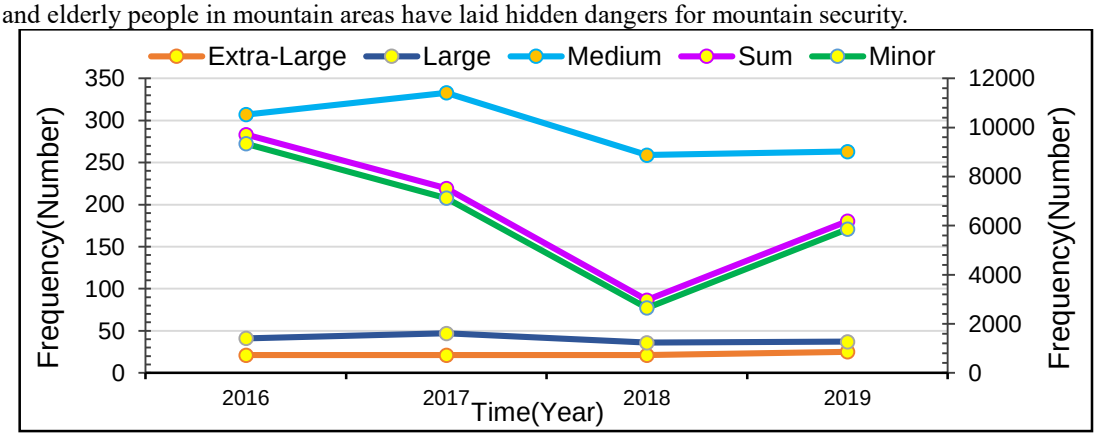

Figure 1 Frequency of Geological Disasters in China from 2016 to 2019

Mountain safety supervision is a huge project that requires the joint participation of the government, enterprises, and society. In recent years, the meteorological disaster monitoring and early warning network, geological disaster monitoring and early warning network and earthquake monitoring network established in my country have gradually become important technical supports for mountain safety supervision. However, due to the rugged mountainous terrain, unsuitable transportation, and the scattered living of mountain residents, it is difficult to build communication infrastructure. Even if communication is possible, blind spots are often caused by high mountains, and communication, interconnection, and interaction cannot be carried out. Especially when natural disasters such as flush flood, landslides, debris flows, etc., conventional communication facilities will not be able to operate normally due to the damage and impact of external factors, and the role of the supervisory system cannot be timely and effectively played. Therefore, it is necessary to use technologies that can provide real-time, accurate and reliable information all-weather, all-day, and all-coverage in mountain safety monitoring management and decision support, etc., to realize the integrated linkage response of mountain safety from monitoring to emergency command.

3 Advantages of BDS in Mountain Area Safety Supervision Application

3.1 Main architecture of BDS

BDS has been built and developed in accordance with the "three-step" strategy. BDS-1 construction was started from 1994 and put into use in 2000. It adopted an active positioning scheme to provide Chinese users with positioning, timing, wide-area differential and short message communication services. BDS-2 was started from 2004 and put into use in 2012. Besides being technically compatible with BDS-1, BDS-2 also added a passive positioning scheme, to provide users in the Asia-Pacific region with positioning, velocity measurement, timing and short message communication services. BDS-3 construction was started from 2009. On the basis of BDS-2, BDS-3 further improves services performance and expands services functions, with the successful launch of 30 constellation satellites. It is planned to fully complete the BDS-3 by 2020, and to provide global users with high-quality services including navigation, positioning and data communication. At present, BDS has a total of 59 satellites, including 15 satellites in geostationary earth orbit (GEO, Geostationary Earth Orbit), besides 4 satellites launched in the test phase; 12 satellites in inclined geosynchronous earth orbit (IGSO, Inclined Geosynchronous Satellite Orbit), and 32 satellites in medium Earth orbit (MEO).

3.2 Characteristics of BDS

BDS possesses the following characteristics: Firstly, its space segment is a hybrid constellation consisting of satellites in three types of orbits. In comparison with other navigation satellite systems, BDS operates more satellites in high orbits to offer better anti-shielding capabilities, which is particularly observable in terms of performance in the low-latitude areas. Secondly, BDS provides multi-frequency navigation signals, and is able to improve the service accuracy by using combined signals. Third, BDS integrates navigation and communication function, and possesses multiple service capabilities, namely, positioning, navigation and timing, short message communication, international search and rescue, satellite-based augmentation, ground augmentation and precise point positioning, etc.

3.3 Analysis on the application advantage of BDS in mountain area safety supervision

Until now, BDS has been widely used in transportation, agriculture, forestry, fisheries, hydrological monitoring, meteorological forecasting, communication, power dispatching, disaster relief, public security and other fields, and has been serving national significant infrastructures, thereby resulting in remarkable economic and social benefits. Combined with the current status of mountain area safety supervision, BDS will have more unique application advantages and application prospects.

3.3.1 Independence system, safe, reliable, stable, and confidential, suitable for use by key departments

The mountainous area not only inhabits one-third of China's population, but is also the main distribution area of ethnic minorities and poor counties, and it is also the main distribution area of our borders. Therefore, the security of mountainous areas is not only related to the life and property of mountain residents, but also to National Security. BDS is a satellite navigation system independently developed by China. It is safe, reliable, stable, and strong in confidentiality. It is of strategic significance to use it in the safety supervision of mountainous areas in peacetime and wartime.

3.3.2 Both positioning and communication functions, no support from other communication systems

Mountainous natural environment is complicated, the transportation is inconvenient, and the communication ability is weak. When an unsafe event occurs in mountainous areas, the transmission and reception of information are often not timely, synchronized, and inaccurate, which is the main problem faced by mountainous areas in safety supervision. BDS has the characteristics of spatial positioning, time reference timing and short message communication, which is an advantage different from other satellite navigation systems. When communication is interrupted and communication devices such as mobile phones are unavailable, the navigation and communication functions of BDS do not require the support of other communication systems. Not only can you know when and where, but also send your location out, so that others you want to inform know your situation and solve the problem of who, what, and where. This advantage greatly improves the efficiency and effectiveness of mountain security supervision.

3.3.3 Covering the global areas, 24 hours all-time service, no communication blind zone

The special geological landforms and meteorological conditions in mountainous areas make the security incidents in mountainous areas both sudden and difficult to predict. Therefore, all-weather, all-time, and all-position monitoring is required. Once hidden safety hazards or unsafe events are discovered, real-time alarms and measures must be taken. BDS is not restricted by time and space, and can provide 24-hour all-weather service without communication blind areas, which will provide effective technical means for monitoring and early warning and emergency management of mountain security.

3.3.4 Both active and passive positioning, easy to provide value-added services

The BDS-1's active positioning scheme enables it to provide positioning, timing, wide-area differential and short message communication services to users, when the public communication network is interrupted or there is no other satellite communications. BDS-2 and BDS-3 adopt passive positioning

scheme, which overcomes the disadvantages of active positioning, such as large power consumption, heavy volume, poor real-time performance, and the inability to remain silent while positioning. BDS-2 and BDS-3 is easy to integrate with mobile phone networks just like GPS. Therefore, the "Location Report + Short Message" function can be completed at the same time using the mobile phone of ordinary users, that is, passive positioning is used during positioning, and active positioning can be selected during communication. The combination of the advantages of BDS and the advantages of communication technology can provide mountain residents with more convenient and extensive security services, and increase the rescue rate of distress in mountain areas.

3.3.5 High-accuracy displacement measurement and speed measurement

High-accuracy measurement receiver based on BDS or BDS enhanced system can be used to achieve real-time positioning accuracy of meters or even centimeters and millimeter. The safety of mountainous areas is closely related to the meteorology, mountain disasters and road traffic in mountainous areas. BDS can not only detect the deformation of geological disasters in mountainous areas, the offset of roads and bridges, and the changes of meteorological parameters, but also use its short message function to transmit the measured data. Timely and accurate monitoring of meteorological changes, monitoring of geological hazards, monitoring of road traffic and vehicle operation will greatly improve the safety supervision, early warning and prevention capabilities of mountainous areas.

4 The Application Path of BDS in Mountain Safety Supervision

At present, the scientific and technological level, especially the high-tech application level of mountain safety supervision work in China is still low, and it is still mainly in the traditional way. Especially for the mountain area safety supervision work, there are obvious deficiencies in information collection, safety monitoring, command dispatching and emergency communication capabilities. It restricts the effective development of safety supervision work in mountainous areas. When large-scale natural disasters and other unsafe events occur in mountainous areas, due to the destruction of communication facilities or communication blind areas, the real-time and dynamic contact between the mountainous areas and the outside world, emergency rescue teams and Emergency Command Centers at all levels and various departments are cut off. As a result, an "Information Vacuum" has emerged at a critical moment in mountain safety supervision. The BDS navigation, positioning, short message communications and position reporting capabilities can provide services for the nationwide real-time disaster relief commanding and dispatching, emergency communications, rapid reporting and sharing of disaster information, which has significantly improved the rapid response of the disaster emergency relief and decision-making capability. The application paths of BDS in mountain area safety supervision is mainly manifested in the following aspects:

(1) Acquisition of safety supervision information in mountainous areas

Based on BDS, satellite communication, geographic information system technology, etc., a highly integrated and portable disaster location information collection hand-held terminal is developed, which can determine the area and location of mountain unsafe events, analyze and evaluate mountain disasters loss, collect information of the security status of mountain residents and special personnel (left-behind elderly, disabled people, patient in serious condition etc.) and two-way communicate, and provide information services such as information collection and reporting message related to the personnel, natural disasters, and other unsafe events in mountainous areas.

(2) Information transmission related to mountain safety supervision

Based on BDS, it can receive real-time monitoring data and location information of mountain disasters, hydrology, meteorological disasters and special personnel, and the location and task execution status of rescue vehicles and disaster relief teams during emergency emergencies, and at the same time, obtain feedback data from the accident site, send mobile path planning information and dispatch information to rescue vehicles, send disaster relief information and mission-instructions such as the resettlement location and transfer path of disaster victims to the rescue team in disaster site, pass the processed information and the generated decision plan through the ground communication network or a location service platform based on BDS feedback to the national and local emergency command center and disaster site command center.

(3) Emergency command and multi-party response of the unsafe events site in mountainous areas

BDS can meet the needs of emergency rescue transfer, resettlement and command dispatching in the mountainous. BDS can meet the needs of emergency rescue transfer, resettlement and command dispatching in the mountainous area. It has the ability to receive information on the accident site of mountainous unsafe incidents, monitor the execution status of rescue vehicles and disaster relief teams, send mobile path planning information and dispatch information to rescue vehicles, and send emergency

settlement sites and transfer settlement routes to disaster relief teams at accident sites.

(4) Monitoring and dispatching of mountain disaster relief materials and rescue teams

BDS can meet the monitoring and dispatching needs of disaster relief materials and rescue teams, and realize the path planning, monitoring, and command dispatch of disaster relief vehicles and rescue teams. The higher-level disaster management department can remotely monitor the current locations and travel routes of disaster relief vehicles and rescue teams. With the aid of BDS short message or other communication methods, we can scientifically dispatch disaster relief materials and rescue teams.

(5) Mountain area emergency search and rescue

The mountainous area is rich in tourism resources but is also a high incidence and frequent occurrence area of various natural disasters such as geological disasters. BDS can meet the emergency search and rescue needs of mountain personnel, locate disaster victims and tourist trapped persons and send search and rescue information to the rescue team closest to the disaster site, then meet the needs of rapid response, continuous tracking and rapid search and rescue.

5 Mountainous Area Safety Supervision Application Mode Based on BDS

5.1 Application framework of BDS in mountain security

The application of BDS in mountain security is mainly reflected in the three aspects of mountain security monitoring, management and decision-making. The navigation function of BDS can provide high-precision navigation and location services for administrative staff and resident users. At the same time, by building the BDS-compatible multi-star & multi-mode GNSS Continuous Operation Reference Station network, it can also provide centimeter-level and millimeter-level accurate measurement of monitoring parameters of mountainous disasters and closely related to mountain security, such as displacement, ground subsidence and other parameters; The short message communication function of BDS is mainly used for regular transmission of monitoring data, the position information of personnel in emergency and texts within 120 words in the routine management of mountain security. At the same time, the information interaction between commanders and search and rescue personnel is realized during the emergency rescue process. The application process of BDS in mountain security is shown in Figure 2.

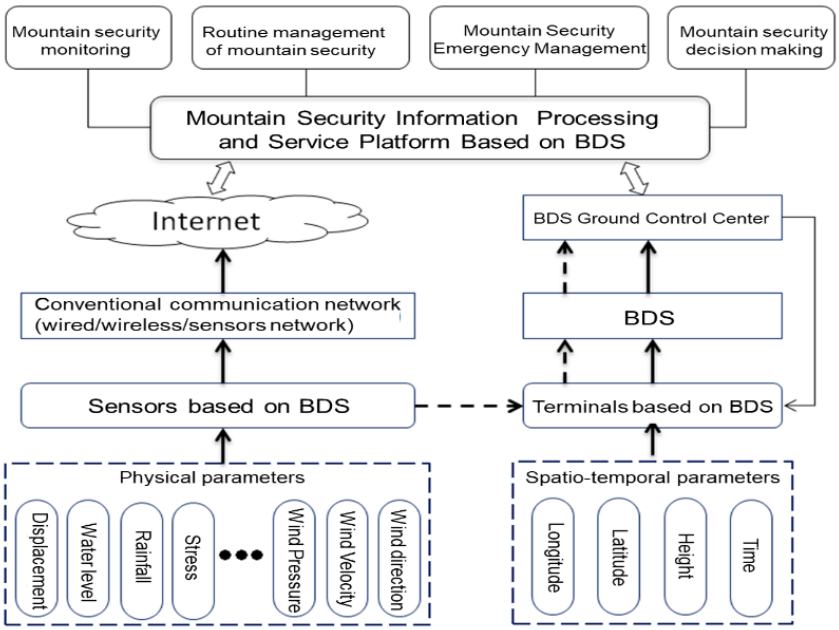

Figure 2 The Application Process of BDS in Mountain Security

According to the application process of BDS in mountain security and the actual needs of mountain security, mountain security application framework based on BDS is divided into sensing layer, access layer, network layer, application support layer, application layer, laws, regulation and standard specification system related to mountain security. The sensing layer mainly includes sensors in the Internet of Things and terminals that use BDS for precise measurement to realize the sensing of mountain security monitoring parameters. The access layer mainly completes the access of various devices, with emphasis on various access methods, including BDS. The network layer mainly refers to the Internet, and the internal private network can also be selected according to the specific situation. The application

support layer mainly refers to a collection of functional modules with universality and reusability, which mainly implements data processing, data management, statistical analysis, and basic GIS functions. The application layer is a collection of application software, mainly referring to various types of application software developed based on BDS according to the actual needs of mountain safety, including mountain safety supervision system, emergency management system and decision-making system.

5.2 Application mode of BDS in mountain security

The application model of BDS in mountain security refers to the basic deployment method of BDS in mountain security based on the application framework of BDS in mountain security according to the specific needs of users. Generally, the application mode of "Terminal + Platform + BDS Integrated Application Service Center" is mainly adopted, as shown in figure.3. Among them, “Users” include individuals, village-level, county-level, city-level personnel, etc.; “Terminal” is customized according to the needs of different users in mountain security, and sends monitoring information and application interaction information required in mountain security, such as communication based on BDS Terminal, emergency terminal, investigation patrol terminal, personal guardian terminal, etc. At the same time, the terminal can also receive information sent by BDS Application Integrated Service Center; "Platform" generally refers to Mountain Security Management and Service Platform based on BDS that can be deployed according to administrative divisions, such as the three-level model of city-county-village or the four-level model of province-city-county-village;. It can also be deployed in a unified manner according to the specific area where the mountain is located, such as the management of mountain security according to the river basin. The functions of the platform are developed and deployed according to the scope, level and respective demand characteristics of the region. They should generally be able to manage various terminals, manage and analyze data, release information, GIS analysis based on electronic maps, and receive data and services provided by the BDS Integrated Application Service Center; The BDS Application Integrated Service Center is usually organized by the company that has been granted the BDS Navigation Civil Service Qualification by China National Administration of GNSS and Applications(CNAGA) to provide navigation and positioning, digital message communication services, and value-added information services based on location for registered network users.

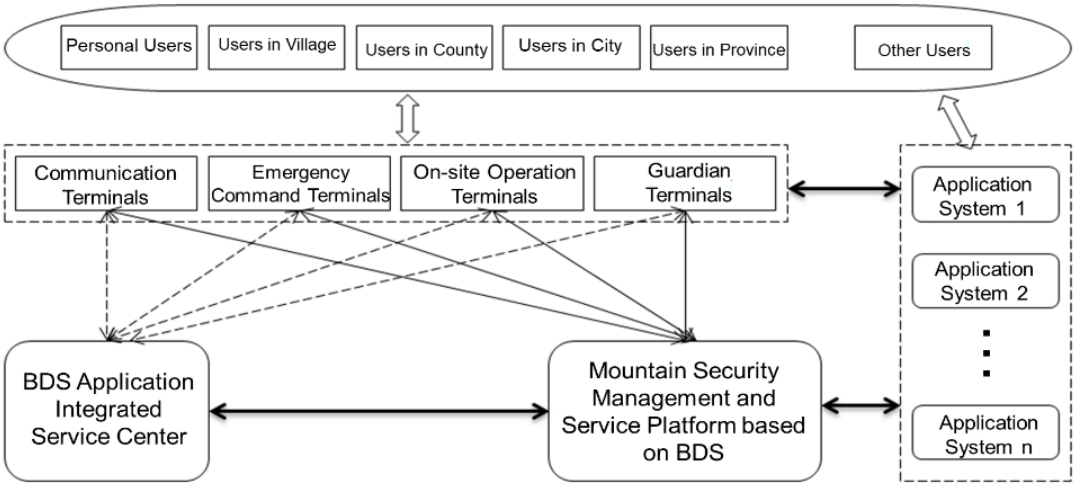

Figure 3 Application Mode of BDS in Mountain Security

6 Conclusion

With the arrival of the 5G commercial era, BDS is accelerating the integration with new technologies such as the new generation of mobile communication, block-chain, artificial intelligence, etc. New modes, business forms and economy of the BDS applications are emerging, profoundly changing people's production and life. In recent years, natural disasters caused by global climate change and unsafe events caused by human factors have shown more and frequent occurrences. The combination of the advantages of BDS and the specific application requirements of mountain security will provide a timely, safe, and reliable technical approach to enhance mountain security guarantee capabilities, and then enhance regional disaster prevention and mitigation capabilities. With the continuous progress of BDS application industrialization, the application of the system in mountain security will gradually from the demonstration to promotion.

Acknowledgement

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Voluntary Work as a Practice of Janitorial Public Services in Brazil

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Abstract: This research has the purpose to study the use of volunteer workmanship with the purpose of solving janitorial service problems in the city of São Paulo. By means of technology and human capital, it is expected to promote social and economic impact on target audience, i.e., individuals from peripheral and of low-income areas of the city. The research results demonstrate that the volunteer work practice is present in the society since the primordial years of small towns and cities and the Human Capital Theory evidenced the importance to use and educate the human workmanship, as, according to this theory, this is the major economical agent of transformation. Linking the historic context with the janitorial and maintenance problems found in the city, we get to the hypothesis of joining the volunteer work with care of public services, promoting social impact and urban transformation. These characteristics are fundamental to make the city smart. It was concluded that São Paulo does not have an efficient management nor an innovative management to solve the analyzed problems; therefore, it is essential to present proposals with alternative solutions, which in a simple manner may be able to improve the efficiency using more technology and promoting a social-economic impact.
Keywords: Public services; Cooperativeness; Social-Economic impact; Voluntary work

1 Introduction

Urban and social maintenance demands of a Brazilian city increase substantially as its population grows. When there is no effective service to solve these demands, small impediments may become great problems to the urban environment. However, the resolution of some problems is not complex. In the city of São Paulo, for example, the problem is in the lack of resources, such as the human capital and technology, which are used to handle the several complaints reported to the City Council.

"The acceleration of the population growth led to two conflicting issues: On the one hand, it is noted the need to excessively explore the resources, the increasing of the pollution and an insufficient number of services available. On the other hand, there is the need to implement the principles of sustainability to overcome such critical situations" (Genari, et al., 2018 p. 71).

The Smart Cities, present all over the world, are examples of how the technology, allied to the common objective of the population and their leaders may provide for a more productive and sustainable environment. The use of several resources, such as Big Data, provides a greater assertiveness in populations more and more diverse each day and which require faster and handy solutions. The technological resource is a key element to make available proper structure and services to the population and for the development of a fast response capacity in case of emergencies (Lee; Lee, 2014).

To be a Smart City, the main objective should be the quality of life of the people living and moving around it. "A smart city uses technology to provide urban services in a more efficient way, improve the quality of life of the people and relationship between local entities, companies, and citizens" (Cunha, et

al., 2016, p. 28). In this context, in São Paulo, part of the population may become the key point for the lack of janitorial and social assistance services.

By joining the public initiative, the community, and the private initiative, it is possible to create smart and feasible solutions. This article comprises the current scenario of the City of São Paulo in the scope of janitorial issues, with the purpose of presenting a solution in which the persons help, on a voluntary basis, to answer the complaints received by the City Council.

2 The City of São Paulo

The city chosen for the conduction of this project and which will be presented in this article is São Paulo, the Capital city of the State of São Paulo, located in Brazilian Southeast region. With a total of approximately 12.18 million inhabitants, distributed over 1,521 km^2, the city that already has a history of 466 years, is also known as the financial heart of Brazil. São Paulo has a heterogeneous population, mainly influenced by Spanish, Portuguese, Japanese, Italian immigrants and migrants from the Northeast region, which gave to the city a rich cultural and architectonic tradition.

Owner of the most famous postcards of several types, such as parks, avenues, and museums, São Paulo also has several deficits related to public service, among which are the difficult to provide janitorial and maintenance services of common areas and public organizations of the city. Every inhabitant has already faced a hole on streets or avenues, noticed parks without the due gardening services, sidewalks and walls without painting maintenance, and dumps on the sidewalks.

This normality, according to the City Council of São Paulo (2019), is due to the number of claims made to the ombudsman service 156 (Portal to receive citizens' complaints regarding municipal issues) which increased 55% in the first semester of 2019, when compared to the same period in the previous year. For pothole filling service, for example, the average waiting time was of up to 45 days (Soares, 2020)[91]

2.1 City Council of São Paulo's service demand data

Due to the great number of occurrences, the public service tends not to satisfactorily meet the claim requests. The seasonality highly contributes to the accumulation of occurrences, for example: During the Summer, when the city faces strong rains later in the afternoons, the complaints to the ombudsman usually increases, as there are more chances of occurrences, such as tree falling, landslides, floods, and inundations. Then, other less urgent services are postponed.

The long waiting period is the main reason for population dissatisfaction, according to the City Council. This period was as long as 45 days for the maintenance of potholes in 2019, and the data does not show any improvements for year 2020. In January 2020, the city registered 7 thousand potholes that were waiting for paving in the city of São Paulo. This data indicates that there are not enough resources to serve all the capital city, the lack of human capital and the limited machinery have a direct influence on this trend.

Other recurrent problem in the city is the incorrect disposal of waste. There are 3814 requests to remove waste thrown over streets and avenues in the city. As a consequence, these roads and sidewalks have their circulation condition limited, which may cause accidents. When the waste is on the sidewalk, pedestrians have to walk through the road, risking themselves among the vehicles, and when the waste is on the road itself, it causes traffic jams and inconvenience to drivers.

[91]https://agora.folha.uol.com.br/sao-paulo/2020/02/disparam-queixas-na-ouvidoria-da-prefeitura-de-sao-paulo.shtml

Among other demands, we also highlight the services of painting of markings on streets and avenues, and maintenance of curbs, which accounted for 152 and 620 requests, respectively, in January 2020 (City Council of São Paulo, 2020). Considering that the demand remains similar over the year, it is estimated that more than 7 thousand curbs will require maintenance up to December 2020. Therefore, it is necessary to address the two causes observed so far, the lack of human capital and limitation of resources to better serve the population of São Paulo. For this purpose, we will analyze the population data that might help us to reach to a potential solution, the unemployed and citizens with low education level.

2.2 Unemployment

The unemployment in the city of São Paulo is a social problem that affected about 15 % of the inhabitants in 2018, i.e., 1,469.545 unemployed people, among which 28% is aged between 16 to 2[92]4 years (Goes, 2018)[2]. Among the main causes for this indicator, we may list the lack of professional qualification, increase in automation of productive process at companies and the technological advances which, in extreme cases, have extinguished some occupations.

"The technological advances started in this period have been molded over the time and today they are more present than ever in our economic context, and the result is the same as that seen in industrial revolution, i.e., the continuous implementation of technological process to the detriment of human workforce use in production process. In this sense, a questionable issue is raised as for the potential worsening of one of the biggest social and economic problems of all times known as unemployment" (Cintra, 2018, p. 9).

Another point to be mentioned is the worker's low qualification, which prevents him/her of, for example, getting operational level jobs for not having basic educational level, communication and expression problems, and lack of technical knowledge. In 2019, a review was made with the data from employment collective effort groups of year 2018 that showed that unfortunately from 5,800 job vacancies and 10,800 candidates, only 3,800 of the candidates had professional qualification to fill that vacant job (Chiara, Gavras, 2019)[93].

In addition to the facts presented, another issue that affects the unemployment is the economic recession a country may experience as a result of several political, social, and market influences, when the entrepreneur is not confident to risk his/her ideas. As a consequence, there are no job vacancies and no production demand.

To Seligmann-Silva (1994), the social isolation as a consequence of the unemployment pushes the individual away from his/her main activities and references of his/her daily life and then, he/she may take refuge in the disease. According to researchers, the unemployment brings losses in self-esteem, social depreciation, depression, among others, as well as cases related to suicide. "The seriousness of this problematics was noted by Angerami and Santos (1984) when interviewing suicide survivors in different emergency rooms in the city of São Paulo, where 33% of the interviewees tried suicide due to unemployment" (Pinheiro, Monteiro, 2007, p. 6).

In addition, among other consequences of unemployment are family relationships affected, lack of subsides for the maintenance of human survival, and individual's social wearing.

2.3 Education

[92]https://www.nossasaopaulo.org.br/2019/02/19/28-dos-desempregados-da-cidade-de-sao-paulo-sao-jovens/
[93]https://economia.estadao.com.br/noticias/geral,sem-qualificacao-parte-dos-brasileiros-nao-consegue-ocupar-vagas-basicas,70002852842

The target public of this project are unemployed citizens, with low education levels and lack of instruction or professional experience. The unemployment becomes a point to be fought, as technological evolution has worsened this indicator all over the world (Cintra, 2019), and formal occupation is also seen as a criterion for social location, bringing visibility to the citizen (Wickert, 1999). The low education level is also considered as a premise for social invisibility and should be eliminated. When this social disparity is not fought, it results in the non-existence of professional qualification of the individuals. "Basic education becomes the root of the problem because all of the future education will depend on its efficiency, besides constituting the minimum level required to contemporary life". (Paiva, 2001 p. 186).

The criteria of National Household Sample Survey 2018 (PNAD), shown that the population of Young adults and adults, older than 25 years, comprise a substantial percent of 33.1% of the individuals with incomplete primary education. The access to primary education is a right ensured by the Constitution to all Brazilian citizens (Federal Constitution Art. 208, Paragraph 1); however, besides those individuals who have lost their constitutional right of access to education, many others also find difficulties along the way which prevents them from completing this step.

The data from the National Household Sample Survey – PNAD of 2018 concluded that the region where São Paulo is located in, the Southeast region of Brazil has the lowest illiteracy rate when compared to the other regions. However, the illiteracy affected 11.3 million of people older than 15 years in 2018; if all of those people were gathered in a single city, this would be the second largest city in Brazil, being only behind the city of São Paulo.

It is estimated that the illiteracy eradication process in Brazil will only be reached in year 2024 (IBGE, 2018); however, the application of primary and professional education initiatives may reduce this term. In addition, the Brazilian education system finds difficulties to introduce contents related to the planet sustainable development, according to the Global Educational Monitoring 2016, prepared by the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2016), in Brazil 60% of the students aged 15 years only have basic knowledge regarding environmental and social responsibility subjects. This data indicates that, in addition to better access conditions to primary education, the Brazilian population lacks a better approach of subjects that are relevant to a sustainable expansion.

2.4 Smart City Project

With the purpose of reaching the target public of people with low education level and difficulty to access the labor market, the incentive to primary education and its completion will be addressed, as well as the opportunity of getting in the labor market and professional qualification. In addition, public-private partnerships are desired to make feasible discounts on household fees. In return, the project participants will be able to voluntarily assist the City Council in janitorial services.

People who did not complete primary education will be encouraged to participate in preparatory courses to take the National Exam for the Certification of Skills of Youth and Adults - ENCEJA. This course was prepared with the collaboration of volunteering university students from the Universidade São Judas Tadeu (USJT) to teach the contents of primary education, so as to complete the Primary and Secondary Education. At the same time the project aims at implementing qualification opportunities to the individual, the participation in volunteer work will be an add-in to the subject's curriculum and provide for unachievable gains, through the contact with new environments, expanding network, and improvement to solve problems affecting the city's daily life.

The problems recorded in the call center 156 of the City Council are varied. We may mention the paving service, rescue of homeless people, tree pruning, sidewalk painting, among others. As observed before, these problems are not only solved by public initiative and their workers, therefore, there is a need of civil society intervention.

To handle this demand, the recruitment of volunteers will be made by an application that connects the citizen with the service requests received by the City Council. The volunteers will register in the application, with pertinent information regarding the level of education, location, age group, availability, and skills. With this registry, the application will analyze the data collected and indicate the best way to assign this volunteer in activities close to his/her location, to ensure a better convenience and, at the same time, it will refer the participant to a preparatory or vocational course, or to discounts in household fees.

The projects consider that it is possible to work for the benefit of a sustainable growth of the city, linking the volunteer work to a problem found in the city. The idea also requires other efforts to be feasible, such as the involvement of public initiatives.

3 Methodology and Result Analysis

As a methodology for the study development, bibliographic and document researches, statistic data, and quantitative field surveys were performed with individuals resident in the city of São Paulo and Great São Paulo area for a better progress of the project and formulation of hypothesis. For the development of initial steps of the research, books and documents were used, as well as official channels to collect educational, unemployment, and income data. The main data source is the Brazilian Institute of Geography and Statistics (IBGE).

Field surveys require formulation of structured questionnaires to be applied on people resident in all regions of the city. 14 questions were grouped by means of Google Forms platform, and were made available in social networks Facebook and WhatsApp. The field survey is important to analyze opinions and habits of the analyzed population.

Then, being the man capable of contributing with volunteer workforce, it was necessary to identify in contemporary society if there is an interest in the practice of volunteer work to reduce the time to handle janitorial and maintenance services. For this end we applied a questionnaire in two steps. The first step aimed at identifying the respondents' profile. The questions were about the gender, age group, approximate family income, zone in which resides, current occupation, and whether he/she had access to Internet.

The second step sought information regarding the problem to be solved, i.e., janitorial and maintenance occurrences. In addition, the second step also queried about the desire of becoming a volunteer in their own neighborhood and whether some "rewards" would encourage other people to participate in this kind of social movement. The research was conducted between May 7 to 21, 2020, in online form, and at the end of application period, the following results were obtained.

The field survey gathered a sample comprised by 135 individuals resident in the city of São Paulo and Great São Paulo area, to whom a 14-question questionnaire was applied. Among the 135 interviewees, 55.6% were women and 44.4% men, most of them were young adults aged 18 to 24 years (55.6%) followed by age group from 25 to 32 (17.9%) and 33 to 40 (15.6%). The remaining individuals were older than 40 years (11%). The current Brazilian age pyramid is similar to the sample collected, with a greater part of the population being comprised by youths and adults. When questioned about the region of the city where they lived, 40.7% stated they lived in South Zone, 17% in the East Zone, 16.3% in

North Zone, 11.1% in West Zone, 8.9% in Great São Paulo area, and only 5.9% informed they lived in Downtown, most of the interviewees (99.3%) said they had access to internet.

The research respondents' interest in participating in volunteer work in their neighborhood, 37% of the people said they were interested in participating in some kind of volunteer activity, 34% said they were in doubt as for their participation, and 29% would not participate. It is important to observe people's willingness to participate in volunteer work, since the human resource is one of the main triggers of the project, and without the involvement of citizens the idea would not even become feasible.

According to Souza and Medeiros (2012), the reasons why individuals do volunteer work are diverse, whether for religious, political, familiar or personal motivation, the individuals dispose of their time and work for the benefit of the society in which they live and they expect to receive a non-monetary reward in return, such as learning opportunities, personal growth and a feeling of collaboration.

The 2017 study Other Forms of Work realized by the IBGE showed that the number of people participating in social work in Brazil grew 12.9% when compared to the previous year, reaching 7.4 million people. The study showed the low involvement of younger individuals, most part of the Brazilian volunteers are women with complete higher education, and who are engaged in other activities besides social work.

Several reasons may be the cause of the low involvement among young individuals in volunteer work. It is possible to list the difficulty to get information about social activities and the low interest for 'traditional' forms of volunteer work. To Souza and Medeiros (2012) it is essential that there is a real interest for the activities developed and the compatibility with the project or institution's causes and objectives. Dohme (2001) also points out that when the volunteer works in an activity that he/she identifies with and that he/she picked himself/herself, the work delivered is enhanced.

To identify potential incentives to do volunteer work, we asked the interviewees, who in summary belong to classes E, D, and C, whether incentives such as discounts in power or water bills would make them willing to participate in volunteer activities. The result for the incentive question shows that 99.3% of interviewees believe that discounts in permanent bills are another form of incentive. The acceptance may be explained by the fact that basic bills represent a great part of the personal budget of Brazilian families, especially in low-income families.

The search for identification with the cause, which was mentioned above by Souza and Medeiros (2012) as the key point for self-motivation and productivity, may be achieved when there are options in different segments, as well as the convenience of being close to home. When asked about janitorial and maintenance occurrences in their neighborhood, the research respondents were not satisfied with the high recurrence of problems such as waste on streets, abandoned squares, potholes on the streets, etc. Each individual reported at least 2 janitorial or maintenance problems in their neighborhood.

In addition to the dissatisfaction, there is also the interest in helping in some way, which shows the support to the volunteer work cause in the neighborhood they live in. Dohme (2001) mentions as the reason for volunteer work involvement the desire for harmony and support to the collective objectives of a community. According to the author, the volunteer is someone who has their own personal objectives and point of view of the social reality around and, therefore, tries to project their objectives towards the community, with an effective participation in the achievement of results, besides the acceptance of a group.

As for the occupation of individuals who answered the survey, 51.1% had formal jobs with registry in the CLT [Brazilian labor regulations], 23.7% were unemployed, and 20% had informal jobs. The

remaining were self-employed or full-time students. IBGE research (2017) also identified that most part of the volunteers had other occupations besides social work, as well as most part of the field research sample showed interest in social work. However, the involvement of the unemployed public is necessary, as they have more free time and would benefit themselves with the experiences in new working areas, besides taking advantage of the vocational courses and discounts in water and power bills. Social work is also considered as a stand-out characteristic in labor market by recruiters.

"Volunteer work becomes an interesting alternative to those wishing to improve their curriculum and developing their communication, team work, time management and organizational skill[94]s, among other important features to professional activity. All of these characteristics are valued by recruiters and, in some cases, the volunteer activity becomes a tiebreaker factor between candidates with similar profiles. (Bortoluci, 2019, p. 1)[4].

Most part of the individuals involved with volunteer work is the public with some educational level (IBGE, 2017). Therefore, the project objective is to reach that portion of people with lower educational level. The reward program proposed by the activity aims at providing courses in several areas, to encourage those wishing to improve their educational level and training themselves to the labor market. It is clear that people with higher educational levels have occupations with better salaries.

In addition, the problem of the low educational level of the population of the State of São Paulo should be fought, as seen in the topic related to educational level in this article; the eradication of illiteracy in Brazil is expected to occur in 2024 only, and the youth and adult population is the most affected by this condition. This fact does not disqualify this part of the population in the exercise of social work, on the contrary, by means of volunteer work, we aim at facilitating the access to education and, consequently, enable the income increase.

"The Human Capital Theory defends that an improvement to the national investment in education - essentially in vocational training - will inevitably lead to an improvement in national income, i.e., will cause an acceleration in the country's economic growth. In the same way, the improvement of individual or familiar investment in education will lead to an improvement of the individual or familiar income". (Rodrigues, 1997, p. 217).

Therefore, it is understood that the social work proposed herein brings benefit to people of different social classes, different age groups, and different occupations, and this fact will contribute for an increased involvement and democratization, impacting positively the collective. The biggest benefit expected with the application of this initiative is the improvement in urban quality of life of all population. As seen over the bibliographic review, this feature is considered by many authors as the fundamental premise to understand a Smart City.

4 Final Considerations

As seen over the study, the migration of the man to the city was the factor that contributed to the emergence of volunteer work, as well as the Catholic Church activities. Then, the link with the church made many people believe that they would be forgiven by their sins in life, in case they did some social activities. Currently, many people do not participate in volunteer work, for reasons such as lack of information and lack of identification with any cause. Considering these two points, if the information is given in a simplified way and is closer to the reality experienced in the neighboring areas of the

[94]https://administradores.com.br/artigos/trabalho-voluntario-no-curriculo-como-ele-pode-ajudar-a-conseguir-um-emprego

individual's residence, then the involvement would possibly be greater. That is why the project´s volunteers will promote social activities for the benefit of the neighborhood or the city they live in. Therefore, the project will help not only the people willing to directly participate in the cause, but it will also help millions of the inhabitants of the city of São Paulo, who would get rid of the minor urban impediments.

The search for the involvement of unemployed population with low educational level was necessary, since this is the population that will obtain the most benefit by the educational, placement in labor market, and income preservation incentives. Alike incentives have already been used in corporate environment, such as tax exemptions offered in exchange of social activities, as shown in this study, it is possible to take this same concept to the individual environment. It was noted that the best way to apply this concept is to benefit the most socially vulnerable population. In São Paulo, a great part of the population facing the unemployment does not have proper occupational and educational qualifications to get certain job vacancies, due to the long time waiting to be replaced in labor market many people often get disheartened, giving up their search for a formal job.

Targeting this type of reality, that is becoming more and more common, the proposed project bring efficient and innovative solutions so that these people are easily reallocated in labor market, and in return, they help the city to solve recurrent problems that have been experienced for years, such as the problem with urban planning. Using the technology allied with the human capital and proactiveness, it is possible to do more than just improve the service offered exclusively by the City Council, but it may also transform the lives of its residents with the incentives to education and study resumption projects, so that these people may have a higher educational level. One of the basis of a smart city, besides technology, is a developed population that is why one of the main objectives of the project is to improve the educational level of its volunteers.

Upon completion of this article, it was concluded that São Paulo does not have an efficient management nor an innovative management to solve the analyzed problems; therefore, it is essential to present proposals with alternative solutions, which in a simple manner may be able to improve the efficiency using more technology and promoting a social-economic impact. We expect this article to be used for the benefit of the city and that proposals like this are analyzed and studied for the implementation of projects around the city so that with the aid of the population's volunteer work São Paulo may achieve higher efficiency and productivity in services that directly affect the quality of life of the population.

One of the limitations identified is that the characteristic of volunteer work may be better studied, especially its social application in larger scale, and the impact on the improvement of quality life of those people involved with it. In addition, other quantitative researches with more heterogeneous group of the population of the city of São Paulo is required to better represent the population diversity. As a proposal for a future study, the project feasibility should be investigated before public organizations, with the purpose of analyzing the applicability of the discount on household fees and State taxes.

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Operational Architecture, Functional Limit and Optimization Path of Grid Management in Colleges and Universities

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Abstract: College student management reflects the management ability and level of colleges and universities. With digital technology embedded, grid management achieves the process reengineering of college student management, lengthens the governance chain, integrates the management power, improves the management efficiency of colleges and universities and refines the management. As a top-down reform of management mechanism in colleges and universities, grid management finds it difficult to completely get rid of the institutional inertia and path dependence caused by changes in the traditional management system. Therefore, it is necessary to further explore the optimization path of grid management in colleges and universities, endow grid management with more humanistic care, establish an all-in-one coordinative mechanism, clarify the responsibilities and authority of the management subject, innovate the ways and methods of management, and expand the functional coverage of grid management.

Keywords: Grid management; Operational architecture; Optimization path; Colleges and universities

1 Introduction

College student management reflects the management ability and level of colleges and universities. In recent years, the grid management theory has been introduced into the reform of college student management. Based on their practical conditions, colleges and universities make endeavors in innovation and improvement according to the characteristics of student management to carry out innovation and improvement, yielding fruitful practical results, which is of significant theoretical implications.

The academic circle has extensively studied the grid management in colleges and universities for now. At the beginning of the 21st century, some local governments in China creatively applied the grid management theory to urban community management, gradually forming a social grid management theory with Chinese characteristics during practice. (Baiying S , Yangming Y,2015)Ever since the 18th CPC National Congress, the Party Central Committee with Comrade Xi Jinping as the core has attached great importance to facilitating the gridding of social grassroots governance, striving to create a social governance pattern featuring co-construction, co-governance and sharing.(Yan Yaojun,2016)With the diversified application of grid management in Chinese social governance, how to improve the level of student management through the implementation of grid management has become a practical problem of great importance that many colleges and universities are currently exploring.(Yang K , Galis A , Todd C,2012)Originating from the industry-specific terminologies, the term “grid” has been promoted through the innovative application of the computer industry.(Arun Jagatheesan,2015)Based on the currently available community management in China, the grid management theory divides the social grassroots self-governing organizations into grids and combines the modern national governance theory with modern information technology. (Qiong Y , Haijun Z , Yuanpeng L,2017)During recent years, the practice of grid management in the social field in China has been basically consistent with the existing residential community as a whole. Meanwhile, the grids are divided and grid points are set according to the gathering and dispersion of residential areas.(Zhu Q,2018)

Nevertheless, to the authors' best knowledge, thus far in the literature no study has been reported to evaluate the operational architecture of college student grid management. Herein, we made an effort on the Optimization Path of Grid Management in Colleges and Universities

2 Operational Architecture of College Student Grid Management in China

With the demonstration of social grid management, some colleges and universities have started to implement grid management among students. After years of efforts, a number of pilot colleges and universities have made fruitful progress in grid management. In this study, we focused on the summary and analysis of the practical practices of eight colleges and universities in Hubei Province for student grid management.

2.1 Process reengineering of college student grid management

According to the basic procedures of grid management, college student grid management also follows the basic framework that includes the steps of grid division, clear division of responsibilities, establishment of database and establishment of feedback mechanism.

Firstly, the management structure is arranged vertically to the end and horizontally to the edge. The first step is to rationally divide the grid elements. Colleges and universities divide the grid according to the geographical distribution of student dormitories. The second step is to reasonably allocate grid managers. On the one hand, based on the practical situation, colleges and universities have established a team of grid staff at different levels ranging from the university to secondary college and class to conduct division of labor and cooperation from the micro perspective to the macro perspective. On the other hand, colleges and universities have appointed students as grid staff of the students' dormitories, forming a three-level grid staff team composed of supervisor of the student grid area, grid staff of students' dormitories and student assistants of grid service management.

Secondly, the operating mechanism should be upgraded from event management to people management. What kind of operating mechanism should be adopted to guarantee the effective operation of the whole management system after the upgrading? This is a question that we must deeply thing about during process reengineering. Without an effective operating mechanism, grid management is unable to play its specific function and role. The first step is to construct corresponding information platforms for grid management, including the basic data platform, geographic information platform, dynamic data platform, statistical analysis platform and communication platform. The second step is to establish grid service management standards. Moreover, special funds have been invested to set up grid workstations and network working points, and to establish grid monitoring room, student affairs service room and the Party and the League activity room, all of which integrate multiple functions ranging from grid multi-screen real-time monitoring to grid information management and student affairs self-service.

2.2 Experience and effect of grid management in colleges and universities

First of all, delayering of organizational functions improves the efficiency of management. The integration of functions, i.e. the combination of similar functions into different modules, not only makes delayering possible, but also breaks the original departmental barriers. Grid management and group-based service enriches the traditional top-down operation of administrative organizations in colleges and universities by adding a bottom-up operation. This two-way operation, which provides personalized and all-round services, makes it greatly convenient for colleges and universities to satisfy the demands of students.

Secondly, the functional boundaries are broken through by information sharing. The student service

management grid established with students' dormitory as the unit contributes to the greatest integration of educational resources and the formation of a joint education model of ideological and political work centered on students' dormitory. The first objective is target aggregation. The second objective is functional integration. The third objective is process integration.

Thirdly, the effectiveness of service management of student grid is significantly improved. According to the survey results of the pilot colleges and universities, the core functions of grid management have been brought into full play in the following three aspects, i.e. the comprehensive collection of student information, the dynamic management of students' behavior track, and the efficient access and feedback of student information. Meanwhile, the stability maintenance function of student grid is significantly enhanced.

3 Functional Limit of Grid Management in Colleges and Universities

The two systems are not smoothly connected. In terms of grid management, the bottom-up operation is realized by non-permanent institutions. Since the problems transmitted by individual students may involve multiple functional departments, a platform is needed to classify these problems and deliver them to relevant functional departments as soon as possible. The application of big data in current college student grid management mostly stays at the experimental level, and it is difficult to achieve normal application. On the one hand, due to ineffective data collection and management, there are a large number of non-standard data, which reduces the utilization ratio of data, interferes with and weakens the credibility of grid management. On the other hand, without timely data utilization and analysis, the comprehensiveness, relevance and complexity of the data are not fully comprehended, making it hard to apply the analysis results to practical work.

There is a coordination dilemma under fragmented governance. Hierarchical management thinking continuously extends the grid management system, the scope of linkage units within the grid is increasingly expanded, and the full coverage of the organizational system and seamless management are pursued. Nonetheless, it also leads to horizontal coordination dilemmas and information interconnection obstacles within the grid. Some colleges and universities one-sidedly regard grid management as information management. Particularly, the functional departments of some colleges and universities still act of their own free will without laying enough emphasis on coordinated facilitation of grid management. There are problems such as repeated data collection, difficulties in data sharing and repeated construction of database, which lowers the efficiency of grid management.

Many unanticipated negative effects caused by grid management originate from the blind worship of hierarchical management in colleges and universities and the continuation of top-down management thinking. The integration of single traditional management forces in colleges and universities is insufficient to effectively respond to the diversified interest appeals of students. Objectively, the cooperation and co-governance of multiple governance subjects are needed to achieve participatory governance.

4 Optimization Path of College Student Grid Management

The current social grid governance and the practice of grid student service management in some college and universities provide experience and reference for further enriching the theory and practical innovation of college student grid management.

4.1 Endowing grid management with more humanistic care

The information technology applied in grid management should be based on the premise of protecting human rights. Instead of being the cold technological rationalism featuring the supremacy of technology and a kind of management that leads to alienation, grid management should be the kind of management full of humanistic care, which should focus on the educational goal of students' growth and development. According to the real concept of education, education matters for every single student. Therefore, we should encourage every student to actively participate in student management as a member of the management grid, which not only effectively mobilizes management resources, but also improves students' self-management ability.

4.2 Establishing an all-in-one cooperative mechanism

The student service grid management in colleges and universities should integrate multiple networks, realize the co-construction and sharing of different management information systems on and off campus, get rid of information barriers, eliminate information isolated islands, and build a cooperative mechanism. On the one hand, it is necessary to strengthen the coordination between the government and the school. On the other hand, the internal coordination of colleges and universities should be strengthened. When it comes to the management mechanism, we should establish and improve mechanisms for maintaining stability, investigating contradictions, intervening psychology and dealing with emergencies, strengthen cross-departmental integration of resources, and accelerate the co-construction and sharing of various basic data. In terms of the management process, grid staff at all levels should bring their roles into full play, do a qualified job in classifying, transmitting, tracking and feeding back student service management information, and constantly make student service grid management more accurate and intelligent.

4.3 Clarifying the responsibilities and authority of the management subject

Through exploring and constructing a reasonable grid management model, integrating the resource allocation as well as responsibilities and obligations of functional departments, course teachers, head teachers, student cadres, students themselves and grass-roots counselors, and making use of information network resources and sites for student activities, the basic categories and core objectives of college student management are assigned to students step by step, thereby strengthening students' self-service and self-management abilities and alleviating the work pressure of the counselors who try to handle all matters, whether important or trivial, for students. In terms of grid staff construction, it is of great significance to enhance management over the selection and recruitment of grid staff, optimize the personnel structure, and upgrade the theoretical level and practical operation ability of grid staff through systematic training. When it comes to strengthening responsibilities, there is a necessity in properly carrying out team building, guaranteeing sufficient financial support, responsibility implementation and work assessment.

4.4 Innovating ways and methods of grid management

College student service grid management should highly integrate the traditional advantages of ideological and political work with modern information technology, transform traditional student service management into a modern management mode, and continuously strengthen the innovation of ways and methods of management. First of all, big data about college students should be fully tapped and applied. On the one hand, with problems as the orientation, colleges and universities should enlarge the application of new technologies. On the other hand, colleges and universities should be goal-oriented and reinforce the research and development of products concerning student service grid management, so

as to promote and confirm the traditional advantages of student service management. In this way, student service grid management will not be blindly dominated by big data, and the intelligent and normal application of big data can be facilitated as well.

5 Conclusion

With the diversified application of grid management in Chinese social governance, how to improve the level of student management through the implementation of grid management has become a practical problem of great importance that many colleges and universities are currently exploring. Grid management achieves the process reengineering of college student management, lengthens the governance chain, integrates the management power, improves the management efficiency of colleges and universities and refines the management. In order to further explore the optimization path of grid management in colleges and universities, it is necessary to endow grid management with more humanistic care, establish an all-in-one coordinative mechanism, clarify the responsibilities and authority of the management subject, innovate the ways and methods of management, and expand the functional coverage of grid management.

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Research on Personal Information Protection Strategy Based on Domestic "Health QR Code"

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Abstract: This article uses the text analysis method, through the text analysis of the health code application, it is found that the information collection roughly covers basic personal information, social relationship information, and action track information. It is believed that in the process of collecting data, there are problems such as incompatibility between information collection requirements and textual descriptions on information protection, lack of personal information protection notification, and failure to provide users with a button to actively delete their relevant information. The study proposes that citizens' awareness of personal information security protection should be enhanced; users should be given the technical initiative to delete personal data unilaterally; social roles should be clarified to achieve a balance between business demands and public interests; laws and regulations should be updated in a timely manner to stimulate platform governance.

Keywords: Personal information security; Health QR code; COVID-19; Information leakage

1 Introduction

Our country's Internet industry, big data and cloud computing have developed rapidly in recent years, and the ensuing personal information protection problems are becoming more and more serious. Under the special conditions of the current epidemic prevention and control, a large amount of personal information is controlled by the relevant departments, but the matching personal information security protection has not kept pace with the times, and it is easy to threaten the information security of individuals and countries.

At present, domestic and foreign scholars' research on personal information protection mainly focuses on technology and law. Research on the technical protection of personal information is currently mainly focused on the subject's identity and the information system. As far as the identity of the subject is concerned, many scholars have proposed de-identification measures to anonymize or pseudonymize the identity of the information subject. In terms of information systems, Kavitha, S and others proposed hyperelliptic curve public key encryption based on the Internet of Things to improve the identity verification and security assurance of the efficient universal group key protocol[95]. The research on the legal protection of personal information is mainly the discussion of contract law, personality rights, property rights, etc. from the legal level by legal scholars. Su Jin believes that when network users log on to the network platform to participate in information interaction, they should clarify the applicable standards of relevant behaviors, and the principles of honesty, credibility and fair transactions should be

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adhered to among information interaction entities(Su Jin,2017). The special legislative model for personal information protection proposed by Lin Qingyun, Jiang Yanbin and others advocated the formulation of a special law-the Personal Information Law(Lin Qingyun,2018;Jiang Yanbin,2018). George J. Annas and others proposed that the government should not only respect individual human rights and individual freedom, but also protect personal information from external sources and third parties(George J.Annas,Wendy K.Mariner,2016).

To sum up, domestic research on personal information protection issues involves interdisciplinary fields, and personal information security issues are of great concern to scholars. However, through combing, it is found that domestic related research mainly studies the personal information security issues in the entire Internet ecology from a macro perspective, and there are very few micro-specific studies. The research on the actual situation is insufficient, so that the research lacks depth. In terms of management countermeasures, it failed to break through the existing framework, and lacked a systematic and innovative management method. At present, under the new crown pneumonia epidemic, the collection of personal information of the people is more common, and the "health code" is an important information collection platform at the moment, and the potential information security behind it has greater hidden dangers. Therefore, using the "health code" to see from the small to the big, g limpse the current pain points in personal information security protection, and propose the main countermeasures, is a problem worthy of in-depth study. It strives to provide theoretical support for the protection of personal information security, provide decision-making reference for the effective management of the government and related institutions, and provide practical guidance for users to participate in the social life of the Internet rationally.

2 Information Content Of Health Code

The "Health Code" is an electronic voucher developed by companies such as Alibaba, Tencent and others for personal travel during the epidemic in early 2020. It is based on real data. The citizens or re-workers submit their own online declarations to fill in the actual address, physical health, whether they have been to the epidemic area, whether they have contact with key personnel, etc. The information generated is Personal QR code. The application relies on a huge amount of personal information to generate, here, personal information is the sum of all the information that can identify the person himself.

Taking the Tencent Health Code and Alipay Health Code, which are used by a large number of people in China, as the specific research objects, the text analysis method is used to study the relevant content of the health code application, and it is found that the user information used is derived from explicit information and implicit information Two kinds. The information that the user actively fills in is explicit information, and the information that the user authorizes the application software to use is implicit information. From the content point of view, it roughly covers three aspects: personal basic information, social relationship information, and action track information. (See Table 1 for various specific information)

Table 1 Health Code Information Collection

Information Category	Text Content Collected By the Health Code Application
Personal Information	Explicit Information: name, ID number, mobile phone number, "Are you currently in a certain place?" "Are you in home isolation?" "Are there any abnormalities in your current health status?" Hidden Information: storage, phone (read call status and mobile network information)
Social Relations Information	Explicit Information: "Have you been in contact with a confirmed or suspected COVID-19 patient in the past 14 days?" Hidden Information: address book, friend information

Action Track Information	Explicit Information:"Have you left your location in the last 14 days?" Hidden Information: location information, fitness

2.1 Basic Personal Information

The health code collects basic information such as your real name, mobile phone number, and ID number, and requires users to actively fill in the real information to obtain the health code pass.By filling in the basic information to digitize the physical persons in the society, and to judge the epidemic-related information by the digital identity. After filling in successfully, there is a function to hide the ID number, only the name, region, and health code color are displayed. Through the experience of Alipay health code and Tencent health code, the author found that the two companies did not make detailed anti-epidemic instructions on the interface of using the health code to collect personal information, nor did they involve information protection related issues. In the whole process of collecting basic information, it plays the role of the commander actively requesting, not the role of the server. From this point of view, because the health code cooperates with the government, it has certain compulsory in the information collection process, the user is in a passive position, and is required to actively cooperate with the work.

2.2 Social Relationship Information

The health code is relatively concealed in collecting social relationship information. It is an authorization given to the software background by the user with one-click operation when the user downloads and uses the software. The main basis for health code generation comes from the assignment of three dimensions: time, space and interpersonal relationship. Among them, the interpersonal relationship dimension is the personal effective information such as the contact status with key personnel. In the process of collecting social relationship data, the user's social relationship is traced by accessing the user's address book, WeChat Alipay friends, etc. to generate their own social relationship network. By collecting personal related social relationships, including relatives, friends, and people with geographical relationships in the same area, and then linking with other people’s health code information in the social relationship, the personal risk of illness is calculated and displayed in three different colors The individual’s current risk status of illness. The prerequisite for this application is that when users use APPs such as Alipay and WeChat, they agree to obtain personal address books, call logs and other information in the software background, and allow access to private information such as pictures and videos in mobile phones. If the user does not agree, the software cannot be used. Therefore, when the user is in a passive position in the process of using, he can only choose to accept the conditions prompted by the software, or he is not aware of his mobile phone information is being restricted due to knowledge conditions. Read and use the software in the background. In this way, the health code algorithm is provided with data support of social relationship information, and the risk of personal infection is more comprehensively evaluated.

2.3 Action Track Information

In the process of applying for the health code, you need to select your city and fill in the recent activity area to allow the background to obtain (strictly speaking, the background is used as auxiliary evidence to obtain information) personal action track information to determine the risk of illness. In terms of positioning, the health code is bundled with Alipay, WeChat and other software that is always allowed to obtain the geographic location when it is downloaded, that is, the default user agrees to obtain the geographic location anytime and anywhere. Even if the user does not manually turn on the mobile phone positioning function, the background can locate the user Location, implement background monitoring

for users. Because the severity of the epidemic is different in each province, and the density of patients in each region of each province is also different, so the use of mobile phone positioning technology to analyze the possibility of people being infected is the health code collection action track The main purpose of the information. Specifically, for example, in a certain area, the diagnosed person holds the red code, and through positioning, other people who are close to him are at risk of being infected, and people can timely sense whether the neighborhood is safe and find out whether they are in time. May be infected with viruses. The background algorithm of the action trajectory data is based on two major standards, a spatial dimension, that is, the national epidemic risk degree, which is determined according to the data accurate to the township; the second time dimension is to calculate a certain value by correlating the action trajectory with time The number of times individuals have visited the epidemic area and the length of stay.

3 Results

This part mainly summarizes the characteristics and problems of the personal information security of the health code.

The characteristics of health code personal information security. First, the health code application has given certain attention to the protection of personal information security, and has set a function to hide relevant information. The display of personal information on the main interface is relatively simple, mainly including the name, location, and health code status. It did not show other details, such as action trajectory, social relations, etc., which reflected a certain awareness of information protection. Second, the health code dynamically monitors the health of personnel, escorts personal life safety, and enhances the accuracy of epidemic prevention and control.

However, the health code also exposes many problems in the protection of personal information. Under the epidemic situation, the information collected through the functions developed by the enterprise, how to use technical and legal power instead of a paper agreement to ensure that it is not abused is an issue that requires our attention. If abuse occurs, it will involve multiple subjects such as Internet giants, governments, and citizens, and the consequences will be disastrous. First, the information collection requirements and the text description on information protection are obviously not equal, which is reflected in many aspects such as the length of relevant content and the expression of words. The specific instructions of the health code application in terms of information collection use and information protection are barely mentioned, and the default information collection method is adopted. This default method comes from the relevant agreement signed by the user and the platform when downloading the software. However, it is worth mentioning that during the implementation of the health code, an application that collects a large amount of personal and private information, no more specific information protection section is given to remind users. Instead, it is embedded on the platform. The preliminary agreement is used to explain and implement relevant information protection, and there is no specific explanation for the protection of personal information security. Second, there is a lack of personal information protection notification. At present, the public has a low awareness of information protection, and the parent companies of Health Code, such as Alibaba and Tencent, are giants of Internet companies. They have a team of highly qualified professionals who should be sensitive to information protection issues and take social responsibility. Help the public to increase this awareness. However, from a practical point of view, personal information protection notices have not kept pace with new application development iterations. The progress of society requires the joint efforts of all parties. The current laws

and regulations need to be completed in the protection of personal information security. Enterprises should consciously promote this process. Third, there is no button for users to actively delete their own related information. From the effective date of the agreement, the user is in a passive position, unable to completely delete the data that he wants to delete, or the platform does not give the user the corresponding right to delete the information legally, nor does it treat the data generated during the user's use of the software Use for any specific instructions.

4 Suggestions

The ever-changing scientific and technological power always affects people's lives first by law, and there are too many uncertain factors in the risk society to challenge human civilization. Therefore, not only the legislation and administration are required to respond continuously, but the developers of network applications should also take corresponding actions on the protection of personal information in a timely manner. Citizens should also raise the awareness of information security protection and combine self-discipline with other disciplines before they can find Compatible way of personal information security protection.

4.1 Co-construction of Multiple Subjects

Raising awareness of personal information protection is a long-term project that requires a multi-pronged approach and requires the joint efforts of multiple parties. Specifically, it can be cultivated from daily education, media guidance, community publicity and other aspects to improve people's information security. Protection awareness.

In daily education, schools of various types and stages should set up relevant courses, and take the current latest incidents caused by the lack of awareness of information security protection as related cases to provide universal information for personal information security protection in the era of big data The basis of consciousness. Start from the student stage, cultivate the correct awareness of information protection, and deliver excellent talents with basic awareness of information security protection for the society. As far as health codes are concerned, various schools and educational institutions should specifically mention the information security protection related to health codes in the daily teaching process. For example, according to the knowledge level of students of different ages, they explain the internal algorithm logic of health codes. And remind students of the personal information issues involved, cultivate students' attention and sensitivity to personal information, and prevent students' private information from being illegally used.

In terms of media guidance, in addition to the mainstream media coverage and promotion of personal information security protection, we must also make full use of self-media for communication. At present, a large number of unofficial communication subjects are gathered on the popular social platforms. Such self-media should also strengthen its own information security protection awareness. It should be sensitive and cautious about the information of itself or related personnel. As far as health codes are concerned, publishing information through various media calls on everyone to actively protect their privacy data while cooperating with information collection.

In terms of community publicity, it can be done in many ways. Propaganda slogans and broadcasting are good choices. During the epidemic, many villages in Henan used the form of broadcasting to call on villagers not to go out, and achieved good results in epidemic prevention. So in the promotion of personal information security protection consciousness, we should also adopt a variety of methods to promote the improvement of personal information protection awareness in a subtle way, so as to take the initiative to

require relevant companies and departments to protect personal information, and force them to do something in information protection.

4.2 Give Users the Technical Initiative to Delete Personal Data Unilaterally

In the process of designing web applications, users should be provided with a new option: the option to close the data connection to the account. Users can use this function to erase the information they do not want others to get from their accounts. After applying this function, the user's historical usage information on the platform will be disconnected from the account, and the platform and the advertiser can no longer track the user through the trace. Users can independently close the functions of personal information tags such as occupation and education level that are used to place relevant advertisements, cut off the connection between the data from third-party software and advertisement placement, and can also block the corresponding advertisement topics. In this way, the advertisements that users see are no longer unilaterally determined by the platform and advertisers, and they can also be included in the decision-making layer and be personally customized within the range of choices provided by the platform. This is especially applicable to the safe handling of personal information data after the epidemic, to prevent the personal information collected during the epidemic from being used for commercial purposes and infringing on people's legal rights.

4.3 Balance the Business Demands and Social Responsibilities of the Company

At present, Alibaba and Tencent have become "super platforms" on the Internet. The expansion of their influence means a change in social roles, and with them more social responsibilities. There is no doubt that commercial companies pursue commercial interests, but they must fully consider the balance between commercial appeals and public interests: in terms of the right to know, a clear, complete, and unbiased user agreement itself is a respect for users' right to know; in personal information In terms of the right of data, users have the right to be forgotten and can choose whether to collect or disclose their own data; during and after the collection of information, users should have the right to know and verify and delete personal information at any time; in terms of the right to choose, accept Or do not accept certain terms in the agreement, the terms should not be tied to each other, and the user should have the right to freely choose each one. In this process, the platform must also actively cultivate users to actively improve their media literacy and legal awareness, and establish a benign two-way trust relationship with users. If the ideals of public reason are combined with related interests, that is, common interests, then we have enough ability (through a priori reason) to form a normative standard that can determine the needs of public interests (Mark J Taylor & Tess Whitton,2020).

4.4 Update Laws and Regulations in Time to Stimulate Platform Governance

The key to the problem is that enhancing security does not mean protecting privacy, and enhancing security will also pay the price of privacy(Agrawal,A.,Gans,J.,Goldfarb,2018). The collection of social relationship data by the health code reveals that a large amount of private information has been collected by users without their knowledge for a long time. The user does not fully understand the specific meaning of the text involved in the process of concluding the agreement between the two parties, and the user does not necessarily want the relevant platform to continue to obtain information such as their own address book and call records, but the current situation of continuous access to personal information has emerged. Even if users do not agree, it is difficult to find relevant laws and regulations or departments to give feedback and make suggestions, which also shows the lag and one-sidedness of current relevant laws and regulations. For example, during a major epidemic, most patients are worried about the impact

of the leakage of diagnostic information on their lives (Yan Li, Wu Heqi,2020). But usually the lag of the law makes it impossible for patients to defend their rights, and they can only temporarily suffer the secondary mental harm caused by this. The EU Directive has more specific provisions on the collection and use of user information on social media platforms. The term "consent" is interpreted precisely, and the data subject must know and freely choose consent(Fan Wei,2016). On this basis, it has been refined, including the burden of proof regarding the consent to the data controller and the data subject's right to withdraw his consent. In contrast, the EU's regulations on the protection of personal information and the right to know of users are more specific. Putting the burden of proof on whether the user subject voluntarily makes a specific, clear, and definite consent is placed on the data controller side. In practice, the data controller can more respect the user's right to know, and it will be more important when setting the user's consent policy text. Think more about how to make users truly make voluntary, specific, clear, and definite consent, so as to complete the collection of evidence to the point where it can be proved. In this way, how to remind users to review the personal information protection policy and how to set up a service single option window can be actually implemented.

The meaning/scope of personal privacy information has been broader than the definition in the US law(Goddard,M,2017), and relevant departments urgently need to establish a real-time legal update mechanism to further regulate the protection of personal information. The personal information protection policy requirements for online platforms should be improved, the personal information protection safety certification qualifications of commercial companies should be strictly regulated, administrative penalties should be imposed on platforms that violate the regulations, and rectification within a time limit should be ordered. And every user should also play their own supervisory role and work with the government and enterprises to create a clean and upright network environment.

5 Conclusion

The health code is an electronic passport for individuals during the epidemic. It carries a lot of personal information and should be highly valued by users, enterprises and the government. However, at this stage, the dilemma in this area is worrying. The lack of user information security awareness, media literacy, and legal literacy, imperfect laws and regulations, and the inclination of business interests of the company all pose great threats to personal information security. In the era of big data, information resources that are so important to personal information are related to everyone's personal safety. Multi-party cooperation is needed to jointly help protect information security, so as to minimize the negative impact of information leakage. The protection of personal information is blocked and long, and the rule is coming.

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Factors of the Sustainable Employment and Heterogeneous Effects on People with Disabilities: A Comparison of Urban and Rural Areas

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Abstract: The sustainable employment is essential to protect the developmental right of the urban and rural people with disabilities. The paper investigates the causes and heterogeneous effects of employment of urban and rural disabilities based on the data of the fifth round China residents' income project. The result shows that the married, self-rated healthy, non-participating in the minimum living security, and male disabled people with party membership obtain better employment status than other groups of disabled people. However, the potential working experience of rural disabled people is more effective than that of urban disabled people. Therefore, we should actively formulate differentiated policies for human capital investment, political guidance and social support to achieve the goal of sustainable employment for the people with disabilities in urban and rural areas.

Keywords: Sustainable Employment; Urban-rural segmentation; Heterogeneous effects

1 Introduction

The living conditions of disabled people in China have improved significantly, but the gap of employment and living conditions of disabled people in urban and rural areas are gradually expanding since the reform and opening up. According to the monitoring data of well-off life for disabled people in 2013, the per capita disposable income of disabled people in urban areas was 15,851.4 yuan, and the per capita net income of disabled people in rural areas was 7,829.9 yuan. The income of disabled people in rural areas was much lower than that of disabled people in urban areas, and the poverty rate of disabled people in rural areas was more than twice that of the general population. To clarify the genetic difference of urban and rural employment for the disabled, it is reasonable and accurate for the disabled poverty alleviation policy premise, this study used the fifth round China resident' income project, combined with Probit model and interaction analysis to investigate the perspective of urban-rural segmentation employment for the disabled cause and effect, to answer the following questions: (1) the commonness and difference between the root cause of the urban and rural employment for disabled persons;(2) the urban-rural segmentation effect of employment causes of disabled persons;(3) gender difference effect of employment causes of urban and rural disabled persons.

In recent years, micro-level empirical studies on the factors affecting the sustainable employment of disabled persons have achieved rapid development, mainly in the following aspects: (1)The intermediate mechanism of the relationship between disability and employment status was gradually being explored (Echarti,Schuring & O'Donoghue,2020).(2)Factors of sustainable employment policy and differential effects of the disabilities were gradually revealed (Rotarou & Sakellariou,2017; Mitra,2016).

Specifically, researchers analyzed the relationship between different types and degrees of disability and variables such as employment status, willingness and stress (Davis et al.,2019). As Mitra and Sambamoorthi(2006) had pointed out, disabled persons with hearing loss, expression or movement

disorder are more likely to be employed than disabled persons with mental illness. Some scholars, starting from the social model, investigated the employment gap among the disabled by exploring their health status, personal characteristics and social environment, and found that economic and policy environment had a weaker impact on employment than health and personal characteristics (Shandra,2018; Cregan,Kulik &Bainbridge,2017). Using data from the 2009-2011 U.S. community survey, Scholars found that the employment gap between women, married people and people with a graduate degree who are disabled and non-disabled is smaller (Sevak,Houtenville,Brucker& O'Neill,2015).Besides, Sevak and Khan (2016) pointed out that vocational rehabilitation applicants with psychiatric disabilities have longer periods of nonemployment than individuals with physical disabilities one.

However, empirical studies about the sustainable employments of Chinese disabilities are relatively scarce, and only a few micro-level empirical studies on employment status of disabled persons at the national or local level are involved (Wang&Liu,2017). In view of the above limitations, based on the national survey data of the fifth round China resident' income project, interactive analysis was carried out to investigate the influencing factors of the employment status of urban-rural disabled people by combining institutional and self-induced factors.

2 Data and Methodology

2.1 Data sources and research samples

The data are from the fifth round of "China Household Income Projects (CHIP)" of Beijing normal university in 2014. The CHIP project team will stratify by region and collect CHIP samples according to the system sampling method. The samples cover 18,948 households selected from 126 ci ties and 234 counties in 15 provinces, and 64,777 individual samples. According to the national regulations on working age at the time of the survey, samples aged between 16 and 60 were selected in this study. The results of a survey (manual interpretation of disability questionnaire, including different levels of limbs, perceptual disorder, spiritual mood disorders and mental retardation, whether normal work, study and daily life produce functional disorder), combining premises after the above variables and data analysis, into the towns study sample of 11781, the rural sample for 23188, samples of 1036 for the disabled, the non-disabled sample was 33,933.

2.2 Variables and descriptive statistics

Table 1 grouping variables according to household registration and disability status, the results show: First, in 2013, the employment rate of urban and rural disabled persons was respectively 51.28% and 60.81%the employment rate of rural disabled persons was higher than that of urban disabled persons. This may have something to do with the fact that the employment of disabled persons in rural areas is mainly engaged in agricultural production, while the employment of disabled persons in urban areas has more forms and flexibility.

Table 1 Descriptive Statistics of Variables

		urban		Rural	
	Variable Description	Disabled	Nondisabled	Disabled	Nondisabled
		Mean /proportion		Mean /proportion	
Employment status	Unemployment=0, employment=1	51.28 (0.50)	78.60 (0.41)	60.81 (0.49)	79.05 (0.41)
Register	rural=0,urban=1	-	-	-	-

Self-rated health	1=very bad, 5=very good	2.84 (1.12)	4.13 (0.76)	2.89 (1.23)	4.14 (0.77)
Party membership	Non-party member=0, Party member=1	17.22 (0.38)	18.17 (0.39)	5.37 (0.23)	5.36 (0.23)
Education years	Years of formal education	10.20 (3.57)	12.04 (3.09)	7.62 (3.14)	9.13 (2.73)
Potential working years	Years=educated time-6	26.72 (10.27)	21.49 (11.70)	28.15 (10.70)	22.02 (12.67)
The minimum living security	No=0,yes=1	20.88 (0.41)	2.2 (0.15)	21.36 (0.41)	2.47 (0.16)
Gender	Females=0, Males=1	60.44 (0.49)	51.67 (0.50)	61.20 (0.49)	53.70 (0.50)
Number of siblings	Immediate family members	2.41 (1.56)	1.91 (1.50)	2.56 (1.46)	2.29 (1.48)
Marital status	Not married=0, married=1	84.25 (0.37)	85.83 (0.35)	78.50 (0.41)	79.90 (0.40)

Note: CHIP employment status is measured by the following indicators: Your employment/study status at the end of 2013 is(1)employment(Including reemployment after retirement);(2)Retired personnel of government organs and institutions;(3)Retirees from enterprises and other units;(4)Student;(5)Unemployment / job-waiting;(6)Household enterprise;(7)Women on maternity or breastfeeding leave;(8)In the long sick leave;(9)Other members who do not work or go to school. In order to avoid the expansion of self-reported bias, the research takes the clear choice of "employment" as the basis for judging residents' employment status.

Second, Table 1 shows that the average education level of rural disabled people is the lowest. On average, non-disabled people have about 1.5 years more education than disabled people. In terms of potential working experience, rural residents have more potential working experience than urban residents, and disabled people have more working experience than non-disabled people. The potential working experience of disabled persons in rural areas is about 28 years, that of non-disabled persons in rural areas is 22 years, that of disabled persons in urban areas is 26.72 years, and that of non-disabled residents in urban areas is 21.49 years. The education level of disabled people is lower than that of non-disabled people. Urban and rural disabled people have worse self-rated healthy than non-disabled people. The proportion of party members among disabled and non-disabled people is similar, but there is a significant gap between urban and rural areas: the proportion of party members among urban residents is about 18%, while that among rural residents is only about 5.3%.In terms of the minimum living security, the proportion of urban and rural residents with the minimum living security qualification is close, and the proportion of disabled people with the minimum living security is much higher than that of non-disabled people.

Thirdly, in other important control variables, the proportion of disabled men is higher than that of non-disabled men. In terms of family background, there are more disabled siblings than non-disabled siblings. Finally, the proportion of married disabled people is lower than that of non-disabled people.

3 Results

Model 1 to model 5 in table 2 respectively show the influencing factors of employment of disabled persons and urban-rural segmentation.

Model 1 shows that education has no significant effect on the employment of the disabled, but the potential working experience can help to improve the employment of the disabled, which shows an inverted U-shaped change that first increases and then decreases. Model 3, model 4 and model 5 respectively show that there is no urban-rural difference in the effect of education and the minimum living security on the employment of disabled persons, but the effect of working experience on the employment promotion of disabled persons in urban areas is weaker than that in rural areas. Through model 2, the number of years of education is further divided into four groups: less than 6 years, 6-9 years, 9-12 years and more than 12 years, indicating that education plays a certain role in the employment of urban disabled persons, but has no significant effect on the employment of rural disabled persons. The employment status of disabled people with other education levels is significantly lower than that of young people receiving higher education, indicating that education has a certain promotion effect on the employment of disabled people.

Secondly, model 1 shows that health can help to improve the employment of the disabled: when the disabled self-rated healthy improves by one level, the employment probability of the disabled will increase by 0.23 ($p<0.005$).Third, the employment rate of disabled party members was 0.181 higher than that of non-party members ($p<0.01$).The minimum living security significantly inhibited the employment of the disabled, with a marginal utility of -0.123 ($p<0.005$).As for other control variables, model 1 shows that there is significant gender discrimination in the employment of urban and rural disabled residents. The employment rate of male is higher than that of female, and that of married disabled persons is higher than that of unmarried disabled persons. The number of siblings had no significant effect on the employment of urban and rural disabled residents.

Table 2 A Probit Model for Predicting Employment Status of Urban and Rural Disabled Residents

	Model1	Model2	Model3	Model4	Model5
	Estimated coefficient standard error）	Estimated coefficient standard error）	Estimated coefficient (Standard error）	Estimated coefficient (standard error）	Estimated coefficient (Standard error）
Register	-0.440*** (0.104)	0.454*** （0.107）	0.797*** （0.303）	0.148 （0.276）	-0.424*** （0.116）
Gender	0.498*** (0.093)	0.548*** （0.093）	0.512*** (0.093)	0.512*** (0.093)	0.497*** （0.093）
Number of siblings	-0.033 (0.032)	-0.033 （0.032）	-0.030 (0.032)	-0.029 (0.032)	-0.033 （0.032）
Marital status	0.724*** (0.144)	0.798*** （0.142）	0.730*** (0.144)	0.713*** (0.144)	0.724*** （0.144）
Self-rated healthy	0.309*** (0.039)	0.317 （0.039）	0.310*** (0.039)	0.312*** (0.039)	0.309*** （0.039）
Party membership	0.560** (0.184)	0.544 （0.186）	0.536*** (0.185)	0.572*** (0.186)	0.560*** （0.184）
Education years t	0.017 (0.015)	-0.413†a （0.229）	0.006 (0.017)	0.015 (0.015)	0.017 （0.015）
Potential working experience	0.035† (0.019)		0.033† (0.019)	0.040* (0.019)	0.035† （0.019）
Squared by potential working experience	-0.001* (0.001)		-0.001* (0.000)	-0.001* (0.001)	-0.001* （0.000）
The minimum living security	-0.381*** (0.106)		-0.377*** (0.106)	-0.391*** (0.106)	-0.362*** （0.121）
register* education			-0.038 （0.030）		—

register* Potential working experience				-0.021* (0.009)	—
register*the minimum living security					-0.075 （0.242）
Pseudo R2	0.164	0.171	0.165	0.168	0.164
N	1036	1036	1036	1036	1036

Note：† represents p<0.1,* represents p<0.05,** represents p<0.01,*** represents p<0.005.T represents the number of years of education divided into four groups: less than 6 years,6—9 years,9—12 years, more than 12 years, A stands for primary school culture, B for junior high school culture, C for senior high school culture, and D for college culture.

4 Conclusion

Through the fifth round China residents' income survey project to analyze and compare the causes of employment of disabled persons in urban and rural areas, The results shows that: First, whether in urban or rural areas, they are consistently show that married, self-rated healthy, non-participating in the minimum living security, and male disabled people with party membership obtain better employment status than other groups of disabled people. However, the effect of employment return on potential working experience of rural disabled persons is stronger than that of urban disabled persons. The employment effect of the education level and the minimum living security has no significant difference between urban and rural areas. Second, there is a significant gender difference in the employment effect of education and the minimum living security for disabled people in urban areas, but not in rural areas. Among them, the employment return effect of education for disabled men in urban areas is lower than that of women. The employment inhibition effect of urban disabled men participating in the minimum living security was stronger than that of women. On the contrary, there is no gender difference in the above-mentioned variables. In addition, the inverted U-shaped effect of the employment promotion effect of working experience first increased and then decreased was significant in urban disabled people, but not in rural areas.

In view of other factors of employment of disabled residents in urban and rural areas, we should focus on the following measures: First, strengthen political guidance and social support for employment of disabled residents in urban and rural areas. We will give full play to the leading role of party members in finding jobs for disabled residents in urban and rural areas, and focus on expanding the employment network for disabled residents in rural areas. We should attach great importance to the provision of family services for disabled persons and create social conditions conducive to the stability of marriage for disabled persons. Second, in the field of health, a comprehensive rehabilitation policy centered on medical rehabilitation, vocational rehabilitation and social rehabilitation should be implemented. We will further expand the network of rehabilitation institutions for disabled persons in urban and rural areas, and give full play to the role of the government, communities and families in coordinating rehabilitation and training for disabled persons in urban and rural areas.

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Research on the Effective Ways of Sustainable Development of Guan Gong Cultural Industry

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Abstract: This paper takes Guan Gong culture of Jingzhou Ancient City in Hubei Province as an example to analyze the ways of sustainable development of cultural industry, and puts forward the importance of University Library in inheriting and spreading intangible cultural heritage. In the future, we should carry forward the cultural connotation of Guan Gong culture in Jingzhou, Hubei Province. The four conclusions of the sustainable development of Guan Gong culture industry are as follows: to strengthen the propaganda of Guan Gong's cultural industry; to accelerate the research and development of Guan Gong cultural products; to extend the integrity culture of Guan Gong culture, to effectively penetrate the connotation of Guan Gong culture into patriotic education; to construct the database of Guan Gong cultural resources.

Keywords: Intangible Cultural Heritage; Guan Gong Culture; Sustainable Development; Effective Way

1 Introduction

In the past decade, China's intangible cultural heritage protection and inheritance has ushered in great development. The 2010 annual report on creative economy issued by the United Nations Conference on Trade and development (UNCTAD) regards library as an important link in the development framework of cultural and creative industries [1]. In 2011, the National Library of China held a special exhibition of Chinese classics and intangible cultural heritage, which was the first time to gather all the documents and objects, inheritors and skills of intangible cultural heritage in the library. This exhibition declared the unique and important role of Library in the protection and inheritance of intangible cultural heritage [2]. As generally known, Guan Gong is the embodiment of "loyalty" and "righteousness" of the Chinese nation. There are various forms of Guan Gong cultural communication activities in the world [3], among which the most prominent is the Guandi temple in Jiezhou, Yuncheng, Shanxi Province, and the Guandi Mausoleum of Dangyang are the most famous[4]. Among them, the Guanling temple in Dangyang is listed in the national intangible cultural heritage protection list [5].

The Guan Gong culture originated in Jingzhou, Hubei Province. The legend of Guan Gong is also listed in the intangible cultural heritage list. How did the belief of Guan Gong in the hearts of the people be formed? How did Guan Gong become known as "emperor" and "Saint" from a military general to later generations? In order to carry forward the national spirit represented by Guan Gong and its influence on later generations, it is particularly important nowadays to explore the sustainable development of Guan Gong culture, an intangible cultural heritage industrial resource.

2 The legend of Guan Gong Culture

The legend of Guan Gong includes Taoyuan Jieyi, Qianli walking alone, Guan Gong fighting Chiyou and so on. There are also a series of activities to commemorate Guan Gong on January 13 and may 13 every year. For example, the "Desheng Street" in Jingzhou City is named after Guan Gong's

victory in attacking Xiangfan Shuiyan seven armies, and "Dianjiangtai" is named after Guan Gong's military training here.

The library is a research platform for the collection, preservation and inheritance of cultural resources. Given such high importance, the library should establish a research team composed of subject librarians, university professional teachers, primary and secondary school teachers and researchers of Guan Gong tourism spot. Therefore, it is particularly important to give full play to the importance of Library in the sustainable development of cultural industry and the social service and education function.

3 Effective ways to the sustainable development of Guan Gong culture

3.1 Strengthen the transmission of Guan Gong culture brand

The government should strengthen the transmission of Guan Gong culture brand to effectively inherit and carry forward Guan Gong culture. Jingzhou Guan Gong culture is the wealth of the Chinese nation. It effectively demonstrates the spiritual monument of the Chinese nation standing firm in the world. Many local folk artists firmly remember the legend of Guan Gong. It is said that folk artists that presents Guan Gong culture are constantly draining, and the folk stories of Guan Gong are constantly disappearing. The government should strengthen the transmission of Guan Gong cultural brand, let the folk artists continue to inherit the culture of Guan Gong and organize the folk artists to study and excavate the cultural resources of Guan Gong to promote the sustainable development of Guan Gong cultural industry. The university library can also organize more comprehensive collection and arrangement of Guan Gong cultural resources. In Jingzhou, Hubei Province, Guan Gong made great contributions to China and made his culture deeply rooted in the hearts of the people. To strengthen publicity and attach importance to the publicity of Guangong cultural brand, and carry out effective rescue and inheritance is necessary. It is an important foundation for inheriting and promoting cultural self-confidence in the new era to build a cultural power and one of the important ways for the sustainable development of Guan Gong culture.

3.2 Accelerate the effective research and development of Guan Gong cultural industry

The government should accelerate the research and development of Guan Gong cultural industry, and effectively promote the development of Guan Gong cultural tourism. Jingzhou has 11 national key cultural relics protection units. Jingzhou, as the birthplace of Chu culture, has witnessed the steady development of Guan Gong culture and a good momentum of Guan Gong International Cultural Tourism Festival, from the worship of Guan Gong, the cultural festival of Guan Gong to the repair of Guan Gong garden. In the future, we should integrate the cultural resources of Jingzhou tourist attractions, concentrate the types of Guan Gong cultural resources, and form Guan Gong cultural scenic spots group, which is an inevitable trend. To promote the sustainable development of Guan Gong culture, the government should increase capital investment, introduce private and foreign capital investment, and develop diversified cultural and creative products of Guan Gong culture industry.

3.3 Extend the spiritual connotation of Guan Gong's honesty culture

The government should extend the spiritual connotation of Guan Gong's integrity culture and effectively infiltrate patriotism education in primary and secondary schools.

Firstly, to regard Guan Gong's "loyalty spirit" as the focus of publicity. He was good at financial management and accounting business before his death. So, he invented the accounting method and designed a daily accounting book. Accounting is a profession that pays attention to honesty and credit. Therefore, because of his integrity and financial skills, Guan Gong is regarded as the God of accounting

industry in China. Also, the advertising slogan of the well-known brand "Guan Gong Fang wine" says: "drinking Guan Gong Fang wine, making honest friends". They both show the connotation of integrity culture in Guan Gong culture [6].

Secondly, the loyalty spirit of Guan Gong is the basis of the development of Guan Gong culture, and the spirit of loyalty is also the core and essence of Guan Gong culture. In history, Guan Gong was regarded as a typical example of "loyalty". In the romance of the Three Kingdoms, "resigning Cao GUI Liu" showed Guan Gong's loyalty and love [4]. When Guan Yu was captured by Cao Cao, Guan Gong "was in Cao's Place, and his heart was in Han Dynasty". He was not moved by Cao Cao's reward [7]. It can be said that it is the most incisive summary of his lifelong loyalty. Cao Cao also said: "each is his own master.". There is also "Guan Gong loyalty" in Guan Gong culture, which is absolute loyalty to the superior. It is needed by the rulers of all dynasties to form a unified moral standard throughout the country. In addition, Guan Yu's loyalty is not only loyal to the emperor but also loyal to his friends. Therefore, people worship Guan Gong for his loyalty and make the culture of Guan Gong spread.

Thirdly, the local government should cultivate primary and secondary school students to be volunteer commentators of Guan Gong culture tourism spots, extend the spiritual connotation of integrity culture in Jingzhou Guan Gong culture, and deeply penetrate Guan Gong culture into primary and secondary school patriotism education to make it deeply rooted among the people. This is also one of the ways for the sustainable development of Guan Gong culture.

3.4 Digitalization of Guan Gong cultural resources

The digitization of Guan Gong cultural resources is conducive to the long-term inheritance of Guan Gong culture. According to Tang Gengsheng, director of China Memory Project Center of National Library of China, the library has the function of preserving and protecting intangible cultural heritage and disseminating intangible cultural heritage. The librarian is not only the keeper of intangible cultural heritage, but also the cultural disseminator of intangible cultural heritage [8].

The University Smart Library has complete functions and digitalizes the cultural resources of Guan Gong, which makes the cultural resources of Guan Gong pass on continuously and spread effectively [9]. For example, teachers and students participate in the collection and research and development of Guan Gong culture, construct the Guan Gong cultural resource library, and make the Guan Gong cultural resources into 3D and online classroom. The research prospect to digitalize the Guan Gong cultural resources is bright, the digitalization can better promote the sustainable development of Guan Gong cultural industry.

4 Conclusion

The cultural management system and operation mechanism formed under the planned economic system affect the vitality and vitality of cultural development. Under the influence of Jingchu culture in Hubei Province, we should strengthen publicity efforts of Guan Gong culture, speed up the development of tourism and the research and development of cultural industry, penetrate the integrity culture of Guan Gong culture into the patriotic education of primary and secondary schools, and construct the database of Guan Gong cultural resources. These methods will certainly drive the economic development of Guan Gong cultural industry and promote the sustainable development of Guan Gong cultural industry [10].

The library links the day before yesterday, yesterday and today, which truly embodies the word "inheritance". In the future, we will further strengthen the collection, preservation, dissemination and utilization of living memory resources in accordance with the requirements of the national literature

resources guarantee system. We should give full play to the importance of university library, utilize the effective support of technology to develop the cultural resources of Guan Gong in the collection, so as to promote the sustainable development of cultural industry [11].

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The Future of Grow with Food and Water: Who Owns the Water and Do We Need Water Governance

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Abstract: The permanent conflict between the search for food for the needs of society and the use of existing resources for production is frequently noticed because of advances in communication, statistical and surveys on the subject and the numbers of malnourished people in the world. Drought represents a major long-term challenge for land and water management, locally and globally, and hinders efforts to reduce poverty and hunger. The problems that justify this conflict are diverse. Studies point to causes for inadequate agricultural practices, such as excessive irrigation and deforestation, especially in scarce water ecosystems. Significant changes in water quantity and quality are evident across the world. These impacts and the changes present an ongoing risk to coupled human and natural systems and related ecosystem services. The climate change, increased production, population growth and increased consumption are justifications for the inappropriate use of water. Factors of urbanization, such as the construction of buildings, the need for a combustion vehicle for locomotion and transportation of goods, and the growing increase in paved streets, are other reasons for the loss of water. The forecasts for the next two decades are shortage of water and food, particularly in developing economies. Future growth with food and water depends on changes in guidance on how to use water in a variety of personal and production activities. This article proposes analyze this question, amplified with identification of waters owner and create a policy for the management of water.

Keyword: Water governance; Agricultural practices; Food; Climate change

1 Introduction

The difference between developed countries and those in development is huge. When the comparison between the countries that integrate the G7 (Canada, France, Germany, Italy, Japan, the United Kingdom, the United States) is made with those underdeveloped, the difference between GDP – Gross Domestic Product is a monetary measure of the market value of all the final goods and services produced in a specific time period – and quality of life is significant.

Although the world is going through the pandemic caused by Coronavirus (COVID-19), this article proposes to present the data before the production stopped in the world in March 2020. Considering the information about the world development after March 2020 compromises the objective of the article which is to analyze the problem of the importance of water in people's lives and as a source of food.

During the population's confinement period, production was paralyzed and drop in GDP leave no doubt. The return of this population to work does not guarantee the resumption of production and inventories at the same pace as before March 2020.

Mahler et.al. (2020)[96] in his study points out that in April that COVID-19 is pushing between 40 and 60 million into extreme poverty. This has increased the death toll in low- and middle-income

[96]https://ec.europa.eu/info/food-farming-fisheries/farming/international-cooperation/international-organisations/g7_en

countries, induced longer shutdowns, and increased the economic costs of the pandemic. As a result, all estimates of the impact of the virus on global poverty have shifted as well.

This study published by the World Bank shows the scale of the problem caused by the coronavirus. In it, the authors consider two possible scenarios and evaluate the reflexes in the GDP of the world economy, the most affected are low-income economies with a drop in GDP of more than 10%. Even with this drop in GDP, significant changes in water quantity and quality are hope across the world. The conflict between society's needs for food and clothing is evident and worsens with population growth and drop in GDP.

The world population is now close to 7.5 billion and continues to grow. Population growth must accompany the increase in food production and this presses the use of available resources, water is one of these resources. Anyway, identifying the owners of water, proposing measures for rational use in different productive fields and making an efficient management of this resource, is will made here.

2 The Regional Distribution of the COVID-19 – Induced Poor

Starting this part by presenting data on different countries according to their level of wealth helps to understand how world production suffers from COVID-19, and the poorest are harmed according to the World Bank[97].

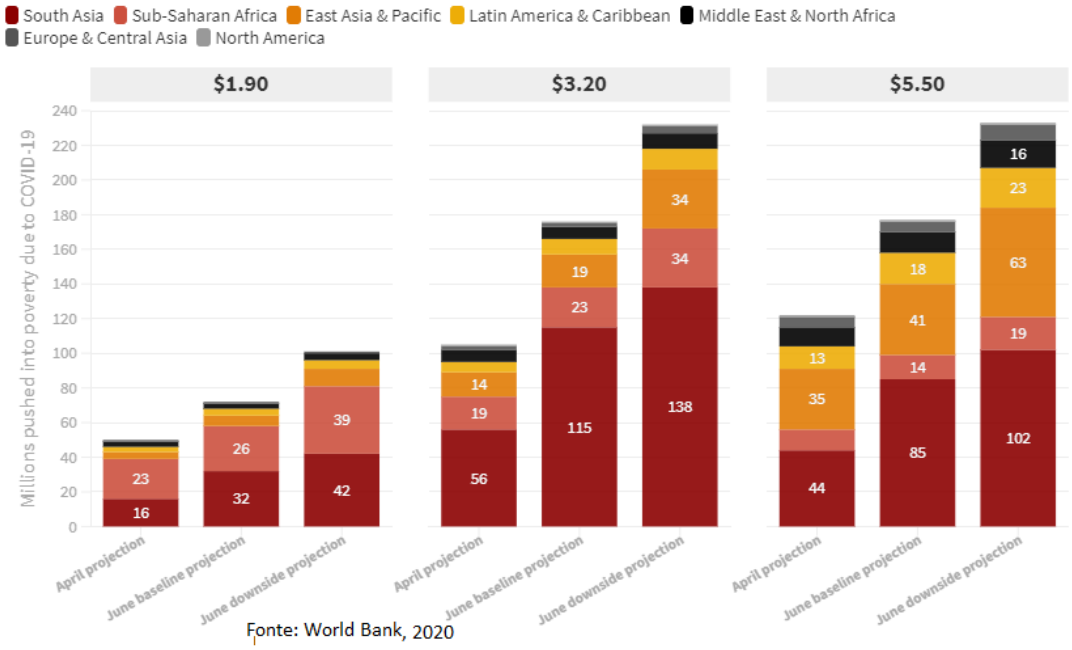

Figure 1 The Regional Distribution of the COVID-19-Induced Poor

The richest countries appear discreetly with the gray color in a small space and the other countries have a large figure and a more visible color. The projections were made by the authors and indicate how the GDP of the poorest countries remains with the fall in economic activity. Once the data is consolidated based on the daily lives of these countries, they are worse than the projections.

Eating habits, production costs and final prices for people around the world are different. Even so, a person living on less than $ 2.00 a day compromises their physical and intellectual development. Analyzing the figure, the number of new poor at $ 1.90 is not a subset of the new poor on the highest

[97] https://blogs.worldbank.org/opendata/updated-estimates-impact-covid-19-global-poverty

poverty lines. If someone in sub-Saharan Africa sees their daily income drop from $ 2.00 to $ 1.50 because of COVID-19, they will be an additional poor person in the $ 1.90 line, but not in the $ 1.90 line. 3.20, where they were counted as poor before and after the pandemic (Mahler et.al, 2020).

Table 1 Real GDP

Region	2017	2018	2019	2020(f)	2021(f)
World	3.3	3.0	2.4	- 5.2	4.2
AVECO	2.5	2.1	1.6	-7.0	3.9
United States	2.4	2.9	2.3	- 6.1	4.0
Euro Area	2.5	1.9	1.2	- 9.1	4.5
Japan	2.2	0.3	0.7	- 6.1	2.5

Fonte: World Bank, 2020 (AVECO = Advanced and Economies)

As shown in Table 1, the world economy grew by 3.3 in 2017, to 3.0 in 2018 and a final figure of 2.4 in 2019. With the Coronavirus pandemic, forecasts indicate a fall of -5.2 in 2020 and a growth to 4.2 positive in 2021. The figures for other economies such as the United States show figures of 2.4 for 2017, 2.9 for 2018 and 2.3 for 2019. The fall is in the forecast for 2020 with -6.1, higher than the average forecast for the world economy. More important than these data for the growth or fall of GDP is how much these countries will consume natural resources to generate the products needed for their society. Among the natural resources is water, the subject of this article.

Table 2 Real GDP – Poor Countries

Region	2017	2018	2019	2020(f)	2021(f)
Sub-Saharan Africa	2.6	2.6	2.2	-2.8	3.1
Nigeria	0.8	1.9	2.2	-3.2	1.7
South Africa	1.4	0.8	0.2	-7.1	2.9
Angola	-0.1	-2.0	-0.9	-4.0	3.1

Fonte: World Bank, 2020

As may be seen in Table 2 Sub-Saharan Africa has numbers very close to those of some developed countries, but the need for growth in very high values must be repeated more frequently so that the population has a better quality of life. The results presented show that in 2017 its growth was 2.6 and was repeated in the following year. For 2019 there was a drop to -2.8 due to climatic, political factors and lack of structural investments. The forecast for 2020 expects to drop to -2.8 and with a slight increase in the forecast for 2021 reaching a total of 3.1.

Nigeria shows very modest values in 2017 of 0.8, rising to 1.9 in 2018 and slightly increasing to 2.2 in 2019. The fall to 2020 predicts a value of -3.2 and a slight increase to 1.7 in 2021, according to this World Bank forecast for 2021.

Knowing how much of this growth represents in terms of consumption of natural resources, especially water, is important for planning the rational use of this resource, avoiding the fall in agricultural production caused by the lack of water.

A frequent situation where a country imports food from another country, it is also buying the water that was used to produce that food. So, when consumers buy food that country imported, he is taking home some of the water that the exporting country used to produce that food.

3 Water: Where is Basic Resource Located

The Earth seen from space is blue because of the seas that surround the seven continents. That's 326 million cubic miles of endless blue sea occupying the expanse in between our seven continents

(Castelo, 2020). With this excessive amount of resources, it is possible to deduce that there will be no problem for human beings with the scarcity of water, almost 70% of the earth's surface is covered in it.

Considering the current stage of technological evolution in several fields of science, the ocean is still little known. Basically, humanity explores it as a way of transport with ships carrying goods or carrying out fishing to feed society. Water location may be seen on Table 2.

The knowledge of the depth of the ocean reaches only 5%, and the depth of the ocean is 11 kilometers (7 miles), which demonstrates the abundant capacity of water to serve humanity. The concentration of sodium in seawater is very dangerous for human health. Therefore, it is necessary to do the desalination so that it is drinkable and used to quench thirst, irrigate plants and serve for personal hygiene.

Water location may be seen on Table 3; but the percentage of the amount of drinking water on the planet are very small. What reassures humanity is that the planet is very large and the low percentage of availability of drinking water can satisfy all of humanity. Of the waters occupying 70% of the earth's surface, only 3% is considered fresh water. Furthermore, about 2.6% of this freshwater is inaccessible for humans. They're either locked up in polar ice caps and glaciers, stored in the atmosphere or soil, are highly polluted, or are too far underneath the earth's surface to be extracted (Castelo, 2020).

About 69% of the fresh water is in form of ice cap and glacier in places like the Antarctic and Greenland ice sheet, further reducing the quantity of the available drinking water. So, if only 31% of the fresh water is available for drinking, this means 31% of 2.5%=0.00775, which equates to less than 1%. Therefore, less than 1% of the earth's water is drinkable. In some areas, the glacier often melts in summer to provide additional drinking water. However, the amount of water from glacier melt is not sufficient to increase the available fresh water to above 1% (Misachi, 2018).

Table 3 Worldwide Water Supply

Water Facts	Water Supply
groundwater	Almost all the available freshwater (excluding glacier) is groundwater. Groundwater provides approximately 40% of the drinking water.
the surface freshwater	Another important source of drinking water is the surface freshwater. The surface water is held in lakes, rivers, dams, and streams. Although rivers and dams are critical for water supply, they contain only 1% of the freshwater.
atmospheric vapor	About 0.001% of the freshwater is contained in the form of atmospheric vapor, small amount considering its important function in weather.
rains and snow	The rains and snow are crucial in replenishing the surface water. The atmospheric waters recycle several times in a year between the atmosphere and the earth's surface, leading to rains and snows.

Source: adapted from Misachi, 2018.

Nearly 1 billion people do not have access to safe and clean drinking water for daily consumption. This fact ends up generating 3.6 million people killed annually from diseases resulting from unsafe drinking water. These people are part of third world countries where clean water is not provided for everyone.

The urban population currently consumes a lot of water and in a small space because of the urban concentration installed in residential and commercial buildings. The source of this water is rain and reuse or treatment after use, which is redistributed for consumption again.

Climatic factors interfere with precipitation or rain, this is decisive in the supply of water. Protecting and managing groundwater and surface water is an essential task in ensuring the availability of drinking water.

Water management policy is necessary for the resource to be better distributed, the population to be educated to consume just enough and without waste and to create production mechanisms with rational processes so that each drop is well used.

4 Duration of Drought and Food Production

Much of the products manufactured in the world have parts from different countries and their consumption does not always happen in the same place of production. World Development Report (2020)[98] cites the example of the $ 4,995 Pedego Conveyor electric bicycle, produced in Vietnam with parts from around the world. Gears, pedals, brakes and other components are shipped from China, Europe, Indonesia, Japan and other economies to Vietnam for assembly, and the bike itself is shipped to the United States for final sale. Approximately 60% of the bicycle's value is from outside Vietnam (World Development Report, 2020)[99] .

This production chain, involving several countries in the world, generates negative externalities for the global environment. Batteries and tires, some of the most damaging parts to the environment, are manufactured in a country that does not have legislation for environmental protection.

Think about it including the other products that are part of a country's economy, with a volume of technical and human resources and the generation of wealth it provides. Agriculture, for example, generates job and income, moves a series of other producers in its chain, such as agricultural machines, seeds and seedlings for planting, transporters, producers of packaging, fertilizers and other resources.

World Development Report (2020) cites as an example of this potential in wealth generation that in 2015, US agricultural producers contributed US $ 136.7 billion to the economy and represented 2.6 million jobs. About half of the revenue comes from livestock production. Other sectors related to agriculture in the food supply chain contributed US $ 855 billion in gross domestic product and represented 21 million jobs.

As mentioned, climatic factors interfere with precipitation or rain, which is decisive in the water supply. In regions with greater frequency and duration of drought, the tendency is for food production to fall, reflecting an increase in malnutrition. The increase in temperature caused by global warming intensifies the incidence of burning of natural forests, as will be seen next summer in several regions such as: Australia, Portugal, California (USA), India, Brazil, which will face a problem with drought, depletion water supplies for irrigation and expand the distribution and incidence of pests and diseases in crops and livestock.

Ideally, raw materials should be purchased as close as possible to natural resources. This leads to savings in transport and factors that generate pollution and global warming, for example. Another advantage, the final price of the product would be reduced and help in the process to create other food producing regions.

Much water is consumed in food production. Agriculture is the production sector that consumes more water, around 93%. The industry consumes about 4% and the rest is consumed by the population. The country that imports this food has an advantage because it is consuming the water of the exporting country and saving its own. The water incorporated in cereals and oils that will be consumed by people and animals, incorporates large amounts of water.

[98] https://openknowledge.worldbank.org/bitstream/handle/10986/32437/9781464814570_Ch03.pdf
[99] https://openknowledge.worldbank.org/bitstream/handle/10986/32437/9781464814570_Ch05.pdf

Approximate crop water requirements to produce food harvested as alfalfa consumes 900 to 2000 kg of water per kg of food produced. Corn / maize consumes 1000 to 1800 kg of water per kg of food produced. These foods are then consumed by both humans and animals. To produce steak, you must have 15,000 kg of water per kg of food produced. When the country imports these products, it takes all this amount of water with it, saving yours that can be used in other activities.

5 Who Owns the Water

Technological changes, greater cargo capacity for ships, planes, trains and improved communication processes have increased global trade. Growth in global economic activity has generated a greater demand for various products, such as food. This increased water consumption and countries that import food have benefited because they save their water.

Who owner water? That is the big discussion today. Find the owner of this water so that management policies can be put into practice and everyone will benefit from the rational use of this scarce resource in several regions. For example, water is a valuable asset in Tunisia - especially in the province of Kairouan, one of the warmest regions in Tunisia. Rain is becoming increasingly rare there. Better water management should help to resolve tensions between farmers (DW, 2020).

As mentioned earlier in this article, urbanization factors, such as the construction of buildings, the need for a combustion vehicle for locomotion and transportation of goods and the growing increase in paved streets, are other reasons for the loss of water. The new habits acquired with technological developments and other amenities created by the market, requires energy consumption to move these devices. This energy comes from dams built on rivers and provide electricity for this comfort.

In this case, the examples of dam construction are numerous. The Three Gorges Plant in China generates enough energy to sustain its average GDP of 7%, but it has side effects such as the 32.0 million people homeless due to the rains and the lack of drainage capacity for this water. Another example, Ethiopia and Egypt are fighting for water from the Nile, some want electricity, others need water. The construction of the Renaissance dam has led to violent disputes between Ethiopia and Egypt and Sudan (DW, 2020).

This resource belongs to the territorial authority of each country. Surface water belongs to the citizen who occupies that location. Groundwater complies with larger legislation at the federal level. The concern is with the rational use of this water so that everyone, both locally and globally, can enjoy and not have a problem with the lack of water.

With global water management, conflicts like that between Ethiopia and Egypt and Sudan would be avoided. In addition, when consuming imported food, the price of the product should incorporate a certain value to be used in management policies for this resource[100].

Major beverage producers are among the largest consumers of water. They are large companies that help any country to have income and jobs, but with a high cost of environmental degradation due to the large-scale use of water in the production of soft drinks and beers, mainly.

The countries where these manufacturers are installed have no interest in banning or creating rules for the consumption of water, since they generate taxes, move the economy, employment and income for the population.

[100] https://www.dw.com/de/%C3%A4thiopien-und-%C3%A4gypten-streiten-um-nil-wasser/av-51939577

Very populous countries are among the most interesting for these and other manufacturers. The lack of efficient management to control water use and other activities is common in these countries.

As there is weak supervision, there is an abuse in the search for more production and an easy gain of wealth, so accidents are inevitable. Low cost and abundant labor attract industries with the main objective of exporting to generate more profit. Examples are not lacking in different periods of history. Tragic incidents, such as the April 2013 collapse of the Rana Plaza building in Dhaka and the garment factory it housed, where 1,134 lives were lost. Calls for the building to close were ignored by clothing makers, residents and shopkeepers (World Bank, 2020)[101].

6 Why Do We Need Water Governance

Changes in people's habits, urbanization, technological availability, congestion, growth in the supply of goods, lead to an increase in water consumption. On the other hand, deforestation and climate change reduce rainfall in some regions or intensify in others.

This fact makes the drought more intense in the region with lack of precipitation and with less impact in flooded regions. Extreme precipitation events are projected to increase in a warming climate and may lead to more severe floods and greater risk of infrastructure failure in some regions (Lall et al. 2018).

In Brazil, on January 1st to August 14th, 32,728 fires were recorded by the National Institute for Space Research (INPE) in the biome. Fire is normally used to clear the land after deforestation. The smoke triggers a series of respiratory problems in those who live in the region, which also generates public health expenses and economic losses due to the absence of employees. The effect of these fires was noticed in several countries around the world.

To reduce the impact of the lack of water, it is necessary to plan and predict how the population will be with the drastic reduction in the volume of water. Water management strategies designed in view of an evolving future we can only partially anticipate will help prepare the Nation for water- and climate-related risks of the future (Lall et al. 2018).

The authorities must plan the areas for housing, the physical structure, areas of shade and cooling for the construction and the use of technological resources that assist in the reduction of water consumption. Although this is a recommendation for strategic water management, when planning to build a factory in a region, they want to know if the place has an abundance of water or not, especially if the product is a soft drink, juice or metallurgy.

To facilitate water management, data on rainfall, consumption, climate history, water and sewage treatment structure, reach of the supply network, topography of the land, total of industries installed in the region, total housing, type of housing, total buildings, parks, area with trees, data on people's water consumption, industry consumption, so they give so much information that should be made available to everyone (Santos, Amorim, Guevara; 2017).

The quality of the information, the participation of research centers and good technicians to analyze the data, represent the principle that water management will be successful. This information changes over time and new factors must be considered so that the planning is always up to date. It is important that everyone involved should participate and know the decisions made. For example, for an industry, the amount of water available and its supply capacity must be informed. This facilitates production planning and the industry's business success.

[101] https://www.worldbank.org/en/publication/global-economic-prospects

Feeding the population is always a challenge because it is a matter of survival. Agriculture is the production sector that consumes more water, around 93%. The challenge until 2050 of feeding almost 9 billion people is to produce more food while using less water, building resilience for agricultural communities to deal with floods and droughts, applying clean water technologies that protect the environment (FAO, 2020)[102].

A negative measure is to subsidize fishing and agriculture because the environmental damage is greater caused by the growth in deforestation and in frequent fishing. Deforestation is done to increase the planted area and consequently obtain more subsidies. In addition, soil erosion and chemical runoff in bodies of water are greater than they would otherwise be, and natural biodiversity decreases.

Trade creates advantages for increasing production with land degradation for agricultural use, one of the main causes of forest loss. Only four products - soy, cattle, palm oil and wood products - are responsible for 40% of global deforestation, at an average rate of 3.8 million hectares per year (FAO, 2020).

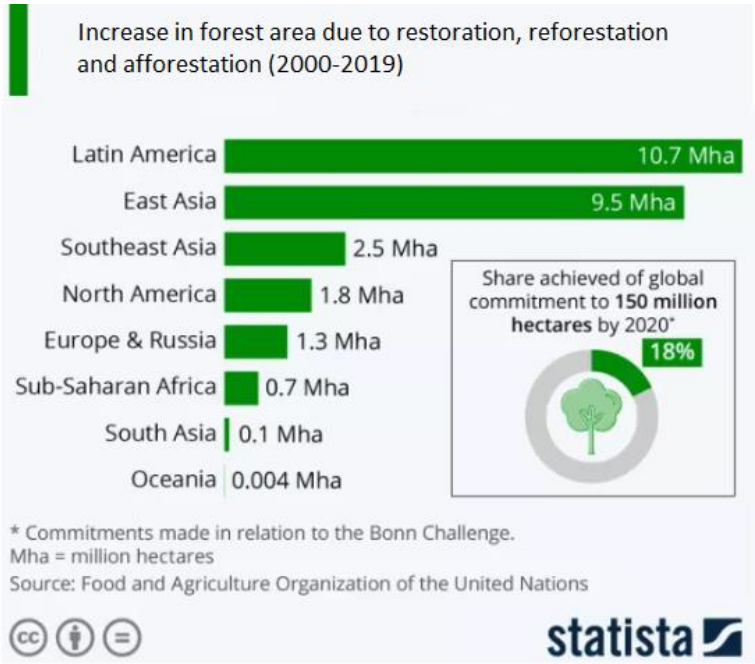

Figure 2 (Slow) Progress in Global Forest Restoration

With the restoration of the forest, the gains for the environment and people's lives are significant. People take care of reforestation, this means jobs, income and more food to satisfy their needs. There are people around the world who live on firewood for cooking, heating water for bathing and cleaning in general. To obtain firewood, people like southern Sudan use reforested wood to have fire to cook their food (Broom, 2020)[103].

However, many other commodities - such as cocoa, coffee, spices, vanilla, bananas, cut flowers, orange juice and natural rubber - are facing growing global demand that threatens the environment at the critical points where these products grow.

[102] http://www.fao.org/3/a-i1688e.pdf
[103] https://www.weforum.org/agenda/2020/07/tree-cocoons-reforestation-harsh-climates/

Indirect strategic measures for water management include modern approaches to genetic improvement and the use of new genes from wild crop relatives that make it possible to develop crops with higher yields and tolerant to climatic stress caused by the lack or total scarcity of water. Irrigation systems modern so that they are more productive and less harmful to the environment with the right amount of water for the plant and without waste.

The population must be oriented towards the rational use of water, how to preserve streams and rivers, forests and trees that protect water sources, how to make conscious planting and adapted crops for each region, how to increase water productivity in domestic, industrial and agricultural.

7 Conclusion

In 1950, the world population was estimated at about 2.6 billion people, it reached 5 billion on July 11, 1987. In 37 years, the world population has doubled and food production has followed this growth, reflecting the fall in prices of food by the year 2000 and with an increase in the price of grains from 2004. The world population reached the mark of 6 billion people on October 12, 1999. In 2019, it is estimated at approximately 7 billion and may reach a top of about 9.7 billion by 206, and so then may start to shrink (IHME, 2020)[104].

In the meantime, the challenge continues between population growth and increased food production. The future depends on the production of food and water for this purpose. The data presented over the period of forty years the world population has doubled and this happened because of the food supply. Deforestation has been expanded, giving way to agriculture and cattle raising. This requires a large amount of water to generate the volume of food needed to satisfy people's needs in a Sustainable way (FAO, 2017)[105].

Food habits, production costs and final prices for people all over the world are different. Even so, a person living on less than $ 2.00 a day compromises their physical and intellectual development.

The article also identified that low-income countries have little availability of good quality water for daily use and for growing their food. This harms society as a whole, because the increase in the number of diseases caused by malnutrition increases the budgetary costs of health.

The volume of water in the oceans represents 326 million cubic miles of endless blue sea, this does not mean that the world population will not have problems with the lack of water. This water has an excess of salt that damages people's health. With technological developments, this water is treated in several regions so that it is consumed as drinking water.

Another result of this article is the lack of knowledge of the oceans, mainly of its depths, even with aquatic robots that can dive and withstand the pressure of water in depth. The use of the oceans is summed up as a means of transport with ships carrying goods or fishing to feed society. Knowledge of the depth of the ocean reaches only 5%, and the depth of the ocean is 11 kilometers (7 miles), which demonstrates the abundant capacity of water to serve humanity.

Climatic factors, deforestation, misuse of land, disordered urbanization, interfere with precipitation or rain, impairing the water supply. This causes an increase in drought periods in several countries, a reduction in the supply of food, an increase in diseases caused by the consumption of clean and non-potable water (Baldini, 2020).

[104] https://www.sciencedaily.com/releases/2020/07/200715150444.htm
[105] http://www.fao.org/3/a-i7959e.pdf

Who owns water? The article identified clean drinking water for drinking and other purposes. To obtain water the population has to travel a greater distance or the cost to treat the water and distribute it in the urban area, is also becoming more expensive.

The need for water management is to prevent the scarcity of the product from compromising human survival and the paralysis of economic activities, especially those related to agricultural production, particularly in development regions like Latin America and the Caribbean (OECD, 2012).

The strategy proposed by this article considers that the actions must be elaborated on several fronts, a multidisciplinary action with measures to control the emission of pollutants and climate targets to reverse global warming or at least soften the impacts. Another measure is the control of the water that is available on the planet, without interfering in the sovereignty of each nation, but with measures of orientation for rational use and strict rules in case the country does not comply with what was determined.

Changes in the planting process, researching crops that are more resistant on less fertile land and being able to cover with less water, propagate irrigation techniques that use less water in agriculture. Finally, a water management policy at the global level and if necessary, include a percentage on the price of products traded on the international market to subsidize working groups and remunerate countries that export agricultural products that consume water from their territory. So, the question is are there alternative pathways to overcome the challenge of food for all (FAO, 2018).

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Sustainable City Development: A Brazilian Goal Plan in Practice

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Abstract: By 2050, two-thirds of all humanity will live in urban areas; as a result, sustainable development will become fundamental for the management of cities. Making cities sustainable means creating opportunities, safe and affordable housing, and building economic and resilient societies. To achieve sustainable development, it is crucial to harmonize three core elements: economic growth, social inclusion, and environmental protection. These components are intertwined and fundamental to the well-being of individuals and societies. This research portrays the Municipal Goals Plan as a strategy foreseen in the Sustainable Cities Program, in view of the United Nations Conference on Sustainable Development, held in Brazil in 2012 and known as Rio +20. The study has a descriptive exploratory character, the use of a case study of the municipality of Antônio Prado, located in southern Brazil, was chosen as a technical procedure testing, and describes how a small municipality could develop and apply the Municipal Goals Plan, based on the objectives of sustainable development (SDG). The results displayed in 42 months of Management (2017-2020) were very satisfactory and actually reached 90% of the 97 actions foreseen by the work teams and this mostly due to three factors: 1) the engagement of those responsible for Administrative Management; 2) the importance of planning, at both strategic and operational levels; and 3) the commitment of the teams in the execution of the actions. These three key factors for the success of the plan triggered an effective collaborative construction work, which may be called collaborative governance.

Keywords: Sustainable development; Strategy management; Sustainable cities program; Goal plan

1 Introduction

Most of the global and Brazilian population live in urban areas. The accelerated urbanization process in Brazil generated the phenomenon of Metropolization, urban occupation that surpasses the limits of cities. (IBGE, 2010)[106].

In this context of urban transformations and from the perspective of sustainable development, it is possible to say that recycling this territory is more clever than simply replacing it; after all, urban clusters can be a great instrument of restructuring for local development. (Leite, 2012). In 2012, at the United Nations Conference on Sustainable Development, the Sustainable Development Goals (SDGs) were agreed to meet the urgent environmental, political, and economic challenges our world has been facing. Among the SDG's – Sustainable Development Goals – there is the "Sustainable Cities and Communities" Goal 11 (UNSDG) which aims to make cities sustainable and inclusive. Among the targets established in this SDG, the target 11 talks about making cities and human settlements inclusive, safe, resilient, and

[106] IBGE. Brazilian Institute of Geography and Statistics. (2010) Census 2010. [R] retrieved on July 02, 2020, from https://agenciadenoticias.ibge.gov.br/agencia-sala-de-imprensa/2013-agencia-de-noticias/releases/13937-asi-censo-2010-populacao-do-brasil-e-de-190732694-pessoas.

sustainable. Brazil, along with the member countries, was a signatory and committed to their implementation until 2030. This agenda is an opportunity for the improvement of Public Management and for the consolidation of policies that promote a fairer and more supportive country. (GPS, 2013)[107].

The agenda consists of 17 Sustainable Development Goals and 169 goals that contemplate the social, environmental, and economic dimensions in an integrated and indivisible way. The implementation and success of the agenda will depend on policies, plans and development programs, which will be the responsibility of the countries and guided by them. (GPS, 2013) ².

Since cities and communities aim to become sustainable and inclusive, it is necessary to think about development in a local way, considering the specific needs and priorities of each location. (United Nations, 2015)[108].

In this sense, the Sustainable Public Management Guide (GPS) is a tool that guides the elaboration of the diagnosis of cities, to facilitate the understanding and use of the indicators of the Sustainable Cities Program. (GPS, 2013) ². Considering the importance of involving public management so as to achieve these objectives, the research seeks to answer the following question: can a small municipality develop and implement the Municipal Goal Plan based on sustainable development ends?

Thus, this study's general aim is to demonstrate how the city, the object of this study, developed a sustainable urban management tool to consolidate policies that promote a municipality with economic growth, social inclusion, and environmental protection.

In view of a concept that can contribute to the achievement of the Sustainable Development Goals (SDGs) adopted by the United Nations, the Society 5.0 will be a Hypothetical Society, in which digital transformation is combined with the creativity of diverse people to bring about problem solving and value creations that lead us to sustainable development. (Sato, 2019).

The research is structured with a brief theoretical construction on urban growth and the principles of sustainable development, followed by the justification of the methodological choice, with the subsequent results observed in the case study, as well as the final considerations.

2 Cities and the Increasing Challenge of Sustainable Development

The discussion concerning the management of cities is not recent; on the contrary, it dates to a long period in history. Managing urban centres defies politicians, philosophers, and scholars from various areas of knowledge. The history of cities shows that they have always experienced problems and glories arising from their urban formation. In the Christian Era, Rome, at its peak, had such crowded streets that horses and carriages were forbidden to transit, the only way to cross the city was on foot. (Wilson, 2009).

Despite their problems and challenges, cities have promoted important civilizing, economic and social processes. However, the same impulses that caused the first industrial revolution also brought its negative impacts, such as disordered population growth, limitations of natural resources, increased emission of polluting gases, and social and economic inequality. (Henderson, 2000; GPS, 2013²; Conti,

[107] GPS. Sustainable Public Management Guide. São Paulo, 2013. [R] retrieved on July 03, 2020, from https://www.pucsp.br/catedraignacysachs/guia-gps.htm.

[108] UNITED NATIONS (2015). ODS. Sustainable Development Goals. [R] retrieved on June, 23, 2020, from https://nacoesunidas.org/pos2015/.

2017; United Nations, 2018)[109]. Given this reality, Brazil also experiences this scenario, since 84% of the population already lives in urban areas (Figure 1) and, compared to other countries of South America and the Caribbean Region, Brazil is the region where the largest population living in urban areas is concentrated.

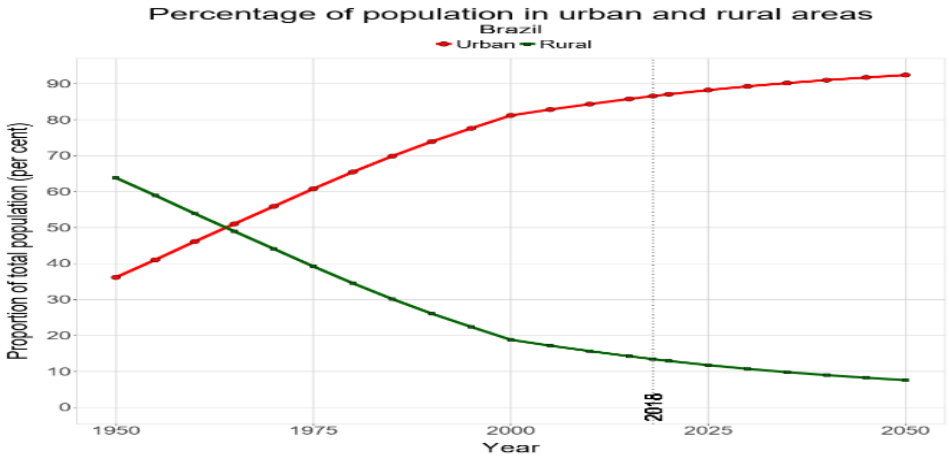

Figure 1 Percentage of the Population that Urban and Rural Areas

Source: United Nations, 2020

Considering that this accelerated process of urbanization in Brazil generated the phenomenon of Metropolization, i.e., urban occupation that surpasses the cities' limits (IBGE, 2010) [1] it is evident that the convergence of all these urban challenges requires long-term planning in order to promote a more sustainable and inclusive urban agenda. In this scenario of urban transformations, the sustainable management of cities is one of the great challenges of this century (Sachs, 2002).

Insufficient increases of tax revenue due to lower economic growth and rapid increases of social security due to aging society will be a big constraint on the sustainable development. In the baseline scenario, the deficit in the government will be increased continuously. Even if technology is developed and economy growth is up, the budget and deficit are still significantly negative issues. In this scenario of transformations, the sustainable management of cities is one of the great challenges of this century. (Nakanishi, 2019).

The first and most widespread concept of sustainable development appeared in the document entitled "Our Common Future" which defines it as one that "meets the present needs, without compromising the capacity of future generations to meet their own needs". (Bruntland Comission, UN, 1986; Elkington, 2001). However, this concept has become incipient over the years and the need to deepen this issue has been admitted. It was then that the sociologist John Elkington formulated the concept of the Triple Bottom Line (People – Planet – Profit)" or Tripod of Sustainable Development, which today is extremely widespread with the three pillars of sustainability: environmental, economic and social. Since then, science has unfolded in favour of the development of existing dimensions in the phenomenon of sustainable development. The process culminated in the adoption of the 2030 Agenda for Sustainable Development, with the 17 Sustainable Development Objectives – SDG where actually

[109] UNITED NATIONS (2018). World Urbanization Prospects. [R] Retrieved June 20, 2019, from https://population.un.org/wup/Country-Profiles/.

the 11th one refers to Cities as may be seen in Figure 2.

Figure 2 SDG 11

Source: UN, 2015

The objectives and targets are essentially global and universally applicable, considering different national realities, capacities, and levels of development, as well as respecting national policies and priorities. They need to be implemented in an integrated manner, through a transparent, inclusive, and participatory process with all stakeholders. In Brazil, it is known that the infrastructures and services established were not able to keep up with the growth of the Brazilian development demanded, so the occupation of the territories occurred mostly in a disordered manner, without an efficient and sustainable urban planning. Thus, it is appropriate to say that the construction of a sustainable city requires the preparation of long-term commitments focused on its citizens, as well as the formulation of strategic plans with systemic actions and also the development of participatory governance models.

In order to collaborate with this demand, the Centre for Future Studies of the Pontifical Catholic University of São Paulo, Brazil (NEF) established the Chair, dedicated to the theme of Sustainable Development and called Ignacy Sachs Chair of Socio-Ecological Development. Through the Chair, NEF developed the Sustainable Public Management Guide (GPS^2) for cities in order to guide the teams of the secretariats responsible for local management to develop a diagnosis, a prognosis and their strategic priorities, followed by a plan of goals for the sustainable development of cities. Hence, this research, by means of a case study, will demonstrate the actions of a municipality that seeks, through the Municipal Goals Plan, to include the city in this sustainable agenda.

3 Data and Methodology

This work consists on a Case Study of a very recent and successful City Management program at the small city of Antônio Prado, located in the State of Rio Grande Sul, in southern Brazil. Antônio Prado is centenary Italian city, with an architectural collection listed as National Historical Patrimony. The Cities Public Administration aims to ensure a responsible development and is committed to offer its citizens a management based on a Goals Plan.

The Goal Plan is to develop a planning and management instrument that may help the Public Administration to define government priorities, as well as the objectives, deadlines, and commitments of the Municipal Executive Branch. The preparation of the Goals Plan meant, first of all, investing in the improvement of public administration, in its democratic modernization and in the search for the efficiency and quality of services provided to the population, because it is directly related to the goals of sustainable development that guide the Municipal Public Administration with management, transparency and sustainability (GPS, 2016).

In order to develop the City Goals Plan, it was carried out a systemic approach to capture the interactions existing between the different fields that interact in the municipality. The Plan considered the implementation of the projects under a short, medium and long-term prospect, in order to ensure the

continuity of the programs; and for this purpose, it was elaborated in line with the Multiannual Plan and the Master Plan.

The Multiannual Plan is composed of programs, objectives, actions, physical and financial goals of an administrative nature, to enable the proper development of the municipality. In addition, the Administrative Management is reformulating the Master Plan and preparing the Urban Mobility Plan. These plans aim to ensure a sustainable development policy, which is a process of mobilization and involvement of the whole society in the formulation of policies aimed at providing better quality of life, equity, and better conditions for sustainable economic and urban development.

4 Main Results

Municipal Administration of Antônio Prado seeks the improvement and efficiency of its management, supported by viable actions that provide better quality of life to the population, enabling to balance economic development with environmental sustainability and social justice, through transparent, democratic and sustainable governance.

Thus, the Goal Plan had its starting point in the Government Management (2017-2020) with the signing of the commitment letter to join the Sustainable Cities Program. The year 2017 prioritized the elaboration of the Municipal Goals Plan with the involvement of managers of the following areas: Chief of the Cabinet, Secretariat of Administration, Finance Planning, Health, Education, Culture and Sports, Housing and Social Assistance, Works, Road and Traffic, Commerce and Tourism, Agriculture, Environment and Industrial Development. In fortnightly meetings and continuous training, 11 Goals of the 17 foreseen by Sustainable Development were acceded, namely: Governance; Equity, Social Justice and Culture of Peace; Urban Planning and Design; Cultural for Sustainability; Education for Sustainability and Quality of Life; Dynamic, Creative and Sustainable Local Economy; Responsible Consumption and Lifestyle Options; Environmental Goods; Minor, Mobility, Less Traffic; Local Action for Health; and Local Management for Sustainability.

The collaboration and cooperation of the team selected 50 indicators that would be developed in the following years, such indicators are found in the Sustainable City Program. The chosen number of indicators is foreseen for small cities, namely:

1) Women in managerial positions in the municipal government;
2) Ombudsman;
3) Transparency portal;
4) Goal program;
5) Law of access to information;
6) Municipal conferences;
7) Spaces for participation, deliberative and public hearings in the municipality;
8) Data in open format;
9) Number of families enrolled in the single register for social programs with per capita family income of up to half the minimum wage;
10) Municipal policy of assistance to drug users and alcohol addicts;
11) Aggression against children and adolescents;
12) Cases of neglect and abandonment of children and adolescents;
13) Children and adolescents who have suffered sexual violence;
14) Reports of violence against women and girls;

15) Aggression against the elderly;
16) Municipal housing policies;
17) Thefts
18) Master Plan;
19) Accessible sidewalks;
20) Cultural Centres, houses and cultural spaces;
21) Actions for the preservation, appreciation and dissemination of material and intangible patrimony;
22) Municipal public resources for culture;
23) Fully literate children up to eight years of age;
24) Demand for vacancies in early childhood education;
25) Full-time education of early childhood education;
26) Demand for vacancies in elementary school;
27) Internet access in middle and high schools;
28) Youth and Adult Education (EJA) in the integrated form of professional education;
29) Students with access to sports court;
30) Participation of family farming in crops and livestock;
31) GDP of the Municipality;
32) Companies that carry out reverse policy in the municipality;
33) Policies for the promotion of cultural activities and the production of local products
34) Jobs in tourist activities;
35) Per Capita water consumption;
36) Integrated solid waste management plan;
37) Access to household waste collection service;
38) Selective collection;
39) Amount of waste per capita;
40) Sewage network;
41) Specific legislation on environmental issues;
42) Bike lanes and cycle lanes;
43) Traffic congestion;
44) Low birth weight;
45) Child malnutrition;
46) Sports equipment
47) Basic health units;
48) Vaccine coverage;
49) Investment in preventive health; and
50) Controller General of the Municipality.

Then, the general and specific objectives for each indicator were constructed, meeting the targets foreseen according to the Sustainable Development Goals. Then, 97 actions were prepared with an initial target for January 2017 and a target intended in December 2020.The results presented in 42 months of Management (2017-2020) were very satisfactory. The execution reached 90% of the 97 actions foreseen by the work teams; the success is mainly due to three factors:

1) the engagement of those responsible for Administrative Management;
2) the importance of planning, both at the strategic and operational levels; and

3) the commitment of the teams in the execution of the actions.

These three fundamental factors of the plan triggered an effective collaborative construction, that one may very well call Collaborative Governance. The research carried out by Conti (2017) in several most representative European Metropoles, showed that Collaborative Governance Systems actually foster Sustainable Development, facilitating cooperation in the development of public policies.

Therefore, it proves to be extremely valuable for the effectiveness of the municipal plans of sustainability, as it articulates the different stakeholders in the participatory process, using several tools for building long-term planning, the involvement of different actors enables team engagement and consequently strengthens strategic planning and operational execution (Tenorio, 1998; Ronconi, 2001; Tatagiba, 2003; Frey, 2004; Wachhaus, 2014). In other words, this research has found that being part of the governing process is an indispensable factor in the search for sustainable development.

5 Conclusion

The Sustainable Cities Program combines the idea of change with the opportunities and experiences that are already available to be placed into practice in the construction of the new development paradigm. It is necessary, because of a worldwide consensus that our development model has been causing a systematic destruction of the planet's resources, endangering the continuity of the human species itself. It is urgent, because of the consensus that the capacity of governance and confrontation of the planetary socio-environmental crisis does not correspond to the speed of the process of destruction of natural resources and climate change underway yet. In response to the question that motivated this research, it is possible for a small municipality to develop and apply the Cities Goals Plan, if the starting point is the socio-environmental responsibility for the consolidation of policies that promote a municipality with economic growth, social inclusion and protection to the environment.

This case study has proved that now, more than ever, the search for consciousness is present. Although everyone has their individual consciousness, with their own way of behaving and interpreting life, it is clear that we need to develop a collective outlook, which means surpassing individual interests in favour of collective interests. The strategic management of the future will be the participative management; however, this future can only be viable with the emergence of new bold research to catalyse interdisciplinary social and hard sciences and engineering. This kind of systemic synergies are essential to shape human-technology partnerships that provide a sustainable, vibrant, liveable people-centric world. (Spadoto et al., 2019).

The formulation and execution of the Cities Goals is widespread in groups of people who seek a better city management. Consequently, if social interaction is the result of an individual's fundamental potential for the community that represents the Basic Social Capital needed joining rights and duties. This trend is growing fast as could be seen in the development of recent Lisbon ranking (Akande et al., 2019).

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E-Citizenship : The Digital Cities Program, a Tool for a New Model of Citizenship in Brazil

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Abstract: The main objective of this study is to discuss, from a contemporary perspective, how public policies which introduced the concept of digital cities have giving new meanings for the model of citizenship in Brazil and at the same time being an introduction to smart cities projects in near future. What this research is trying to demonstrate is how the digital cities program and its deployments can be a trigger to a new citizenship model in the country. The start point of this study was the concept of citizenship in the context of the dynamics of digital cities. The methodological path followed by the researchers was a qualitative exploratory and bibliographical approach, which begin with the state of art of various aspects of citizenship within the perspective of the public policy that implemented the digital cities program. As a result, it was observed that when there is a massive penetration of digital technologies in the society, in particular in the public sector management, the implementation of citizenship occurs more easily; however, there is still a large portion of the population that remains outside of this process, no longer because of difficulties to have access to internet, which was a limiting factor in the past, but for not understanding the mechanisms of participation and interaction, the new possibilities of internet access nor the importance of using information, what may configure a case of digital illiteracy.

Keywords: Public policies; Digital cities; Digital citizenship; Digital literacy

1 Introduction

The purpose of this paper is to discuss the theme of smart/digital cities as a public policy and the new meaning of citizenship in Brasil. Firstly, there is no a unique definition for smart or digital cities; however, some characteristics are common sense among scholars: governance, technology, communication, transport, infrastructure, people, economy, environment, natural resources, innovation and quality of life (Kondepudi and Kondepudi, 2019).

As a public policy, digital City is an urban public policy which aims, to through technologies of information and communication, to promote digital inclusion and citizenship, fostering governance strategies and democratize the participation of population and busting urban development (Costa et al, 2019).

The Digital Cities Program in Brazil was planned with the objective of bringing together digital technologies and city management, in order to modernize and expand access to public services, promoting the overall development of cities. This is a subject that has been revised constantly, as digital cities are part of the process, among others, to foster citizenship through initiatives that promote a certain level of equity among citizens. Its structure reduces the distance between individuals with regard to access to new opportunities, which nowadays refers to the inclusive aspects considered between citizenship and digital technologies.

Brazil is following global investments trends in projects like this, concerning the creation and maintenance of digital cities, which assume a broader dimension as far as the analysis of changing vectors

of capital investment, of the role of the citizens and the instrumentalization of public management. However, as far as development is concerned, it is a common sense that just accessing technologies is no longer a sufficient condition for individuals to be part of the well-known Knowledge Society[110] in which digital mechanisms are deeply understood and used. So, it is necessary to be more than that; it is necessary to be an "informational literate" to, in fact, be inserted in this new paradigm.

Regarding informational literature, Cuevas and Simeão (2011) argued that it is related to the ability to obtain greater autonomy in the selection, evaluation and processing of information, and also to the development of skills throughout life, understanding that it is about developing skills to access and to use information and communication technologies, and to learn skills to operate digital resources and electronic media.

The concept of citizenship has been changing throughout history and subject of several updates as society also changes. The contemporary concept of citizenship converges to public policies that try to implement digital cities programs, since it fosters improvements in the quality of life for the citizens of a certain country.

The concept of citizenship is being reframed due to digital technologies, but it is still closely related to the exercise or constitution of the individual's rights and duties and, in face of this new model of organization of the society, it is born the term "e-citizenship".

The State is the element responsible for ensuring citizenship and, through the digital cities program, individuals have the possibility to intervene in the State's actions, thereby exercising digital citizenship. The correlation of themes occurs to the extent that public policies legitimize in favor of citizens' actions in the face of the challenges of a technological society.

Pischelota (2016) considers information and communication technologies (ICT) as an essential component for many of human activities, realizing that the digital exclusion can become social, political, economic, and cultural too. Thus, the myth of technology as a key element in social development has been destroyed by a growing emphasis on the role of the human being, a true protagonist of this change. Therefore, what we designate as digital citizenship is strengthened as the State, through digital inclusion programs, develops actions that have the principle of empowering citizens to understand and to use ICT.

Public policies in their various dimensions are instruments that are operationalized through programs, actions and decisions taken by national, state or municipal governments, with the participation, directly or indirectly, of public and / or private entities, which aim to ensure certain rights to the citizens of various groups in society or for a specific social, cultural, ethnic or economic segment.

So, civil rights ensured by law (according to the Brazilian Federal Constitution) configure exercise of citizenship as they also meet specific social, cultural, ethnic, or economic niches. The basis or axes of public policies which address directly on digital citizenship and inclusion converge to put in evidence thousands of Brazilians excluded from this digital wave, who do not have access to internet and are losing job opportunities, since they are not taking any advantage from digital contents; therefore, not participating effectively and critically in the so called knowledge society.

2 Digital Cities in Brazil

Cities have been suffering serious consequences due to the high speed of unplanned urbanization. The growing imbalance is inevitable, especially with regards to the needs of the population and the capacity of public management to promote orderly and sustainably development in urban centers.

1.https://www.encyclopedia.com/social-sciences/applied-and-social-sciences-magazines/knowledge-society

According to the Inter-American Development Bank (IDB), in North America, 82% of population lives in cities and in Latin America and Caribbean, 80%; so, cities become complex systems where public leaders have to face challenges every day. To solve them, they must develop decision-making tools able to change local government structures through the intense use of technologies and increasing participation of all actors involved (Bouskela et al, 2016).

The utilization of strategies such as digital cities programs was in response to these requirements through a more agile, participatory, and integrative management model, based on the use of digital technologies. A digital infrastructure needs to be set up for the provision of services and for free access to the internet in certain urban areas, as well as other applications which are part of the program. Applications such as the possibility to modeling spatial information systems, which simulate urban environments, supporting city planning projects and the formation of virtual communities in organizing access and dissemination of useful information to the citizens.

This concept was developed with the purpose of creating an interrelation between the dynamics of cities and the new technologies of communication and information. According to Bonilla and Pretto (2011), categories such as digital inclusions, wireless network infrastructure and electronic government (digital gateways and information content) are part of this relationship.

For Silveira (2010), nothing is transforming more human reality than technology in all its facets. Extensive and profound changes have taken place in society through digital technologies, which have already demonstrated their intense economic potential, both for the creation of new and more qualified jobs, as well as for generation of income. The processes gained more amplitude for new models of production, consumption and, mainly, for knowledge generation and distribution. Considering this approach, it highlighted structural changes in the world economy, which was made possible by massive investments in telecommunications infrastructure.

In all the meanings of the term “cybercity”, is evident that there is a strong relationship between cities and the new information and communication technologies. Digital cities are the result of the impact of digital technologies in urban spaces in contemporary cities. So, in general, the term “cybercity” would be translated as cities where there are already present a digital infrastructure and, in this sense, almost all major contemporary cities might be called a “cybercity”.

It is a concept that aims to place emphasis on new information and communication technologies in interface with the urban space, whether to promote social bonding or digital inclusion. Thus, “cybercity” might be also a city of “cyberculture” where citizens can get more information, space management can get more data, and political, cultural, and economic activities are more alive (Lemos, 2007; Levy, 2010).

According to Lévy (2010), Cyberculture is linked to the evolution of cyberspace and it is not related only to the physical infrastructure of equipments and internet users, but also by the set of information and communication connections in the cyberspace.

Lemos (2007) explains the term “cybercities” (cyber city, digital city, digital village) by analyzing four categories: (a) the first one refers to a government project (private and/or civil society), which creates a representation of a particular city on web space; (b) another possibility is to understand “cybercity” as the establishment of an infrastructure (services and access to internet in a given urban area). Therefore, nowadays, new technologies such as the wireless technologies have caused transformations in urban mobility and, consequently, new designs of “cyber cities”; (c) simulation of urban spaces to assist in city planning and; (d) creation of virtual cities for the implementation of virtual communities, which shall use the city metaphor for the organization, access, and navigation of information.

Many authors may have different denominations for digital city or "cybercity"; and in particular Lemos (2007) refers to digital city or "cybercity" as "world city". He also considered them as: informational city, transactional city, centers for digital information exchange in the world economy or global city. All these denominations refer to the same revolution, the revolution caused by the new communication and information technologies; and Lemos (2007) actually considers as the most important changes in the development of urban networks since the beginning of the last century.

In Brazil, The Digital City program, under the coordination of the Ministry of Science, Technology, Innovation and Communication, was created and institutionalized by the Act No. 376 of August 19, 2011to provide the installation of a network of optical fibers and internet connection points in government agencies and institutions of public use (Rede Cidade Digital, 2006, Redes Regionais de Cidades Digitais, 2006)[111]. In addition, the Act No. 376 states the creation of Apps for mobile devices and training programs for public servers, to improve local city management in selected cities.

The main objectives of the Digital City Program are to expand the quality and transparency in public services and management provided to the general population, the democratization of the internet access, promotion of a creative and sustainable economy, the creation and development of contents of public interest, the construction of collaborative environments in open networks and the encouragement of local development.

The program intended to interconnect the city administration through a network of fiber optics and establish a public network of access to the World Wide Web using radio stations and Wi-Fi signal, which are responsible for giving internet access to the population in public spaces. This program and its actions are managed by public agencies linked directly to the city management board.

According to Rezende and Ribeiro (2018), the use of technological resources in programs such as digital cities in Brazil are important complementary instruments to improve the efficiency of management of cities and municipal public organizations.

Among many benefits generated by the execution of the digital city program, in the short term, one of the most relevant is the significant reduction of costs on data transport and communication in public governance. In the long run, other benefits were the increase in efficiency of public management, the encouragement and strengthening of the digital economy, and the consolidation of the communication infrastructure necessary for the implementation of large businesses agglomerates.

These factors, when combined with the perception of progress by the population, have the capacity to promote radical changes in society, especially with regard to the exercise of citizenship, justifying the relevance of the program.

To make the Digital Cities project feasible, a systemic and integrated vision of the city is essential. It is the full responsibility of city managers and public servers to provide a quality, efficient and transparent management of resources, promoting citizenship, encouraging the population to participate in city management mechanisms.

For the implementation of the Digital City program, some pre-requisites are essential, such as the investments in network infrastructure. Regardless of the technological model adopted, the infrastructure needs to be correctly sized to guarantee the data flow, anticipating rapid increase of data flows in the near future. Initially, it was suggested the implementation of infrastructure equipments that could interconnect the various city administration departments, to save resources with telecommunications, as the basis of the implementation of mobile Apps and citizen services.

2 https://redecidadedigital.com.br/

Secondly, it was considered the premise that information is a basis of citizen's rights and that communication between government and society is essential. Effective communication between the population and the various social actors (State, Institutions, and other stakeholders) constitute the formation of a digital culture.

It is a public managers' responsibility to guarantee communicational effectiveness, to offer the necessary infrastructure and to promote actions, which lead to democratic access to the whole population. Their responsibilities go beyond the sole transmission of data and information, but also consider education and fostering local development. These demands for communication, education and digital inclusion are the basic triad capable of promoting a new social dynamic with more participation of population, promoting the insertion of new entrepreneurs in the virtual world.

However, the flexibility is mandatory, as there are many different realities in Brazilian cities. The program is just a guideline with the objective of facilitating the construction of an innovative ecosystem aimed to promote the development of society. Thus, the best start for programs like the Digital City program is to think about the creation of an infrastructure for ICT, providing concrete improvements in public management and in citizens' lives.

For the implementation of this program, cities have received funds from the federal government to build fiber optic networks, interconnecting local public agencies. Other investments were also done aiming the development and availability of the e-government mobile Application to be used by city management agencies, training of public workers and internet free access in public spaces such as squares, parks, and bus stations. Cities, which implemented the program with their own resources, focused mainly on the free distribution of internet signals, as a way of expanding access to public management services and promoting digital inclusion development.

In 2013, the digital cities program was included as part of the Growth Acceleration Program (PAC), a major program supported by the Brazilian Federal Government. At that time, the program selected 262 cities with population up to 50,000 people. In 2016, the program was re-structured, so that funds would only be available with congress amendments. According to the Ministry of Science, Technology, and Innovation, it is being already distributed in five regions of the country and 166 cities with full implementation; and Regional Digital City Networks star being developed.[112]

Nowadays, the concept of the Digital Cities program expanded to a broader concept, becoming the Smart Cities Project. The meaning of "smart cities" uses 70 indicators and involves aspects such as the integration between mobility, urbanism, environment, energy, technology, innovation, economy, education, health, security, entrepreneurship and governance, now presented in more than 500 Brazilian cities.

Thus, the implementation of digital cities in Brazil meets the need to modernize public management tools and expand access to public services, as well as promoting the development of Brazilian cities through technology. The main goal is to provide access to public information, so that everyone can use those data, in compliance with the open data plan of the Ministry of Science, Technology and Innovations (MCTIC, 2020)[113].

However, considering this, the key to success implies in choosing and implementing a model, which considers local realities. So, appropriate choices for current and future solutions can represent the difference between the failure or the success of this program.

[112] http://regionais.redecidadedigital.com.br/

[113] https://www.mctic.gov.br/mctic/opencms/indicadores/DadosAbertos.html

3 Digital Citizenship Concepts and Perspectives

The understanding that a modern social organization is supported by the fulfillment and exercise of civil rights and duties is a fundamental principle of life in society for every citizen, regardless of nationality, ethnicity, or belief. It means that the possibility of enjoying social, cultural, and even natural resources, as well as the need to respect the laws and rules, are the basis of the practice of digital citizenship.

Citizenship is notoriously a term associated to life in society and has become a reference to studies that focus on politics and its conditions to exercise it, in both ancient and modern societies. The changes in the socioeconomic structure have affected the evolution of the concept and its practices of citizenship, shaping them according to the needs of each period. From this evolution in the meaning of citizenship, a new concept was developed: digital citizenship or e-citizenship. Its re-signification occurs from the insertion of technologies, which confirms it as a right for all citizens.

According to Silveira (2010), historically, the concept of citizenship has been linked to the concept of physical space or shared territory. The ancient Greek philosopher Aristotle stated that the "polis" couldn't extend beyond the reach of the citizens' voice, because its essence is the democratic dialogue, which manifests itself in the Àgora[114] as a meeting point.

According to Bonavides et al (2009), the contemporary concept of citizenship includes a perspective in which citizens are not those who votes, but individuals who have the means to exercise the vote in a conscious and participatory way.

Among many scholars, citizenship is perceived as a combination of factors such as: formal status of state membership, rights and duties and a major form of identity; however, the modern concept of citizenship expands rights through widening access to political participation and practices (Kerikmæ, T., 2016).

Morgado and Rosas (2010) argued that the use of digital media shall benefit citizens, in the sense that help them to carry out public policies in terms of integration, cooperation and equity. But not only that, it is already changing the way citizens participate and oppose to ideas in a democratic regime. Even though the idea that those technologies have great potential of changing the form of citizenship awareness, it is very difficult to predict what effectively happens, despite specific empirical evidence of their action.

Therefore, citizenship is the condition of access to social (education, health, security and social security and pension) and economic (fair wages, employment) rights, which allows citizens to develop all their potential, including an active and organized participation in the construction of a collective life in a democratic regime.

It is difficult to think about the implementation of digital cities without considering their impacts on the exercise of citizenship. The concept of citizenship has had several phases and adaptations, from the classic meaning which is associated to the participation of individuals in their communities to the contemporary, in which citizenship is constructed in practices (Holma and Kontinen, 2019).

Silveira (2010) argues that thinking about the formation of a citizen implies in fostering a critical perception of the limits and possibilities, risks and opportunities that exist in the participation of the communication flows in the internet. More than that, it is necessary to stimulate citizens to participate in the city's communication process, which it is vital to democratic life and the construction of the city.

As far as digital citizenship is concerned, Cazeloto (2008) argued that it presupposes the overcoming of a phase of digital inclusion, and it is conditioned to issues such as democratization of internet and

[114]Ágora was an ancient Greek city that served as a meeting ground for various activities of the citizens.

processes related to the evolution of digital technologies. However, the implementation of this new perspective of citizenship still requires a long way to go and demands great efforts to fully reach the status of a connected society, even with the speed of the huge changes brought by the technological revolution.

The extension of the concept of digital citizenship involves essential principles and values for conscious access to technology services. In other words, it is necessary to educate society to use the internet with discernment and responsibility, to promote mutual respect among individuals and be consistent with capabilities and interactions proposed by the digital cities program.

4 Final Considerations

As an important outcome from this study, researchers understand that, in order to implement a digital city program, firstly, it is crucial to build a systemic and integrated vision of the city, leaving to public managers the challenges of providing quality services and an efficient and transparent administration of resources; also, inserting the population in the digital world, encouraging participation in local management mechanisms and, finally, promoting the full understanding of the concept of citizenship.

In order to support the physical implementation of digital cities projects, it is necessary to set up a network of fiber optics to interconnect all local public agencies. The limiting factors are related to the lack of funds to build the technological and communication infrastructures, along with the need to educate the population to think and act within the digital context.

The challenge, however, is to introduce clear and structured policies which are essential for the progress of digital inclusion strategies in Brazil. These policies shall be strategically directed to the various segments of society in order to meet their goals.

Based on the premise that information is an unquestionable right and communication between local government and society is crucial to the success of any program, an effective communication among these actors (State, Institutions and Citizens) signifies the formation of a digital culture. Moreover, an effective plan involving both public and private initiatives is required to provide appropriate training programs for the population, to meet the needs of a modern citizen. As a matter of fact, today's impact of the Covid 19 Pandemic is pushing society, in Brazil and everywhere to a Tipping Point into the Digital Era that may hopefully lead, using advance technologies, to foster E-Citizenship.

It is part of the public managers' duties to ensure effective communication and proper technical infrastructure, as well as to promote its democratization for the population to guarantee communicational effectiveness, having appropriate access to the digital world. Actions that go beyond a mere communication access to information, but enhancing education tools, fostering local development.

The demands for communication, education and digital inclusion are part of the basic triad capable of promoting a new social dynamic for people participation and local development, encouraging the insertion of new entrepreneurs in the virtual world (Becker, 2009).

If there is any doubt about the establishment of the digital cities program, it is because, on one hand, there is an intense and rapid introduction of technologies in public management, which shall require certain skills and competence from citizens to understand the extent of internet use. On the other hand, what is presented is an absence or discontinuity of public policies that validate digital inclusion initiatives, suggesting new perspectives for this new digital world, strengthening the democratization of access to information and forming citizens to live in this new city model.

The conclusions of this study may suggest that programs such as the digital cities program are a great step for the development and implementation of smart city projects. In addition, in the execution of the digital cities program, citizens are required to be more conscious of their needs by participating in local decision-making processes, what shall demand better education level and institutions with a more extensive range of digital tools, as well as a more democratic access to technologies. Those citizens, who have already developed information skills, shall understand the need for quality information to deal with problems related to their own lives, to the community and society. As a matter of fact, already Brazil started recently an initiative on Sustainable Smart Cities[115]

Finally, this paper aimed to contribute to an in-depth understanding on concrete contributions of programs such as the Digital Cities Program as a change and transformation agent for a new digital citizenship concept. In addition, it provides emphasis to the importance of the conceptual evolution of citizenship and its multiple and diverse repercussions, as a possible support to a broader view of the relationship between State, institutions, and society in this new digital environment. In fact, Brazil is already moving toward a Program on Sustainable Smart Cities.

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Business Ethics and Corporate Social Responsibility in Times of COVID-19

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Abstract: This article aims to discuss the impacts of COVID19 on corporate social responsibility and corporate governance policies. We indorse Corporate Governance oriented by ethics and morality as an essential organizational posture that needs to be adopted in order to respond to the crises effectively. Regarding the prescriptions founded, we can highlight as an initial step towards a solution would involve the creation of a special committee to manage the crisis. The largest obstacle to overcome would be the protection of different social groups, where inequality margins impact the outcome of the crises.
Keywords: Corporate Social Responsibility; Business Ethics; COVID-19.

1 Introduction

Towards the end of 2019, the media started covering the COVID-19 outbreak in Wuhan, China. For undeveloped countries such as Brazil, dealing with new pathogens is a norm and is evident through coexistence with Dengue, Zika, and H1N1, amongst others. Initially, local government officials and citizens were not concerned, given that the outbreak was occurring over 17000km away. However, less than four months into 2020, the World Health Organization (WHO) officially declared a state of emergency as the world acknowledged the uprising pandemic, with the risk of a health system collapse due to the rampant, uncontrolled spread of infected cases.

As the crisis continues to manifest itself, companies are faced with a serious question: how should commercial activities be maintained without putting stakeholders and associated parties at risk? This essay aims to discuss the impacts of COVID-19 on corporate social responsibility and corporate governance policies. The study has a qualitative and exploratory character in order to foster an important discussion on organizational behavior.

For one to respond appropriately to the question above, one will have to propose a solution that is based on the fundamentals of corporate ethics, and in order to understand this concept, the foundation is of utmost importance. According to Srour (2003), morality, is the building block of ethics, it is considered as a set of cultural norms within society which determines what is deemed to be correct or incorrect. Ethics, associated with morality, is understood as a science that studies human behavior concerning one's peers, taking into account moral rules; approval or disapproval of society before its pre-established values. Corporate ethics is a reflection over dominant organizational norms and values, considering factors responsible for actions producing positive results. This essential posture needs to be adopted in order to respond to the crises in an effective manner.

The critical factor of "decision making" is the key to success in the battle against COVID-19. Organizational leaders will have to analyze and deliberate plans which are of ethical nature and consist of responsible actions. The main objective should be to uphold the health of collaborators above any business decisions. Businesses have the critical know-how, the reach, and resources - the right tools to create opportunities and a means of the auxiliary to aid the world and contribute towards recovery.

2 Discussions

Corporate Governance could be the deciding factor to resolving approaches in dealing with the current pandemic. It is understood as a system in which companies are directed, monitored and encouraged, involving the relationships between all its parts, from the partners, management, supervisory and control bodies, and other interested parties. This system consists of a board of directors which is an organ responsible for the decision-making process, opening the way in a strategic manner, as it plays the role of guardian in relation to the principles, values, corporate objectives and the governance system of the company (IBGC, 2015).

The autonomy of the board is vital, since its role is to reduce risks and improve strategic company decision making. In view of this, independent audits are important, as long as they are carried out in a collaborative manner, while ensuring resources are being used efficiently. There are 4 basic principles which guide the corporate governance system; transparency, accountability, equity and social responsibility (IBGC, 2015).

Regarding the prescriptions found, we can highlight as an initial step towards a solution would involve the creation of a special committee to manage the crisis and adequately deal with the lockdown. This committee should involve individuals from Human Resources, the Legal, compliance, communications, and IT departments. The committee should be formed by the board of directors as the principal of this agency and allocate a head as an agent to carry out predetermined objectives. Bylaws should be put into place in order for the committee to act on a larger degree of autonomy, to quickly respond to any new incidents or demands, which surface during these unpredictable and turbulent times. Following the establishment of a corporate governance system, the crisis committee will have to function transparently. Outsourced opinions conducted by independent specialists will reinforce accountability and minimize fraudulent behavior.

This committee will be able to carry out risk assessments applicable to the current business reality and alignment with company principles (EUROMONEY, 2020). Using this information, the board can decide on a means of maintaining operational activities while preserving the health and integrity of all members and collaborators. This will allow for companies to deal with operational risks and fully plan for harmful externalities. A key factor of avoiding this type of exposure to risk, is investing within this crisis committee, allocating more funds towards research and development.

The second step which contributes towards a solution is social responsibility, something which strongly correlates with ethics and acts as a key principle to corporate governance. Organizations which understand or, in actual fact, are socially responsible in benefiting consumers, creating actions with little publicity and positive impacts on society, are companies which obtain value of image and brand. Analysis shows that there are numerous businesses committed to facing the crises responsibly and this is seen in various sectors, where financial resources are applied, sanitary and health equipment are provided and investments are made on research and development. There are, however, a handful of companies which

have chosen a different path when presented with the current choice between socially responsible actions or economic gains.

Companies which have chosen to follow a path of socially responsible actions, form part of an extensive list. A few examples of Non-Profit Organizations, amongst many, include (ETHICAL CONSUMER, 2020):

- Feeding America, where a COVID-19 response fund is made available, helping to ensure food banks across struggling regions;
- Doctors Without Borders, sending medical aid to countries hit hardest by the virus and strengthening infection control programs, helping over 70 countries;
- Team Rubicon, a veteran based company which provides assistance to regions affected by natural disasters and emergencies, currently have directed forces into helping logistics, packaging and food distribution.

A few examples of organizations which include donations in assistance to medical and social supplies are:

- JBL, donating headsets to schools in need of virtual class assistance;
- T-Mobile partnering up with Verizon, AT&T, and iHeartMedia to donate over 40.000 cell phone chargers to allow for contact between families and hospital patients;
- GSN Games raising $217.000 for the Meals and Wheels Covid-19 response fund; and
- New Balance shifting their shoe productions to masks, offering it at cost price.

As many businesses choose a righteous path, a few have chosen to focus on self-gain. Examples of these companies include (ETHICAL CONSUMER, 2020):

- Amazon, crowned as the clear financial winner of the crisis, have maintained warehouses and mass production, ignoring health and safety rules. Workers have claimed a lack of face masks, rejection for remunerated sick leave, a scarce number of sanitary measures and complete disregard for social distancing.
- The Fraser group has been reported on zero hour contracts not being paid, while stores are closed and social distancing is disrespected; and
- The Arcadia Group having laid off 300.000 store workers, with no financial compensation or warning.

What could be proposed to facilitate these organizations, is a management model which aims at not only considering the interest of owners, but also, a wide range of stakeholders. By clearly identifying internal and external stakeholders, relationships can be formed, prioritizing the best fit strategy to creating equity amongst all parties. Monitoring actions and results are key to clearly defining and updating procedural responsibility acts, while creating a plane of inclusion to integrate external groups, broadening contributions towards the decision-making process. In order to fully achieve successful integration of stakeholder groups, it is compulsory for organizations to possess predetermined policies

which are easily comprehendible, decisions and interests which are aligned, ultimately, positioning the company within a sustainable framework.

Companies with an inclusive organizational culture are probably more comfortable to stakeholder integration, turning the decision-making process into one which is more agile, while maintaining satisfaction over stakeholder interests. This avoids less efficient practices and unnecessary developments of new system channels. Organizations which are unfamiliar with this model, should take initial steps by integrating employees, not only from the executive and senior management, but also middle management and operational workers. These groups of individuals are considered to be valuable as they have a grasp on customer relations, organizational culture and a perspective over the effects of the pandemic. These vast numbers of perspectives could help contribute in creating socially fair actions, while aiming at a decent return of investment and a sufficient amount of capital on hand, in order to maintain organizational activities.

With the unbalanced scale of working via virtual means, no distinction has been made in terms of daily working periods. At this point, it seems as if individuals are placed within a 24-hour working day cycle, leading to an increase in depression due to the uncertainty of future events, and a steady increase in the number of burnout cases due to an overload of work. Avoiding retrenchment and promoting financial security is something that acts as a dealing mechanism, and through the stakeholder integration process, employee mental and physical health could be preserved. This gives them the opportunity to voice out their concerns which ultimately forms part of the decision making process.

Infection over the economy shocks the business sector and is understood as a prolonged plague with an unforeseen rein until a vaccine is discovered. Private institutions possess great responsibilities, although they're not able to win the war without an army. Banks act as key soldiers in this battle, where responsible actions are necessary for positive social impact to exist. China has approved a $71 Billion reduction in loans to allow companies to cope and resume operations. The U.S Central Bank has reduced interest rates to facilitate confrontation against the crises. Brazil's Central Bank plans to offer extra services to stimulate the economy, by approving loans and financing. Brazilian banks had reacted quickly to the pandemic, expressing great support of social distancing with public campaigns and service measures, in addition to a compiled donation agenda. A grace period of 2months had been announced by larger banks to assist smaller institutions lead with debt, while increasing credit grants and reducing interest rates (EUROMONEY, 2020).

Contrary to what is mentioned above, some banks are making it difficult to release credit, increasing interest rates and reducing payment terms for new debts. This creates an ultimatum in dealing with the crisis, as maintaining operations and remuneration becomes dependent on generating more revenue, inserting these institutions within a socially responsible dilemma. It is of utmost importance that banks rely on socially responsible actions in alignment with consumer needs. Advertising without effective measures of transparency and harmony, turns publicity into obsolete propaganda, where the public misinterprets organizational decisions, as there is no clear reason to why these actions are necessary for the survival of these companies. Taking into account society's expectations and needs, it becomes possible for organizations to gain empathy, especially during a time where responsibility isn't limited to commercial transactions.

Social responsibility does not only form part of corporate governance, but also sustainability, which is understood as: living in a permanent manner of production, while maintaining equilibrium of natural resource consumption. Sustainability makes way for the triple bottom line concept, defining which

characteristics are necessary in order for organizations to be considered as sustainable. The triple bottom line refers to a company which produces a balance between being economically viable, socially fair and environmentally friendly (SROUR, 2003).

The triple bottom line provides ethical guidance to organizations and allows them to obtain a good reputation with perpetuity. This creates a perception of quality in relation to products or services, attracting investments, retaining potential talent and influencing the volume of sales. A company that adopts an ethical stance is able to meet demands with counter offers that are mutually beneficial to all parties, where the company's social and environmental interests come together to create a vantage point (SROUR, 2003).

The World Business Council for Sustainable Developments (WBCSD) has published three response projects in hopes of correctly tackling the current pandemic. The first, being long term impacts of COVID-19, guides businesses on how to fully recover from the crises by building a system which targets vulnerabilities to create a more sustainable future. The second response, is returning to normal - employee health and business recovery. This involves a plan of resilience to face the second wave of COVID-19, while preparing them for any future eventualities of similar nature. This will be achieved by securing the wellbeing of employees and their families, through confinement and also providing supplementary resources to enhance the value of businesses and their respective collaborators. Lastly, vital supply chains, such as food, which faces deep risks. Chronic hunger and food insecurities rise as the pandemic progresses, spiking an economic downturn with strain on food supply chains. A Rapid Response Platform is used to tackle these risks by working with experts to address these systematic flaws, fueled by poverty and inequality, by mobilizing actions to support those in highest need.

The pandemic had emphasized the importance of intercommunications between different social divisions, while reinforcing global awareness, demystifying the idea of profit at the expense of others or the environment. In order for companies to overcome obstacles, they need to be clearly mapped out and addressed in order to promote the company’s image, with concrete actions tackling inequalities and social injustice. The key objective here is to understand new behaviors in the supply chain and demand, consumption patterns and the needs of employees, all of which enable a real connection between stakeholders and the community (SAI GLOBAL, 2020)

The United Nations created a system known as the Global Pact, where 17 traits are mentioned, encouraging the commercial sector to adopt politics over corporate social responsibility and sustainability. A few suggestions have been made in order for organizations to effectively lead with the global crises:

- Increasing consciousness by sharing WHO and Pan America Health determinations and precautions over preventive measures;
- Being flexible to employees working remotely;
- Supporting collaborators by creating health and metal support groups; and
- Providing help with equipment and materials in scarcity amongst infected regions, either by offering assets, resources or financial and medical aid.

Specialists have noted organizations within the Brazilian commercial sector, promoting educational channels and awareness of the current pandemic. These articulations are of extreme importance as our actions today would help the future of tomorrow. A report of organizational confrontation against

COVID19 was conducted by the Brazilian network of the Global Pact, which demonstrated results of an analysis involving 84 institutions (PACTO GLOBAL REDE BRASIL, 2020):

- 84% are in support of adopting sustainability and social responsibility policies;
- 97% agree with contributing towards finding a solution;
- 42% is involved in socially educating the public over the pandemic; and
- 72% stand by policies which preserve jobs.

According to Imprensa Nacional (2020), the government has realized a series of laws and decrees establishing guidelines and rules aimed at containing the transmission of COVID-19. Law n º13,979 / 20, created on the February 20, 2020, provides for measures to deal with the public health emergency. This law, in conjunction with the penal code, proposes potential punishment if individuals disregard the quarantine determinations from a medical prescription or health surveillance agency. Putting sanctions into place to deal with organizations or individuals which disrespect legal determinations to minimize pandemic effects, will appropriately enforce the ideology of equity, provided that businesses cater to all interested parties by creating an even playing field for everyone.

According to the National Congress (2020), Provisional measure no. 927, implemented by the administration of president Jair Bolsonaro, deliberates over the suspension of working contracts and salary cuts during the pandemic, which was later approved by the Federal Supreme Court and regulated into the civil code. Certain organizations have created a “non-job termination” movement going against the previously mention provisional measure, where a record of 4 thousand companies have avoided a 1,5 million reduction in the national working force, reducing the development of the 62 Million registered as vulnerable by the International Working Organization.

The largest obstacle to overcome, would be the protection of different social groups, where inequality margins impact the outcome of the crises. Lower social classes have fewer resources at their disposal to fully tackle the pandemic. According to Caio Magri “If we have a group of companies that have affirmative racial and gender equity policies, they need to act with even more energy and investment, to create even broader safety nets for workers in their companies and reduce the impact of the pandemic in areas key to Brazil” (ECOA, 2020).

3 Conclusion

In conclusion, it is plausible to maintain commercial activities without endangering direct stakeholders and other interested parties. This could be achieved by forming a crises committee, deliberated by the board of directors, using a management system to implement adequate procedures, deemed as fit under the ethical code of conduct. In this manner, organizational practices are seen as viable under the triple bottom line concept, classifying actions as sustainable, reaching, not only a socially responsible stance, but also an environmentally friendly title, while being able to generate enough revenue to maintain operations and remunerate employees. This committee should create its norms based on medical determinations, while following suggestions made by the WBSCD.

The compliance tool becomes fundamental and guarantees that actions are carried out in an efficient manner, while remaining under the direction of the law. The main challenge is to recognize and consider that it is not possible to grow indefinitely in an environment with limited natural resources. From the moment we consider this premise, we will make better decisions over government and public policies,

businesses and the way we live and consume. We need to be protagonists of the environmental and social changes necessary to live longer and better lives.

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Improvement of Online Education in Graduation Design for Engineering Undergraduates Based on the CDIO Model

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Abstract: Under the context of coronavirus, communication engineering undergraduates still need to brace themselves for their final courses online, preparing for employment in the competitive society even when quarantine at home. This study firstly identifies the professional competence requirements of communication engineering students in course of Graduation Design based on the "CDIO mode". Then an empirically comparison of eight competencies required by the course was conducted for 176 communication engineering undergraduates in Class of 2019 and 186 ones in Class of 2020. After collecting and analyzing self-evaluation data from questionnaires, our finding indicates an overall decline in all competencies of undergraduates and addresses some problems in online teaching curriculum. In the end, this paper puts forward some relevant recommendations for our educators to make changes and develop higher quality and more professional education programs in online teaching process of Graduation Design.
Keywords: Graduation design; Online education; CDIO mode; Competency; Communication engineering undergraduates; Teaching quality

1 Introduction

In the past, virtual process is only taken as a supplement for physical process in some experimental courses called "blended learning" (Allen and Seaman, 2007). Under the context of "coronavirus", lockdown of universities and quarantine at home made online learning as the alternative to traditional classroom learning, or substitute for physical processes (Hill et al., 2017; Hodges et al., 2020). In line with cutting-edge technologies such as big data, transmitting communication applications, internet-engaged behaviors of new generations (Huda et al., 2017), higher education are confronting many new challenges in teaching programs, especially for Graduation Design (or Graduation Dissertation Design). On one hand, distance education has to caster the increasing industry's needs such as technological knowledge, professional ability and creativity in industry; on the other hand, the disruptive growth of blending courses or online education urgently need a teaching revolution to empower the novel engineering concept of "CDIO" (i.e. Conceive-Design-Implement-Operate) (Lu and Yan, 2015; Hill et al., 2017). Through identifying the excellent and professional competencies learnt from Graduation Design based on CDIO, this study intends to close the gap between online teaching and traditional education, improve teaching quality, to benefit the employment of undergraduates in the souring economic circumstances.

2 Learning Outcomes of Graduation Design Based on CDIO Mode

Since engineering education in Chinese universities have gradually shifted the focus to the student-centered and outcome-lead approaches, the education concept of "CDIO" by Massachusetts Institute of Technology (MIT) has prevailed in engineering universities (Boiko et al., 2017; C. Office, 2015[116]; Gu et al., 2006; Wan et al., 2018). All courses designed in CDIO framework lay more emphasis on cultivation of capabilities (JiaJu, 2009; Mustapa et al., 2017). "Graduation Design", the final-year course of communication engineering, it is a comprehensive course designed to integrative cultivation for communication professional skills and innovative capacity in various engineering practices and operations. It is usually arranged in eight procedures, from project selection, project assessment, project

[116] C. Office. (2015). *History of the Worldwide CDIO Initiative.* Available at: http://www.cdio.org/cdio-history (Accessed: 16th June 2020)

proposal, procedural guidance, mid-term assessment, project appraisal to oral defense, then putting on record at the end. All the steps are integrated into the process of course as its assessments. Meanwhile we summarized eight learning outcomes below of "CDIO requirement" for Graduation Design through literature reviews (Chen et al., 2016; Li and Wang, 2018; Li and Han, 2016; Chuchalin, 2020) and experts' sessions of our specialty.

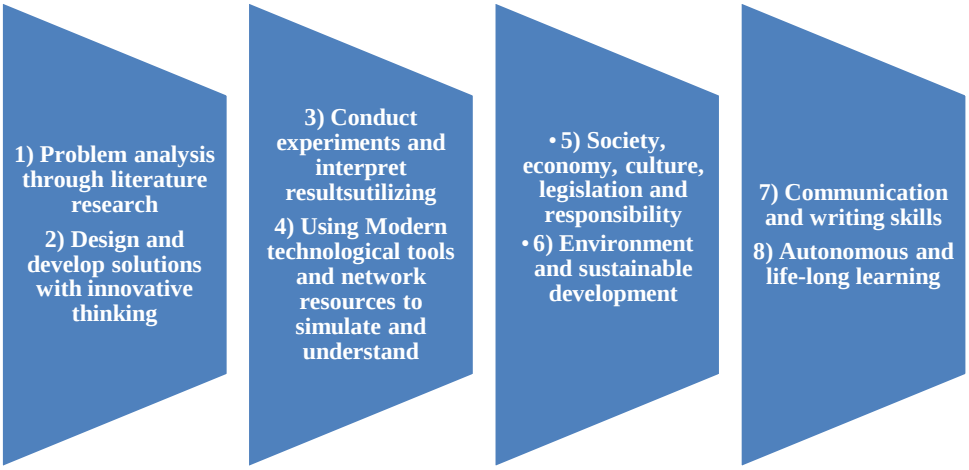

Figure 1 Engineering Competency Indicators of Graduation Design Based on CDIO

These eight competencies are designed as indicators of the course learning outcomes in major of communication engineering of our university, which are: 1) Ability to identify and analyze complex engineering problems through literature research in the field of information and communication; 2) Ability to conceive and design complex information and communication system solutions with innovative thinking; 3) Ability to implement experiments, analyze and interpret experimental results, then draw the reasonable conclusions; 4) Ability to simulate, predict complex engineering problems and understand the limitations, with support of modern technological tools and network resources; 5) Ability to evaluate social, economic, legal and cultural impacts of the engineering project, understanding the responsibilities; 6) Ability to consider the environmental, social and sustainable development implications of complex engineering project; 7) Ability to communicate effectively with industry peers and the general public, including writing and presentation skills; 8) Ability to engage in full learner autonomy and life-long learning.

Therefore, teachers of the course are required not only to deliver scientific and technical knowledge forecasting the society needs, but also engage students in designing and implementing new solutions, systems, or products with innovative thinking (Kurilovas and Kubilinskiene, 2020). Furthermore, students are expected to be equipped with comprehensive qualities of logical explanation, clear writing and responsible considerations.

3 Survey and Status Analysis

In order to compare the learning outcomes of the course in recent two years, undergraduates of communication engineering in Class of 2019 and 2020 were asked to carry out a questionnaire to do a self-assessment of their capabilities and satisfaction to Graduation Design. The questionnaire is designed in consistent with the "CDIO" mode and eight competencies above are all included in it. The 4-scale self-reported answers are categorized as "A. done badly and did not attain the objective" (1 point), "B. made much effort and did not attain the objective" (2 points), "C. performance average and attain the basic objective" (3 points) and "D. well done and attain the objective" (4 points). Through the two weeks online investigation, we collected the effective 176 respondents in Class of 2019 and 186 ones in Class of 2020. After computing the expectation value of assessment results for each capability, the overall result shows a distinct decline trend in eight competencies of undergraduates, as in figure 2.

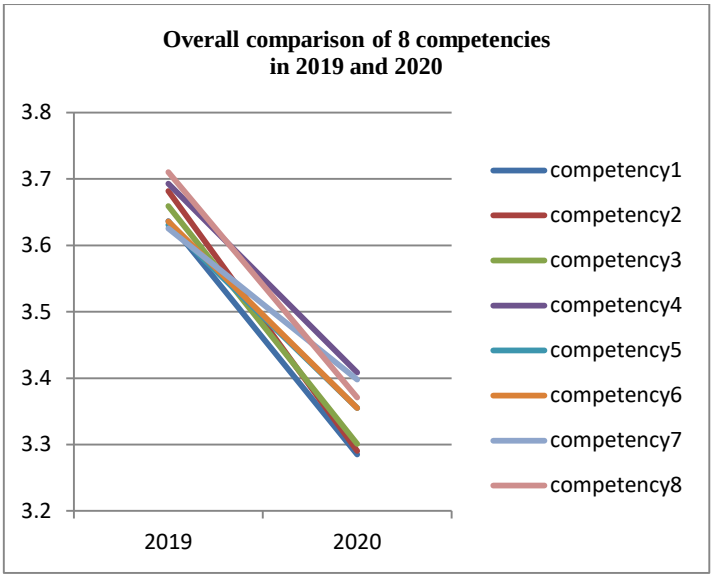

Figure 2 Competency Comparisons of 2019 and 2020

Analyzing the student survey, we found that compared with Class of 2019, more students conservatively took the option of "C. performance average and attain the basic objective" and less students chose the option of "D. well done and attain the objective" as self-evaluation in Class of 2020. Since there are similar downward trends in eight competencies and we only choose two most significant indicators (i.e. competency 2 and 5) here to illustrate the issue.

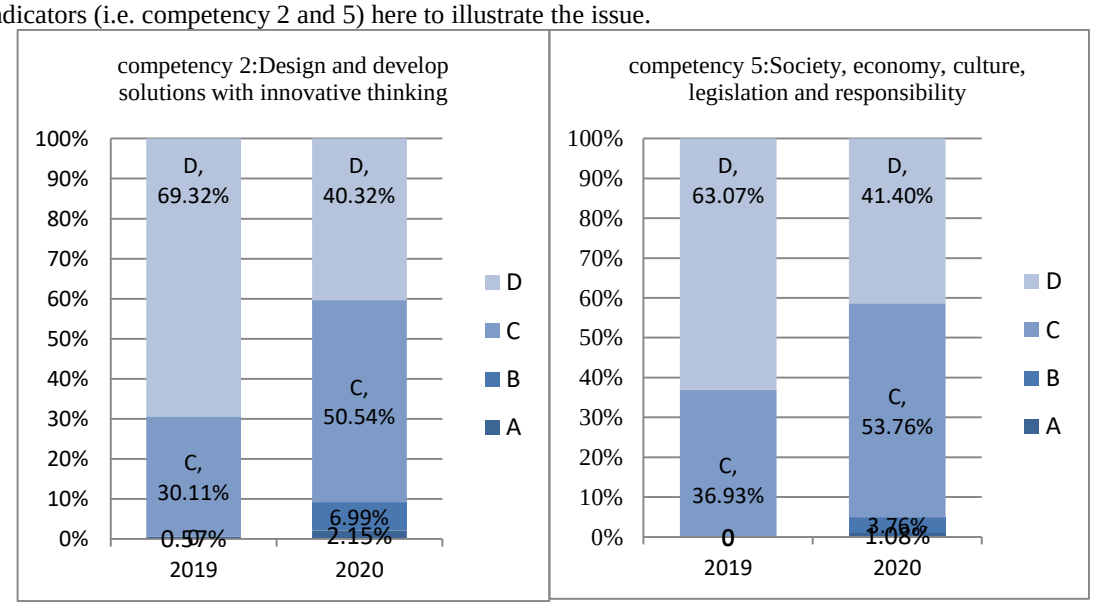

Figure 3 Comparisons of Outcomes in Competency 2 and 5

Although the status results only indicated the perspective of student themselves, two comparisons of learning outcomes in competency2 and 5 indeed reflect that the undergraduates confront more frustrated problems in designing and developing solutions than last year by 29%, and their understanding of social responsibility has also reduced by 21.67% in this year. These two representative results should be a note of warning in our course to improve the effectiveness of teaching programs including various aspects such as professional technology and scientific humanistic quality. It is essential to fill the gap in core competencies training of undergraduates in Graduation Design, and some relevant improvements to its traditional teaching are urgently required in the remote education.

4 Strategies for Transfer Teaching and Courses

There are many reasons to explain the decline status of this year in the course survey, such as lacking of real learning atmosphere, physical experimental resources and inconvenient network because of

campus lockdown. Some argue that virtual learning online brings many barriers to learning process, but actually high-order educational outcomes can also be facilitated in online learning with appropriate teaching presence (Hill et al., 2017; Ko and Rossen, 2017; Li and Wang, 2018). Or some just neglect the urgency to transform the mentality from traditional pedagogy to blended teaching or online education (Allen and Seaman, 2007). The most important part of enhancing teaching quality is the transition of educators' role consistent with the modernization of engineering education in Internet Age.

Firstly, educator should pay more attention to the online course design purposefully as "outcome-focused" (Dalziel et al., 2015; Richard, 2019[117]), or problem centric principle. Since adult learners are self-directing and of self-concept (Knowles, 1980; Lieb and Goodlad 2005), supervisor should not only offer a general recommendation list of literatures but also explain the course objectives of how to achieve the requirement of information industry and society respectively. In this way educator can help undergraduates to identify and analyze why and what they really want to learn (Mezirow, 2000) from the complex engineering problem (as **competency 1**).

Secondly, utilizing online communication tools without restraint of time and location makes supervisor set aside the authority and helps undergraduates reduce negative emotions such as anxiety and misunderstanding brought by physical absence, to realize the efficient and active interactions. Online group chat and feedback with dedicated teaching guidance can be more engaged, positive and flat, as a bridge linking needs of society, e-learning environment, developing the **competency 7** as well.

Thirdly, multiple online platforms can be used for simulation and experiment for the undergraduates of communication engineering; even some are freely operated by national engineering virtual simulation experiment platforms. More abundant resources than offline, for instance, MOOCS of famous universities, videos of lectures, academic groups and forum on website, are available to use repetitively. Making changes to program implementation of Graduation Design by emphasizing on simulating complex engineering problems and understanding the limitations, instead of laboratory equipment and experimental materials, are the embodiment of **competency 4**.

Fourthly, this course is the last crucial part of communication engineering curricula to help undergraduates on self-development and they could change from connectivism to constructivism (Kop and Hill, 2008; Tacoma et al., 2020). For instance, personalized project of Graduation Design can be assigned to students by specific tasks in the final year from the online integrated teaching system, who had participated in various competitions in the junior and senior years. Meanwhile, digital appraisal of online management system can guarantee the quality of each stage in the course. The distance educational mechanism not only contributes to improving the depth, completeness and security of learning process (Griffiths and Inman 2017), also innovation self-efficacy relevant in **competency 2 and 3** for engineering students (Schar et al., 2017). The life-long learning ability of **competency 8** can be developed via online learning.

Last but not least, setting up cooperation between university and industry via internet, delivering critical reviews remotely from supervisor, enterprise mentor, or peer experts can greatly help students reflect and interpret the project prototype, especially in the phase of oral defense. It is vital for communication engineering undergraduates to achieve fuller understanding of the course objectives, the need of contemporary enterprises, social responsibility, and environmental impact in **competency 5 and 6**.The process of students creating a self-aware in discourse and constructing intrinsic values is explained as "Transformation Theory" (Mezirow, 2000).

5 Conclusion

It is known that university is a starting point for promoting innovation and updating with a rapidly changing society. In order to prepare communication engineering students to adapt to the high-tech enterprises and be an excellent engineer in future, the teaching quality of online curricula such as Graduation Design based on CDIO framework is worthy of great effort. How to enable teachers and students to achieve high-quality teaching and high-order learning should focus more on the transformation of distance education (Thurlings et al., 2015).

Through the comparative analysis of survey results for the course in Class of 2019 and 2020, we found many problems in the cultivation of students' capabilities. Considering the distinctness of adult learning, five stages of online education (Salmon, 2004), we suggest that each educator should try best

[117] Richard Culatta, Andragogy (Malcolm Knowles), 2019. Available at:

https://www.instructionaldesign.org/theories/andragogy/ (Accessed: 17th July 2019)

to reduce bias, promote innovation and make certain changes to realize CDIO requirement via online implementation (Gu et al., 2006; Thurlings et al., 2015). Prevalent online education can provide the assured superiority of encouraging learning autonomy, multiple resource offerings, "anytime and anywhere" access, convenient personalized interactions and remote management of professional corporations (Tabuenca et al., 2015; Martin et al., 2019).

However, there are several limitations in our survey. For instance, answers of questionnaires without a mid-point might bias the results. And our study only focused on the assessment of student self-response, and other points of view should be included in the future. The last point is that further investigation on strengthening different management of online courses should be carried out, in response to distinct desired learning outcomes.

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A Study on the Use of Mobile Payment by College Students

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Abstract: With the rapid development of Internet technology, mobile payment has gradually penetrated into our daily life, from shopping in large shopping malls to small merchants on the side of the road. The shadow of mobile payment is everywhere. The convenience of mobile payment makes it rapidly developed and widely used among college students. Studying the problem of college students using mobile payment is of great significance to the future development of mobile payment. This article first understands the situation of college students using mobile payment; then it analyzes the problems that college students have in the process of using mobile payment; and finally, "prescribe the right medicine" and give solutions. This article uses qualitative analysis to analyze the use of mobile payment by college students, and draws the conclusion that mobile payment is very popular among college students and the future of mobile payment is promising.

Keywords: College students; Mobile payment; Solutions; Prospect

1 Introduction

With the development and improvement of Internet technology, the use of mobile payment has increasingly become the primary choice for our payment methods. By the end of 2013, the number of consumers using mobile phones had reached 125 million, a year-on-year increase of 126%. It can be seen that mobile payment is favored by most consumers and has a broad market development space. According to the “Overall Situation of Payment System Operation in 2015” issued by the central bank, the scale of mobile payment services reached 13.837 billion in 2015, and the amount of mobile payments reached 108.22 trillion yuan (Han Haowei, Liu Ting, Wang Jia, 2019). In 2017, China University Media Union jointly paid for the consumption data of more than 10 million college students in more than 4,000 universities across the country. The data shows that the proportion of mobile payment after the 90s in 2016 is about 92%, and the per capita payment amount of college students on Alipay is near 40,839 yuan. The development of mobile payment has caused extensive research at home and abroad.

Deward (2005) research shows that consumers pay high attention to privacy protection and payment security when using mobile payment. According to the survey, about 26% of consumers did not use mobile payments because of concerns about security.

Schierz (2010) research shows that although the security of payment does not significantly affect consumers' use of mobile payment, it can largely affect consumers' non-use of mobile payment.

After research and analysis, Pan Li and Pu Junfeng (2015) proposed that the cost of using mobile payment and the ease of use of mobile payment also have a great impact on users' willingness to use mobile payment. The lower the cost, the easier it is to use. Then the stronger the user's willingness to use mobile payment.

Tan Xi and Chen Jianbin (2010) take capital university students as an example. When studying the factors that affect the use of mobile payments by university students, they add cost variables to the UTAUT model (integrated information technology acceptance and use model). They believe that risk

factors are cost factors and will Consumers' use of mobile payments has a negative impact.

Tao Yanyan (2013) divides perceived risk into six aspects: economy, privacy, function, service, time, and psychological risk, and conducts separate research on this, and finally concludes that economic and privacy risks have the greatest impact on consumers.

2 The Mobile Payment Related Overview

2.1 Methods and characteristics of mobile payment

With the development of technology, there are more and more mobile payment methods. Now the main mobile payment methods are: SMS payment; Scan code to pay; Fingerprint payment; Sonic payment. In addition to more and more payment methods, the characteristics of mobile payment are becoming more and more obvious, mainly including the following characteristics: mobility, timeliness, customization, convenience (Joe Boden, Erik Maier, Robert Wilken,2020), security (Lv Yue, Liu Ziran, 2017).

2.2 Research significance and current situation of college students using mobile payment

As the emerging subjects of the younger generation of online consumption, college students generally accept new things quickly, and they are also actively and boldly trying new things, and most of them can give valuable opinions and suggestions to conduct research on their use of mobile payment. It is helpful to predict the development prospects of mobile payment, and is also helpful to discover the problems encountered in the process of using mobile payment, and it is very helpful to solve these problems, and is conducive to promoting the development and improvement of mobile payment. Therefore, it becomes more realistic to study the status quo and prospects of college students using mobile payment.

The use of mobile payment by college students is of great significance to the future development of mobile payment. Research by foreign scholars has found that the security of mobile payment will affect college students' use of mobile payment to a large extent; while research by domestic scholars has found that costs, economic risks and Privacy risks will affect college students' willingness to use mobile payments.

Through the research on the status quo of the use of mobile payment by college students, it is found that there is a problem of low security awareness among college students in the process of using mobile payment, and it is necessary to raise college students' awareness of risk prevention. This article starts with a questionnaire survey of college students' use of mobile payment, analyzes the advantages and disadvantages of mobile payment, and predicts the development prospects of mobile payment.

3 Statistical Analysis of College Students' Use of Mobile Payment

In this paper, through the way of questionnaire survey to understand the use of mobile payment by college students in Wuhan, a total of 210 questionnaires were issued, and finally 210 questionnaires were collected, the effective rate of the questionnaire was 100%. Among them, the ratio of male and female is 49.52% and 50.48% respectively, and the proportion of male and female students in the questionnaire is reasonable; 21.9% of freshmen, 22.86% of sophomores, 21.43% of junior students and 33.81% of senior students are senior students. Therefore, the sample extraction is effective.

3.1 Survey data

The author uses a questionnaire survey to understand the use of mobile payment by college students in Wuhan. The following are the results and data of the questionnaire survey.

Table 1 Survey Data

	Variable	Frequency	Percentage (%)
gender	Male	104	49.52
	Female	106	50.48
Use how long	1-2 years	49	23.33
	2-3 years	70	33.33
	3-4 years	36	17.14
	More than 4 years	33	15.71
	Never used	3	1.43
Reason for use	High security	131	62.38
	Convenient	47	22.38
	Low cost	32	15.24
Future performance improvements	safety	70	33.33
	more convenient	49	23.33
	Have more features	47	22.38
	others	44	20.96

3.2 Problems reflected in the questionnaire

The questionnaire survey shows that college students pay high attention to the security of mobile payment, and the security of mobile payment even affects their willingness to use it.

In addition to the above security issues, college students hope that mobile payment can be more convenient.

3.3 Suggestions for solving problems in mobile payment.

The security of mobile payment technology is an important and even decisive factor for user satisfaction. When users experience mobile payment, the first thing they pay attention to is its security, and secondly its convenience (Zapan Barua, Wang Aimin, Xu Hongyi, 2017). As a key indicator of the quality of mobile payment experience (Mihail Cocosila, Houda Trabelsi, 2016), security has attracted more and more attention from users of mobile payment. The purpose of convenience is to help users get rid of the complicated process of cash transportation and payment (Chen, Su, Carpenter, 2020), so convenience has also become an important indicator of user satisfaction.

Addressing security issues: Mobile payment operators should strengthen technology research and development to further improve the security of mobile payments and ensure that users can enjoy convenient and fast payment methods in a safe and secure environment. In addition, mobile payment operators must strictly keep users' personal information confidential, improve moral quality, and be responsible for user loyalty. In addition, in order to reduce and avoid users' misunderstanding of the security of mobile payment, mobile payment operators should also strengthen the promotion of the concept of secure payment to reduce the cognitive risk of users on mobile payment. In addition, users should also raise awareness of safety precautions, especially college students, and should also raise risk awareness and safety awareness, and schools and society should take corresponding responsibilities for college students' mobile payment security awareness education. Regularly carry out mobile payment security awareness lectures, symposiums and other related activities to improve the risk awareness and security awareness of college students (Yan Zhen, 2016).

Solution for convenience: mobile payment operators should deepen the cooperation with network companies strengthen the network construction of mobile payment, and create a fast payment

environment for mobile payment user.

4 Prospect Analysis of Mobile Payment

4.1 Analysis on the competition and cooperation of mobile payment

(1) Competition

Although mobile payment is developing rapidly, it is also full of resistance. As one of the four new inventions in China, mobile payment has developed rapidly and is popular with everyone. This will lead to fierce competition in mobile payment, and there is also strong competition between mobile payment and banks. In the past, banks paid more attention to the bank accounts and transaction amounts of both parties of the transaction, while UnionPay paid more attention to the transaction amount (Cheng Hua, 2017). Mobile payment operators paid more attention to the payment capabilities of mobile phones and the binding of accounts. There are many common interests between them, but the boundaries are not so clear in the actual operation process. Once the boundaries are crossed, the division of benefits will not be so even, and there will be some overlapping business between banks and mobile payments, which inevitably leads to competition.

Table 2 Business of Commercial Banks and Mobile Payments

Commercial bank business	Mobile payment service
deposit business, loan business, securities investment business, cash asset business, transaction business, payment settlement business, clearing business, bank card business, etc.	settlement business, credit business, prepaid card issuance and acceptance business, online payment service, bank card acquiring business, etc.

The market size of China's mobile payment is constantly expanding, and the transaction value is also rising. Mobile payment has become a hot spot in the financial industry. As early as December 2012, the People's Bank of China released a series of technical standards for financial mobile payments. The introduction of these technical standards provides a good opportunity for banks to enter the field of mobile payments. Finally, the competition between mobile payment and cash payment cannot be ignored.

(2) Cooperation

Competition and cooperation are often difficult to separate. Although there is fierce competition between mobile payments and banks, they also have common interests, and these common interests are the basis of their cooperation. As early as 2012, Shanghai Pudong Development Bank and China Mobile jointly released four strategic products, mainly developing mobile phone near-field payment services. In the future, cooperation between banks and mobile payment is also indispensable. With the continuous development of the country's “going out” strategy, cross-border payment has also developed rapidly. Mobile payment joint commercial banks have opened an overseas fund settlement channel. In addition, the cooperation between mobile payment and commercial banks is also reflected in the security of online payment. In terms of network payment security, both have the same appeal, both against online fraud, pursuing the security of network technology, and ensuring user funds accounts and security of personal information (Jia Ning Luo, Ming Hour Yang, Szu-Yin Huang, 2016).

4.2 SWOT analysis

(1) Advantages: Mobile payment can make payments conveniently and quickly, and the popularity of the Internet and mobile phones provide a solid foundation for it.

(2) Weaknesses: The use of mobile payment may reveal the user's account, password and personal information, there is a privacy risk in the use process, and the use of mobile payment is more likely to be fraudulent.

(3) Opportunities: The rapid development of Internet technology is an opportunity for mobile

payment based on the Internet. The rise of online shopping has expanded the business and field of mobile payment, and promoted the popularization of mobile payment.

(4) Challenges (Threats): Mobile payment is developing rapidly, but the development of various institutional rules is not perfect, and competition is fierce.

Mobile payment is welcomed by users. According to the 2016 annual bill of Alipay, a subsidiary of Ant Financial, mobile phone payment has become the main payment method for people's daily consumption. According to incomplete data statistics, 68% of transactions occur on the mobile terminal. This data in the future It will continue to rise. And according to the results of the questionnaire survey, college students generally believe that mobile payment will develop well in the future, which is as high as 78.57%; the number of people who are uncertain about the future development of mobile payment accounts for 12.86%; only 8.57% believe that mobile payment will develop in the future Not good, college students are generally optimistic about the future development of mobile payment. Both the annual billing data and the results of the questionnaire survey show good news for the future development of mobile payments.

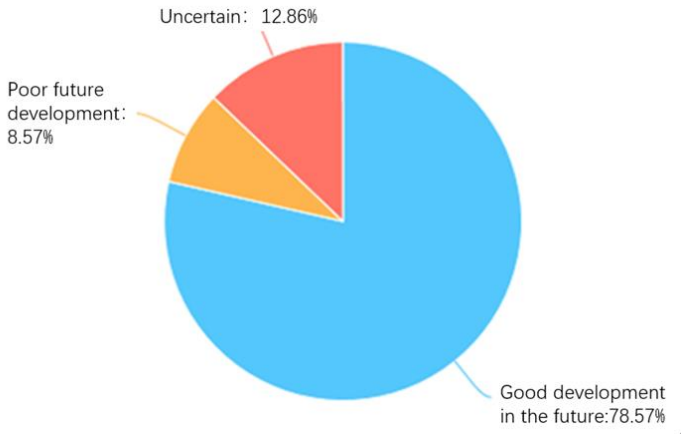

Figure 1 Survey of Mobile Payment Prospects

5 Conclusions

5.1 Summary of this article

Based on the above analysis, the future development of mobile payment has competition, cooperation, opportunities and challenges. However, mobile payment has developed in the era of rapid popularization of the Internet. Its emergence has greatly met people's demand for convenient and fast payment methods. The strong union of mobile payment and financial institutions such as banks has continuously deepened cooperation, and the innovation of mobile payment in technology research and development and payment models has been deepened. Mobile payment will go further and wider in the future.

5.2 Recommendations for mobile payment

(1) Actively Innovate Technology (Luo Tong, Miao Fang, 2020)

The improvement and innovation of mobile payment technology are the guarantee of security and reliability, and security and reliability are closely linked to user satisfaction. Therefore, technological innovation is essential to mobile payment.

(2) Establish Error Recognition System or Add Error Cancellation Function

Although most users are more cautious when making transfer payments, when there are still gross mistakes, if the mobile payment platform can automatically recognize some abnormal instructions, remind the user or cancel the transfer within a certain period of time when the user makes a mistake. Conducive to improving user satisfaction.

(3) Strengthen Cooperation with Banks and Other Institutions

Although there is a competitive relationship between mobile payment and banks, there are also many common interests and cooperation foundations between them. Mobile payment enhancement and cooperation between banks can complement each other and improve their competitiveness. On the one hand, we can also concentrate resources of all parties, jointly study and determine relevant standards to promote the development of mobile payment, reduce the risk of mobile payment, promote the establishment of a sound credit system, and promote the vigorous and healthy development of mobile payment.

5.3 Research prospect

This article studies the development of mobile payment from the perspective of university students. It is expected that more scholars will study mobile payment from the perspective of various social groups, and put forward more constructive opinions and suggestions to help the further development of mobile payment.

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Strategies for Enhancing Teachers' Online Teaching Based on Online Learning Acquisition for College Students

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Abstract: Online education has become the popular teaching style in China for the first time due to the outbreak of COVID-19. As numerous problems accompany the rise of online education, such as web-jam, some students hang up online learning, etc. So, how to enhance the online teaching effect is very important. From the perspective of online learning acquisition of university students, this essay uses three science methods, such as literature review, interview and questionnaire to investigation. According to analysis of the 457 data results, college students' acquisition of online learning is not very good in general. From the result, this paper discovers that teachers teaching has eight effects on online acquisition to college students. Based on the investigation results, this research gives three matching strategies to enhance teachers 'online teaching. Such as increasing interaction, adjusting teaching style and training the operational skills.
Keywords: College students; acquisition of online learning; Influencing factor; College teachers; online teaching improvement

1 Introduction

There are plenty of literature about the teaching on line and a fully online university in foreign country. Badia, Garcia, & Meneses (2017) surveyed 965online teachers belonging to the Open University of Catalonia and gave three approaches to teaching online: the Content Acquisition approach, the Collaborative Learning approach, and the Knowledge Building approach. Antoni Badia , Consuelo Garcia and Julio Meneses (2018) investigate the emotions associated with the experience of teaching online in an online university and the factors that influence these emotions .Cheng, H. N. H., Liu, Z., Sun, J., Liu, S., & Yang, Z. (2017) pointed out online learning behavioral patterns and their temporal changes of college students in SPOCs. Cho, M.-H., Kim, Y., & Choi, D（2017）found the effect of self-regulated learning on college students' perceptions of community of inquiry and affective outcomes in online learning. In line with cutting-edge technologies such as big data, transmitting communication applications, internet-engaged behaviors of new generations (Huda et al., 2017), higher education are confronting many new challenges in teaching programs, especially for Graduation Dissertation or Graduation Design.

The reform and innovation of College Teachers' classroom teaching has been concerned with the years. At the beginning of 2020, the guidance[6] No.2 issued by the Department of Higher education clearly pointed out that response to the needs of epidemic prevention and controlling, universities should make advantages of online teaching, carry out the teaching and learning reform and innovation with the deep integration of information technology and education and teaching, promote the reform of learning methods, and complete the teaching task with quality and quantity guaranteed"（CNNIC,2020）. Yongxin Zhu（2020), Since coronavirus outbreak, the establishment of the largest online teaching program with the largest number of on-line courses and the largest number of people are covering the largest number of universities in the short time.

In China, there are many researches on the analysis of online education market, especially on online learning in recently years with the development of online teaching and learning（Li fang,2018）. However, there are few researches on online teaching of college teacher based on the perspective of College Students' online learning acquisition. At present, the epidemic prevention and control has been normalized. This is both an emergency solution and a demonstration of the "Internet plus education" reforming in the previous stage. Based on the background of the situation, this study uses online interview and questionnaire to survey the online learning acquisition of 457 college students and college teachers' teaching influence in detail. At last, it gives countermeasures to promote online teaching for college teachers.

2 Survey Methods and Sample Structure

The 457 questionnaires are collected and are valid questionnaires. Among them, there were 253 males (55.36%) and 204 females (44.64%). There are 128 freshmen (28.01%), 67 freshmen (14.66%), 191 juniors (41.79%) and 71 seniors (15.54%).

Table 1 Data Information of Research Objection1

Project	Category	Number of samples	The percentage
Gender	male	253	55.36%
	female	204	44.64%
Grade	A freshman	128	28.01%
	A sophomore	67	14.66%
	Junior year	191	41.79%
	Senior year	71	15.54%

This paper uses three research methods. First method is literature analysis: Through the analysis of scholars' literature on online teaching and learning, combined with the current status of online teaching in China, this paper explores the problems existing in the current online teaching mode and forms the basic framework. Second method is interviewing method. To understand the acquisition of college students' online study, compiled the first interviewing outline. The open interview questionnaire consists of the following three parts: "What your gains from the online learning the process" "what factors affect your online learning gains from your college teacher ", "What's your ideas about improving the college students' online learning from your teacher". According to collecting data, choose high frequency items for closed questionnaire. Third method is closed questionnaire survey. Combined with previous literature analysis and interviews, the closed questionnaire was finally formed. The questionnaire is divided into three aspects: the personal information, online learning gains of the research object, the factor analysis of the impact of the teachers, and the countermeasures.

3 Survey Data Analysis

3.1 Analysis about online learning acquisition of college students

Table 2 Online Learning Acquisition for College Students

Options	The number of	The percentage
Very good	16	3.5%
Good	52	11.38%
General	68	14.88%
Bad	132	28.88%
Very bad	189	41.36%

As Table 2 shows, the gain of online learning for college students shows an increasing trend from "very good" to "very bad". 41.36% of college students think online learning is very bad, 28.88% think it is bad, 14.88% think it is average, and only 11.38% and 3.5% think it is ok or very good. According to the data, college students' gains of online learning is not very good in general, and online teaching in the implementation process is not very satisfactory to college students.

3.2 Analysis about the affection of college teachers on acquisition of online learning to college students

Table 3 Influence of Teachers on College Student's Acquisition of Online Learning

options	The number of	The percentage
Teacher-student interaction frequency	286	62.58%
Teaching style	269	58.86%
Course content	230	50.33%
Homework	224	49.02%
Course rhyme	222	48.58%
Teachers' proficiency in using online platforms	200	43.76%
Learning material Shared	191	41.79%
The number of learning platforms used	102	22.32%

other	9	1.97%

Carmo, R. D. O. S., & Franco, A. P. (2019) pointed out teachers should start working as online tutors conducting the pedagogical mediation in the virtual environment of distance undergraduate courses[9] As table 3 shows the frequency of interaction in classroom is to 62.58%, and college students have a strong demand for classroom interaction. "Teaching" is an exchange process between "teaching" and "learning". Online learning lacks related supervision and teachers didn't response immediately, students will become more relaxed and less involved, which directly reducing gains from online learning.

The influence of teaching style is as high as 58.86%. Teachers' teaching habits can give a good impression on students and whether the expressions of humorous or dull will influence the classroom experience of online learning of college students. The influence of course content is as high as 50.33%. Whether the course content has conditions and requirements and whether the teaching form can meet the needs of the course can affect the progress of college students' online learning. According to the amount of homework is also accounted for 49.02%. Most college students believed that the amount of homework is much more than offline class. So, they feel more pressure about it. The influence of course rhythm is 48.58%. Most teachers didn't give living in online teaching, which they afraid of leading the web crowed. So, most teacher can't see every students' face, which is unconsciously speed up the voice' and the course progress. Therefore, Students' gain will be reduced because they can't keep up with the knowledge and thinking mode.

Teachers' proficiency of using online platform is accounted for 43.76%. Teachers are familiar with the application of learning platform conveniently, which can have a high-quality result with the existing conditions in the process of teaching. Teachers' operational skills are not good in online learning platform and can cause teaching processing is not timely, not smoothing and delaying course progress, which led to students' learning motivation decreased.

The influence of amount of studying data share by teachers is 41.79%. A large number of college students said teachers share online learning data, for example learning courseware, learning video are greatly increasing than before. The sharing material in spare time associated with the course can attract the students' interest in learning and stimulate students' self-study ability, expand the scope of the study, which can improve the acquisition for them. The impact of quantities for learning platforms used is 22.32%. Too many learning platforms occupied a large amount of memory of computer or telephone. So, it is easy to get stuck and make students go to the wrong set, which was inconvenient for students.

4 Strategies for Enhancing Teachers' Online Teaching

4.1 Increase interaction between teachers and students

Gao, J., Zhao, B., Xiong, Y., & Gan, J. (2019) gave suggestion about the emotional participation. Interactive Learning Environments (Gao J, Zhao B, Xiong Y, et al,2019) .This study also found that college students expect teachers to interact with students more in class and to open the camera to have more dynamic interaction; It is expected that teachers can play music or small videos during the break. Teachers should let students speak freely and express their own opinions online which can stimulate students' initiative;

Teachers can use the style of recording and living in online teaching. When teachers record the course, he can give a speaking message to where they want to emphasize the supplement and also can give some questions to students to think and communicate. So as to reduce the boredom during the class as much as possible, it can also let students review knowledge by watching video in their spare time. Teachers can set some interesting checking, random roll call, regular Q&A, characteristic interaction, etc. In order to make up for the boring feeling brought to students by too much theoretical knowledge, teachers can share more extension of knowledge from reality use.

4.2 Teaching style and content should be adjusted

Online teaching should be mainly around students. Teachers should take students as the center in the online teaching process and grasp the common characteristics class which make certain adjustments to teaching methods with the principle of person to person (Zheng xiang,2020). At the same time ,the construction of competition system of team shows in ecological classroom teaching mode can be copied on online teaching and learning (Zheng xiang,2018)In terms of teaching resources, such as courseware, exercises related reading materials and video, should match the students' learning ability and matching with teaching content and students' subjective thinking. To achieve a unique teaching resources, especially the timely sharing of teaching resources, it is important influence on students preview and review.

Between live broadcast and recorded broadcast, students prefer to the front one. Students prefer live

broadcasting to recorded broadcasting. They found the live broadcasting has a better interactive, which can find and solve their problems in time. The special review and assignment evaluation can be recorded and put on the learning platform, which is convenient for review. To teaching process, teachers should do it step by step or from the easy to the difficult. Accord to the actual situation, use a variety of teaching methods can stimulate students' interest in learning and reduce the online difficulty. For the teaching schedule, teachers can adjust their schedule according to students' reflection and give up full class teaching or chase up. Students think long-term exposure to electronic products will hurt their eyes. Only appropriate homework can get the effect of reviewing and consolidating knowledge. Students also want to reduce the time of course videos and also hope the deadline of the platform should be extended by teacher because they really have more homework than before.

4.3 Online teaching effect should be improved

In this research, some students said that class are delayed by unskilled operation of the teaching software for teachers and also affected their experience in the online learning. So, they hope teachers should accept certain online skills training which can use the teaching platform fluently. Teachers can join in teaching experience sharing meetings, enhancing online teaching methods to rebuilt a good role of teachers and improve online teaching quality to enhance students' online learning acquisition at last (Yuchen Shi,2020). On the other hand, colleges' functional department can set up online teaching support groups to solve the blockage of teachers' online teaching to the greatest extent.

Table 4 College Student's Demands of Online Learning

Options	The number of	The percentage
Increase interaction and share more extracurricular Knowledge	288	63.02%
Share learning materials in time	287	62.8%
Reasonable allocation of class hours, accurate Grasp of the course schedule	242	52.95%
Adopt a student-centered teaching approach	192	42.01%
Recorded as far as possible	189	41.36%
Strengthen online teaching technology training	187	40.92%
Increase the form of attendance such as punching In and random drawing	139	30.42%
Other	9	1.97%

5 Conclusion

Young people are the future and are a powerful way to realize Chinese's dream and they also are human capital foundation to promote the social development in our country. As time goes on, online teaching and learning has become a normal way for cultivate talents. College students' gains of online learning is closely related to the depth and breadth of knowledge understanding, the comprehensive quality, and career planning effective abilities. This study found that college students generally believe that online learning effect is not as good as offline learning effect, because of the poor learning environment, low self-control ability, little interaction between teachers and students, and not timely sharing of learning materials, etc., so it needs the joint efforts of all social parties to improve students' sense of online learning.

There are many pities in this study, such as lacking more research methods and analysis is not deeply, etc. In the future, the research will enhance the ability in many aspects, such as the selection of investigation methods, the rigorous and patient in research and it will be compared analysis with the structural equation model in order to achieve better research results.

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Singapore's Main Experiences and Practices in Developing World-class Universities

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Abstract: Singapore's is rapidly developing world-class universities in a short period of time. Its national promotion and government-led mode is similar to China's. This paper carries out empirical research methods, put forward that the main experiences and practices of Singapore in developing a world-class are the reform of university governance system, globalization in running university, an excellent scientific research system for the transformation of achievements, and concludes that Singapore's case successfully nurture a world-class education system even it is a small country, making a great enlightenment for China to develop world-class universities.
Keywords: World-class university; Singapore; National university of Singapore; Nanyang technological university

1 Introduction

In November 2015, the Chinese State Council released a statement ("Coordinate Development of World-class Universities and First-class Disciplines Construction Overall Plan") designed to lift the status and standing and international competitiveness of China's higher education system. In September 2017, the Ministry of Education, the Ministry of Finance, and the National Development and Reform Commission jointly released a selected list of universities and colleges, which will participate in the country's plan of world-class universities and first-class disciplines.

In the existing research results of experience reference, the sources of reference are mostly concentrated in developed countries. For example, (Wang Changyu, 2006) summarized the development process of higher education in the United States, while (Liu Yuanyuan, 2015) took Cornell University as an example to summarize experience and put forward enlightenment. These studies have certain reference for the construction of world-class universities in China. However, developed countries have experienced a long process of modernization and higher education, with a relatively solid foundation. How China can jump out of the disadvantages of late start and weak foundation is worth thinking about. At the same time, the existing research results of experience and reference mostly focus on specific issues in one aspect, such as (Ke Wenjin, 2014) carried out research around the salary system. Therefore, we should find a reference source that is more in line with China's national conditions and carry out empirical research focusing on the fundamental issues of the construction of first-class universities. Singapore's higher education system is closer to China's, that is, it is both a state-driven and government-led higher education system.

Singapore has six publicly-funded autonomous universities, including the National University of Singapore (Hereinafter referred to as NUS), Nanyang Technological University (Hereinafter referred to as NTU), Singapore Management University (Hereinafter referred to as SMU), Singapore University of Technology and Design, Singapore Institute of Technology and Singapore University of Social Sciences. According to the world-renowned university rankings, Singapore's world-class universities mainly refer to the NUS and the NTU. Some business disciplines of SMU are also highly competitive in the world. There are four major world university rankings, they are QS World University Rankings (Hereinafter referred to as QS), Times Higher Education World University Rankings (Hereinafter referred to as THE), US News World University Ranking (US News) and Shanghai Ranking's Academic Ranking of World Universities (ARWU). In recent years, the NUS and the NTU have both ranked the top 100 in the above ranking lists (see the table 1 below). According to the 2020 QS World University Rankings, Both the NUS and NTU hold its position as 11th in the world and 1st in Asia. The two universities are named one of the world's first-class and Asia's top.

Table 1 NUS and NTU in the Four Major World University Rankings

	NUS				NTU			
	Year 2019		Year 2020		Year 2019		Year 2020	
	Global	Asia	Global	Asia	Global	Asia	Global	Asia
QS	11	1	11	1	12	2	11	1
THE	23	2	25	3	51	6	48	7
US News	38	1	34	1	49	2	43	3
ARWU	85	7	67	5	96	8	73	7

2 Singapore's Main Experiences and Practices in Developing World-Class Universities

To meet the challenges of globalization as well as enhance Singapore's innovation and national competitiveness, the Singapore government continuously increased investment in higher education, promoted the reform of university governance system, and guided universities to adhere to the concept of internationalized education, thus realizing leapfrog development of higher education and winning a good international reputation. Its main experiences and practices are as follows.

2.1 Promoting the reform of university governance system

The Singapore government began to try out the reform of university autonomy and enterprise governance in 2000 and fully implemented it in 2006. The governance reform has transformed universities from statutory institutions affiliated to the Ministry of Education to autonomous universities with autonomy in running schools and governed by corporatization.

2.1.1 Clarify the powers and responsibilities, and delegate the autonomy of running schools

After the governance reform, the rights and responsibilities of the government and universities are clarified by the relevant bills. The university bills approved by Congress and signed by the Country's President are the most important basic documents to clarify the relations between the government and universities. The government governs the school through the university board and no longer directly engages in university teaching and management affairs. The university enjoys autonomy in the following aspects:(1)The university's development strategy and priority areas;(2)The university's internal governance;(3)The use of funds;(4)Setting and adjusting tuition standards for different specialties within the limit;(5)The training mode of students;(6)Independent enrollment within 10% of the total number of undergraduate students;(7)Recruiting foreign students with full tuition fees;(8)Recruitment and promotion of teaching staff;(9)Salary and treatment of teaching staff.

2.1.2 Determine the responsibility framework and strengthen the supervision system

In order to ensure that universities can follow and cooperate with the overall development goals of higher education set by the state and effectively improve schools-running, the government has set up a responsibility framework system to supervise universities. The responsibility framework system includes three aspects:

(1) Policy agreement: clarify the responsibility of government funding and that universities can always follow the overall goals and plans for the development of higher education formulated by the government on the premise of autonomy.

(2) Performance agreement: formulated by the university and approved by the Ministry of Education. Determine the overall development goals of the university within a certain period and the main development indicators in specific fields such as teaching, scientific research and social services.

(3) Quality assurance system: through the combination of internal evaluation and external evaluation, the university can effectively use resources and achieve the expected development goals.

2.1.3 Ensure financial input and encourage universities to raise funds through multiple channels

The government believes that sufficient funds are necessary to promote the construction of world-class universities. Based on ensuring the steady growth of financial investment, the government encourages universities to raise funds through cooperation with enterprises, provision of social services, attraction of alumni, social donations and other channels. The government not only gives tax reduction to donors, but also gives a 1:1 matching subsidy to donations received by universities. In 2010, the government introduced an enhanced matching subsidy policy, that is, the ratio of endowed donation received by the government to universities was increased to 1: 1.5, and the ratio of donations received by newly-built universities was determined to be 1: 3 in the first 10 years.

2.2 Adhering to the vision of globalization in running university

One of the most important functions of a university is to carry out global cooperation, cultivate students' global vision to cope with challenges in the international context. The NUS proposed "help students meet the world and introduce the world to the NUS"; The NTU proposed "introduce the world into the NTU". This global vision and open way of running schools are mainly reflected in adhering to the concept of internationalized running university, the globalization of staff and student training.

2.2.1 Adhering to the concept of internationalized running universities.

Both the NUS and the NTU attach great importance to improve the internationalization. They cooperate with top international universities through jointly running schools. In 1998, the Singapore government announced that it would attract 10 world-class universities to set up branches or cooperate in running schools in the next 10 years. By 2005, 10 of the world's top universities specializing in medicine, business, logistics and engineering have set up branches in Singapore, including Johns Hopkins University, Massachusetts Institute of Technology, the University of Pennsylvania, European

Institute of Business Administration, the University of Chicago, Georgia Institute of Technology, and Shanghai Jiaotong University. Currently, the colleges jointly organized by Singapore and top international institutions include Yale-NUS College(a collaboration between Yale University and the NUS), Duke-NUS Medical School(a collaboration between Duke University and the NUS), Cornell-Nanyang Institute of Hospitality Management(a collaboration between Cornell University and The NTU), Lee Kong Chian School of Medicine (a joint initiative between Imperial College London and the NTU), continue to serve Singapore in introducing top higher education resources.

2.2.2 Globalization of the teaching staff

Take the NUS and the NTU as examples. More than 65% of the teaching and scientific research staff comes from abroad, with doctoral degrees from top universities. Some even are Nobel Prize winners. Local teachers also obtain higher education degrees from top universities. The country spared no expense to draw the world's outstanding talents, supported universities to recruit presidents, internationally influential scholars and outstanding young talents. For example, the NTU currently has more than 20 world-class senior professors and more than 100 outstanding young scientists and scholars. The university supports teachers to participate in international academic exchange activities, sends a certain number of teachers to study abroad, and employs a high proportion of famous foreign scholars to give lectures to promote exchange of teachers from “going global and bringing-in”.

2.2.3 Globalization of students training

It is estimated that about 15% of undergraduates and nearly 60% of postgraduates in the NUS and the NTU come from overseas (see the pie chart below). The government provides a great number of scholarships and subsidies to attract outstanding international students to study in Singapore. The university strongly supports students' overseas exchanges. For example, the NUS cooperates in student exchange programs with more than 300 partner universities in more than 40 countries, it has 11 NUS overseas colleges in major global entrepreneurship centers such as China, Israel, Sweden and the United States to provide students with enterprise internship programs. The NTU has cooperated with more than 100 overseas universities to implement the “Global Immersion Program” for undergraduates, which enables most undergraduates to study overseas for one year, broadening their horizons and enrich their choices.

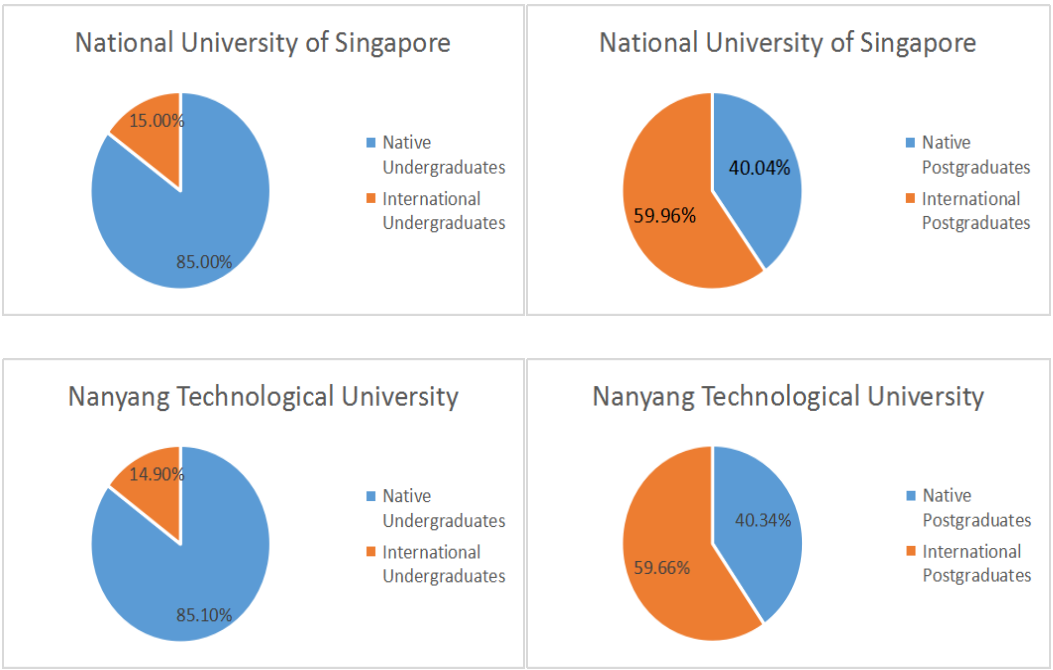

Figure 1 Percentage of International Students in the NUS and the NTU

2.3 Building an excellent scientific research system for the transformation of achievements

Scientific research is an important indicator to measure university performance. Singapore enhances the research capacity by building an excellent scientific research system for the transformation of scientific research achievements and strengthening cooperation with enterprises.

2.3.1 Building an excellent scientific research system

The government has set clear and specific targets and invested in key areas through institutions such as the National Research Foundation, Standards, Productivity and Innovation Board, Economic

Development Board and Agency for Science, Technology and Research, with great results.

The government created “Campus for Research Excellence and Technological Enterprise”. Also, it encourages cooperation between the university and top international universities to establish research centers. By launching the “Research Centers of Excellence” project, six Research Centers of Excellence were established in the NUS and the NTU to attract the world's top researchers. On average, each center receives about US $100 million from the Ministry of Education and the National Research Foundation.

The government started the “Competitive Research Project” to improve the research capacity of university. The project is aimed at potential strategic areas where Singapore can invest in developing new industries in the future. Each project will be funded by 5-10 million US dollars according to the opinions of the international evaluation Committee.

2.3.2 Strengthening Cooperation with Enterprises

The universities have established partnership with enterprises, carried out cooperative research, developed new technologies. The NTU has established long-term partnerships with BMW Group, Rolls-Royce Company and Lockheed Martin Corporation, and the research projects involve space and deep-sea science, new fuels and nanotechnology. The NUS has established research and development partnerships with large multinational companies such as Siemens, General Motors, Agilent and Roche.

3 Implications Revealed in Singapore’s Case

Singapore’s case revealed that what are the advantages and characteristics of world-class universities as well as the connotation and key indicators that world-class universities should have. It can be summarized in the following aspects: scientific university-running ideas and innovative governance system, internationalized teaching faculty and first-class scholars, academic freedom, knowledge innovation and technology transfer, international cooperation and student training with international vision, serving the society in various forms and close connection with enterprises.

Generally speaking, “Newly-formed” world-class universities are unlikely to surpass “time-honored” universities in the early stage due to various reasons such as educational experience and conditions to achieve the goal of world-class universities. However, recent years is witnessing the rising proportion of “Newly-formed” world-class universities in the list of world-class universities rankings, such as the NUS and the NTU. This fully demonstrates that university-running history and experience are not decisive factors of developing a world-class university. This type of university also achieves “leapfrog development” under appropriate circumstances, and successfully ranks world-class universities. In the process of achieving the goal of being world-class in China’s higher education system, there are problems such as the deviation between the concept of university development and the essence of university, the development slogan is more important than the action, the excessive emphasis on the speed and scale of development, and the excessive emphasis on research indicators, thus ignoring the internal factors such as university culture shaping , development strategy formulation, organizational management reform.

The enlightenment of the NUS and the NTU to the “World-class Universities and First-class Disciplines Construction” in China includes adhering to the development concept of “entrepreneurial model” universities and shaping innovative entrepreneurial culture; formulating long-term strategic planning and introducing first-class faculty; promoting internationalization and combining “introducing” with “going out”; improving the governance system and enhancing the governance capacity.

4 Conclusion

The case of Singapore arrives at the conclusion that even a small country can nurture a world-class education system if it has appropriate and good governance system, funding measures, infrastructure, academic culture, etc., thus making Singapore's higher education win a good international reputation and some of them have climbed up the list of the world's leading universities.

But, the construction of a world-class university in Singapore is not perfect. For example, the influx of foreign talents has impacted the interests of natives in job markets and welfare, and ranking pressure has led to a certain utilitarian tendency in academic evaluation standards, and excessive talent mobility may affect the talent structure. In general, some universities in Singapore have been listed in world-class universities in a short period of time, and Singapore has ranked among the developed countries in the world by its advantageous position in the global economy.

Singapore's experience is of great significance to China's construction of world-class universities because Singapore is similar to China and both belong to post-development countries in higher education. China may learn from Singapore’s experience as it embarks on the process of developing world-class universities.

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Research on Mobile Phone Addiction in College Students

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Abstract: In this study, we took college students as subjects, and used convenient sampling to conduct a questionnaire survey. On the basis of previous literature review, this paper puted forward the hypothesis that mobile phone addiction affects college students' cognitive function. This study argued that college students' mobile phone addiction would affect a variety of functions, including negative emotions, cognitive failure, and constructed a mediation model of the impact of mobile phone addiction on college students' cognitive failure. Conclusion indicated that mobile phone addiction had direct effect on cognitive failures, anxiety mediated the effect of mobile phone addiction on cognitive failures partially.
Keywords: College students; Mobile phone addiction; Anxiety; Cognitive failure; Mediation model

1 Introduction

The use of mobile phones brings convenience to people and also immerses them in it. For example, some mobile games are like "electronic opium", and there are countless addicts (Xie Wan Fei, 2017). Mobile phone addiction refers to an obsession state in which an individual's physical, psychological and social functions are impaired due to his/her uncontrolled use of mobile phones (El-Sayed Desouky Dalia, 2020) . Excessive use of mobile phones will bring negative physiological and psychological effects, such as neck pain, dizziness, palpitation, gastrointestinal dysfunction and other physiological reactions (Hadlington, 2015). Weaken interpersonal skills and cause interpersonal conflicts (Chen L 2016),reduce individual academic performance (Samaha, 2016). Therefore, the negative consequences of mobile phone addiction deserve our attention.

In recent years, research perspectives have begun to shift towards the effects of mobile phone addiction on individual cognitive functions, such as cognitive failure. Cognitive failure refers to an individual's cognitive ability to perform cognitive tasks that are inadequate or impaired, resulting in an individual's inability to successfully complete daily tasks usually performed, such as forgetting appointments ,repeat reading the text they have already read (Nicole Carrigan, 2016). Frequent cognitive failure leads bias in selective attention, reduces the ability to focus attention , affects the safety behavior of individuals in the workplace, and even cause serious traffic accidents (Hu Yue, 2017). Previous research has found that individuals with Internet addiction show significant impairment in cognitive functions such as memory and attention, MP use has a significant negative impact on working memory performance of human participants. The effect is apparent even for a 5 minute use of the MP (Kalafatakis, 2017). Hadlington's research has shown that excessive mobile phone use increases cognitive failure in daily life. He believes that excessive use of mobile phones will reduce the cognitive resources needed by individuals in other activities, resulting in an unreasonable allocation of resources (Hadlington, 2015). Therefore, they are prone to distraction and false memories when completing tasks, leading to cognitive failure. Other study has shown that mobile phone addiction is significantly positively correlated with anxiety (Zhou Yang, 2016). Demirci et al. also found that excessive use of mobile phone can predict an individual's anxiety level. Individuals with a high propensity for mobile phone addiction tend to show significant anxiety (DemiRci, 2015). To sum up, previous studies have paid less attention to the negative impact of mobile phone addiction on individuals, especially their cognitive function, and lacked the exploration of the formation mechanism of negative consequences. Therefore, this study intends to study the relationship among mobile phone addiction, anxiety and cognitive failure, to provide some reference for prevention and intervention in this field in the future.

2 Objects and Methods

2.1 Objects

The sample consisted of 1000 undergraduate students in their first to third years at two universities (Wuhan, Hubei).All students possess mobile phones and have access to Internet and use it as part of their life. Questionnaires were a distributed and collected on site. Participation was voluntary, six students had to be excluded for not replying properly to all questionnaires, so the final sample consisted of 994 participants(560 males and 434 females)374 freshmen, 368 sophomore students and 252 junior students, with a mean age of 19.12 years (SD = 1.18).

2.2 Methods

This study used questionnaire investigation, included the Chinese version of Mobile Phone

Addiction Index (MPAI-R), the Chinese version of Cognitive Failures Questionnaire (CFQ-R) and Symptom Checklist-90 (SCL-90).

The MPAI-R compiled by Leung et al. and revised by Huang Hai. It is a 17-item 5 point-Likert scale questionnaire, including four dimensions: loss of control, withdrawal, avoidant and inefficient. Higher questionnaire score indicates higher level of individual mobile phone addiction. Cronbach's alpha of the MPAI was 0.91.

The CFQ compiled by Broadbent et al. and revised by Zhou Yang. The CFQ is a 25-item 5 point-Likert scale questionnaire, including five dimensions of interference, memory, interpersonal errors, motor coordination and name memory. The higher the score, the higher the level of cognitive failure. Cronbach's alpha of the CFQ was 0.94.

The Symptom Checklist-90 (SCL-90) was used to check for complaints indicating the presence of psychological distress. The SCL-90 is a 90-item self-assessment questionnaire for symptoms of different mental disorders; for the purpose of our study, only selected the anxiety subscale, it is a 10-item 5 point-Likert scale questionnaire. The higher the score, the more serious the anxiety symptoms were. Cronbach's alpha of the anxiety subscale was 0.83.

2.3 Statistical analysis

We used SPSS19.0 for statistical analysis. Descriptive statistics were obtained for all variables; to identify the possible relations between variables, Pearson correlation coefficients were calculated.

3 Consequence

3.1 Descriptive statistics of mobile phone addiction, anxiety and cognitive failure of college students.

The MPAI total score and each dimension scores were 37.86±11.50, 16.46±5.16, 7.91±3.46, 7.75±3.08 and 5.75±2.47, and the total score of mobile phone addiction was in the middle level. The score of anxiety was 15.1 ±4.34, at a low level. The total score and dimensions of cognitive failure were 57.31±14.93, 25.27±6.41, 12.13±3.91, 9.15±2.98, 6.25±2.04 and 4.51±1.59, the total score of cognitive failure was in the middle level.

3.2 Correlation analysis of mobile phone addiction, anxiety and cognitive failure among college students.

As shown in Table 1, the total score of MPAI and the scores of each dimension, anxiety and cognitive failure were significantly positively correlated (P<0.01), with the correlation coefficient between 0.26 and 0.54.

Table 1 Descriptive Statistics and Correlation Analysis Results of Scores of Each Scale（n=994）

	Score	loss of control	withdrawal	avoidant	inefficient	anxiety	cognitive failure	interference	memory	motor coordination	name memory
1	0.886[a]										
2	0.801[a]	0.559[a]									
3	0.716[a]	0.463[a]	0.502[a]								
4	0.791[a]	0.677[a]	0.534[a]	0.419[a]							
5	0.391[a]	0.323[a]	0.285[a]	0.343[a]	0.322[a]						
6	0.544[a]	0.468[a]	0.400[a]	0.403[a]	0.495[a]	0.512[a]					
7	0.537[a]	0.467[a]	0.383[a]	0.404[a]	0.487[a]	0.491[a]	0.942[a]				
8	0.460[a]	0.390[a]	0.352[a]	0.328[a]	0.427[a]	0.418[a]	0.906[a]	0.777[a]			
9	0.474[a]	0.392[a]	0.353[a]	0.375[a]	0.430[a]	0.493[a]	0.830[a]	0.718[a]	0.683[a]		
10	0.424[a]	0.370[a]	0.317[a]	0.303[a]	0.378[a]	0.412[a]	0.818[a]	0.689[a]	0.782[a]	0.591[a]	
11	0.384[a]	0.349[a]	0.275[a]	0.262[a]	0.351[a]	0.353[a]	0.767[a]	0.684[a]	0.640[a]	0.593[a]	0.600[a]

tips： a $P<0.01$

3.3 An analysis of the mediating effect of college students' anxiety on mobile phone addiction and cognitive failure

To analyze the mediation effect of anxiety, we took mobile phone addiction (MPAI) as the independent variable, cognitive failure (CFQ) as the dependent variable, and anxiety as the mediation variable. This study used deviation correction non-parametric percentile Bootstrap method to extract a sample size of 3,000 and a confidence interval of 95%. The results showed that each path value of the mediation model was between 0.33 and 0.91, all of which were significant (P <0.01). The goodness of fit indices were: χ^2 =250.5, df =33, χ^2/df = 7.59, RMSEA=0.08, TLI=0.95, CFI=0.96, so the mediation hypothesis model is acceptable, as shown in Figure 1. Further test of mediation effect showed that the 95% confidence interval of mediation effect of anxiety between mobile phone addiction and cognitive

failure of college students was [0.11, 0.17]. The mediation effect value was 0.13, and the mediation effect value was significant, accounting for 21.8% of the total effect. Therefore, anxiety is a mediation variable between mobile phone addiction and cognitive failure in college students.

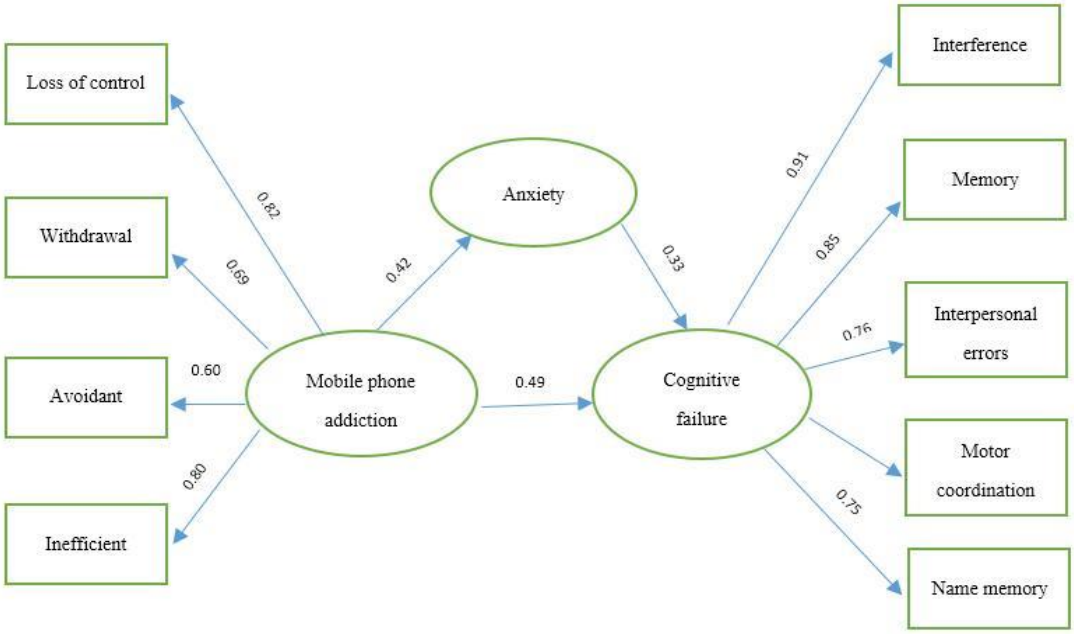

Figure 1 A Mediating Model Between Mobile Phone Addiction and Cognitive Failure

4 Conclusion

Our hypothesis, that excessive use of mobile phone is related to psychological distress in college students has been confirmed, in accordance with previous studies with college students where problematic users showed less self-esteem, more loneliness, depression, anxiety and sleep disturbances, as well as higher scores in the general indices of the SCL-90.

Our results also show the mobile phone addiction of college students is at an intermediate level. It shows that with the popularization of Internet and mobile phones, college students use mobile phones more and more frequently, and their dependence on mobile phones is also increasing, which should arouse the attention of mental health educators.

The results of this study show similar to previous research conclusions, mobile phone addiction of college students has a positive predictive effect on cognitive failure. This may be related to the lack of individual mental resources. Mobile phone addiction individuals will overtax their psychological resources and are prone to physical and mental fatigue. These individuals will be susceptible to emotional lability when completing cognitive tasks and will be less motivated to complete the task, and increase the likelihood of cognitive failure. Therefore, mental health educators should be highly concerned about the impact of excessive mobile phone use by college students on their cognitive failure.

The results show mobile phone addiction has a significant positive predictive effect on anxiety, the more dependent they are on mobile phones, and the more likely they are anxiety. Previous studies have also shown that excessive mobile phone use can cause emotional problems such as social anxiety. This is because frequent mobile phone use may activate individuals' emotion and physiological arousal, bring sleep disorders and lead to increased anxiety experiences. Mobile phone addiction also relatively less able to manage their emotions. When they're under pressure, they cannot deal with their emotional issues and experience more anxiety.

On the other hand, mobile phone addiction indirectly affects the cognitive failure of college students through anxiety, which plays a partial mediating role between mobile phone addiction and cognitive failure. Excessive use of mobile phones to play games will increase the anxiety experience of college students, which in turn will make them unable to refocus their attention on new cognitive tasks, such as learning new knowledge, thus weakening the individual's ability to process information. This leads them to show more cognitive failure when they complete daily tasks, such as more daydreaming and poor academic performance.

This suggests that the psychological intervention of mobile phone dependent college students should not only pay attention to the repair of cognitive impairment, but also pay attention to the role of emotion

in the formation of cognitive impairment. In the future, it may be considered to reduce the performance of cognitive failure by enhancing the emotional regulation ability of college students.

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Research on the Sustainable Development of National Defense Scientific Research Management in Higher Education Institutes from the Perspective of Military-Civilian Integration

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Abstract: Higher Education Institutes have high-quality human resources and technological innovation environment, which is becoming the key subject of the national strategy of deep development of civil military integration. Combining the development requirements of Optimizing top design and innovating management system of scientific research from the perspective of civil military, this paper points out the problems in service concept, evaluation and incentive mechanism, whole process management and resource integration in the management of national defense scientific research. The paper sums up three contradictions brought about by opportunities and challenges, puts forward some effective measures to promote the sustainable development of national defense scientific research management in Higher Education Institutes.

Keywords: Military-Civilian integration; Higher education institutes; National defense; Scientific research management; Sustainable development

1 Introduction

As an important supporting point of scientific and technological development, human resources and innovation power, higher education institutes shoulder the important mission of cultivating talents, innovating science and technology and serving the society (Jiang L, 2015) .With the national strategy of military-civilian integration gradually promoted, universities have been highly valued by the national top-level planning. Without a high-quality scientific research management team, scientific research achievements cannot be carried out and got smoothly. With the growing number of scientific researchers based on the background of military civilian integration in universities, there are many traditional disadvantages in the management of national defense scientific research, such as limited promotion of service concept, long-term absence of evaluation and incentive mechanism, flaws in process management, and insufficient effective integration of scientific research resources. Therefore, it is imperative to solve the above problems and promote the sustainable development of national defense research management in higher education institutes.

Scientific research management in higher education institutes generally refers to assisting and guiding scientific research personnel to complete project application, project approval and review, organization and implementation, inspection and evaluation, acceptance and appraisal, declaration of achievements, science and technology transformation, filing of archives, etc. (Lan Yun-li, 2019), which runs through the whole process of scientific research. With the in-depth implementation of the national strategy of military-civilian integration, the breadth and depth of University participation in national defense research are constantly improving. In view of the characteristics and qualification basis of

national defense scientific research tasks, many universities set up special scientific research management institutions to coordinate national defense scientific research management, carry out certification and review of military industry. The ability to undertake national defense tasks and serve national defense has been further enhanced.。

With the release scope of the national defense research project guidelines expanding gradually, the publication procedures and project evaluation of the guidelines are constantly simplified and standardized. The number and amount of funding for national defense research projects undertaken by higher education institutes are growing steadily. At the same time, we should also see that some universities blindly declare the situation in order to strive for the number and funding of scientific research projects (Lu Jing, 2020).Exposing the management shortcomings that do not match the former.

1.1 Limited promotion of service concept

Colleges and universities shoulder the important responsibility of cultivating more high-quality strategic talents and cultivating more achievements of dual-use conversion. At present, there are many policies and documents related to the management of national defense scientific research in higher education institutes, such as project management method, fund management method, evaluation and incentive method, which directly apply to the top-level documents; there are many policies and documents that are not formulated according to the actual situation of higher education institutes; there are many service consciousness, service means, service ability and service system that cannot keep up with the times (Wang Chao, 2016).The service concept does not match the role orientation of national defense research.

1.2 Existing flaws in process management

The whole dynamic process of national defense scientific research management can be roughly divided into 3 important links: project declaration and approval, execution and control , final check before acceptance. For a long time, the focus of work has been on the project establishment and conclusion but there is no effective dynamic monitoring mechanism for the whole research process of the project, resulting in the process management is completely replaced by annual summary and node inspection report. This management mode of "emphasizing both ends and neglecting the middle" become unadaptable to the quality system management requirements of national defense science and technology work (Li Lun, 2020).

1.3 Long-term absence of evaluation and incentive mechanism

The university researchers engaged in national defense research are often more than one shoulder to carry out, not only to complete the prescribed teaching and research tasks, but also to undertake national defense research tasks, some also undertake some administrative tasks. One of the characteristics of traditionally national defense research is confidentiality. Undertaking national defense research means that we must strictly abide by the confidentiality regulations and requirements. As a result, the achievements of national defense researchers in universities cannot be fully disclosed (Pan Na, 2017). At present, most colleges and universities are still lack of specific implementation methods for this kind of personnel evaluation and incentive and professional title evaluation, which results in the incomplete chain of national defense scientific research management policy system, and thus limits the enthusiasm of scientific researchers to participate in national defense scientific research.

1.4 Insufficient effective integration of scientific research resources

The innovation of national defense science and technology needs the effective integration of talents, bases, disciplines and other advantages. Especially in comprehensive universities, insufficient attention

is paid to resource integration and crossover due to the large number of superior discipline resources, and it is difficult to meet the requirements of some major national defense science and technology projects with broad knowledge scope for interdisciplinary and system complexity. Compared with the military industry, it is difficult for higher education institutes to concentrate on human resources, financial resources and materials (Yuan Yayun, 2019). If the management department does not coordinate, it is difficult for the teams of different disciplines to effectively establish the cooperative operation mechanism. To a certain extent, it also proves that many universities can only undertake supporting projects and fund projects.

2 Opportunities and Challenges of Military-Civilian Integration Strategy

Many scientific research work in higher education institutes cannot be separated from resource sharing and technology sharing, which has the characteristics of civil-military integration (Lafferty B, 2013). Higher education institutes can maintain the ability of scientific research and technological development by undertaking basic research projects based on the background of military civilian integration, provide innovation points through applied basic research, and solve technical bottlenecks through key technology development (Shen Yiping, 2018). However, how to take the initiative and enhance the influence of national defense research under the strategic background of national development with deep civil-military integration，national defense research management still faces many opportunities and challenges.

2.1 The contradiction between the rising level of scientific research in universities and the few docking of major application of national defense

With the continuous increase of national investment in science and technology, the level of scientific research and discipline development in universities have developed from the past tracking research to the international frontier in some fields, and some of the achievements have even reached the international leading level. Aerospace, Aviation, Nuclear, Ship, Electronics, Weapons and other industries almost represent the highest level of science and technology in a country's independent innovation. In the development process of these industries, universities provide strong support in basic research.

The traditional management of scientific research in higher education institutes is mainly subject system or project system, which enjoys full autonomy within the scope of planned tasks and budgets approved by the competent departments, and takes responsibility for completing the task. The management of national defense scientific research requires more attention to the procedural construction of national defense quality system, which increases the "burden" and "input" of the research group beyond the scientific research value compared with the traditional scientific research management. There are also many institutional barriers and practical dilemmas in the process of implementing and promoting the specific scientific research of major national defense applications. At present, there is a lack of unified standards and strict procedures for declassification of military demand information, which leads to the idea of "crossing the river by feeling the stones and looking what others do" in many departments during the release process of demand information, and the implementation work is not in place and thorough. At the same time, the release of demand information is more focused on the supply of primary raw materials for military needs, and technological innovation is relatively lacking, there are not many universities that can connect.

2.2 The contradiction between the expansion of young teachers and the low enthusiasm of serving national defense research

The proportion of young teachers of higher education institutes is expanding. They have strong scientific research ability and subjective desire, but at present, most of the scientific research sources and batons in Colleges and universities are guided by national and provincial natural science fund projects. The difficulty of getting financial aid for the above-mentioned projects is increasing year by year, and the amount and amount of financial aid are limited, so it is urgent to find new fields and hands. To fully stimulate those outstanding young talents with good academic background and outstanding innovation ability to engage in national defense scientific research projects will provide young teachers with great historical opportunities to improve their own scientific research ability, serve the country and contribute to society.

More and more information platforms for national defense projects, such as "Army's Purchasing Information Network for Weapons and Equipment" and "National Civil-military Integration of Public Service Platform", are presented in front of young teachers. Participation in national defense research requires long-term accumulation and teamwork. Some young teachers who have not been exposed to national defense research projects do not understand the specific application background, lack of contact and communication channels, and simply equate "national defense" with "secret", which leads to the subjective reluctance to contact or undertake national defense scientific research projects. These above reasons limit the possibility of young teachers to display their talents in national defense scientific research field.

2.3 The contradiction of national defense research between the increasing demand and the insufficient management ability

The strategy of civil-military integration has promoted the continuous lowering of the threshold for higher education to participate the field of national defense research, thus increasing the demand for national defense research in universities. Ministry of Education closely coordinates each university participating actively to the national defense science and technology research.

The biggest characteristic of national defense research compared with the others is to abide by the "secret high-voltage line" and "quality lifeline". Most of the scientific research management personnel in colleges and universities are transferred from other positions or directly recruited in a small number. They have little contact with scientific research management, especially national defense scientific research management, and know very little about the characteristics of national defense scientific research. Although the civil-military integration has broadened the scope of participation of universities in the field of national defense scientific research, the corresponding national defense scientific research management ability has not been effectively improved simultaneously. In general, the clear task and application orientation require the national defense scientific research administrative department to play not only a good role as the bridge between the competent department and the research group, but also an important role in the command and decision of national defense scientific research. The management department of defense scientific research need undertake the planning and scheduling, secret management and quality management work in addition to the common sense of the project management.

3 Sustainable Development Measures of National-defense Scientific Research Management

3.1 Top-level design and policy guidance

First, strengthen organizational leadership. The university should specially establish a leading group for military-civilian integration of scientific and technological innovation to carry out top-level design and comprehensive planning for the long-term and sustainable development of the university's military-civilian integration, clarify the development direction and guiding ideas of the university's military-civilian integration. Second, do a good job of planning and design. According to the specific reality of the university, combining with the national frontier innovation needs and the university's discipline advantages, relying on experts from the military and local departments and the university's defense research team, the university actively matches the national major task plan and scientifically formulates the university's military-civilian integrated development plan. Third, build the management mechanism. Higher education institutes should adapt to the development environment of the deeply military-civilian integration, simultaneously promote the reform of the system and mechanism, innovate the management mode, and rationally establish the national defense research and management department. Finally, make policy sensibly. We should improve the talent evaluation system to provide effective incentives and institutional guarantees for researchers to engage in military-civilian integration. Scientific research management departments of universities should actively develop its incentive functions, establish scientific incentive mechanism for young teachers, and combine their management objectives and the effective demand of young teachers (Liu A, 2016). Higher education institutes can promulgate professional title evaluation policies that are appropriate to the characteristics of national defense science and technology work. Higher education institutes can give preferential incentives to defense-related scientific and technological achievements. The foundation for young scientists of national defense scientific research should be set up each year, which mainly support frontier technology, major projects to foster innovation and so on. The aim is to provide talent reserve for the sustainable development of higher education institutes' civil-military integration work.

3.2 Ensure the effective operation of the whole process management through multiple channels

First of all, optimize the management structure and set up layers of management reasonably. The local management should assist the administrative department of national defense scientific research to establish the whole process and all-round tracking feedback and inspection mechanism, comprehend the implementation of the project, find problems in time, seek solutions, and ensure the smooth progress of the project as planned. Secondly, combine project management with confidentiality inspection and quality review. It can save the cost of management, and avoid unnecessary burden to researchers. Overall arrangement of person, finance, material, cycle, etc. Thirdly, the reward and punishment system or assessment system should be formulated quantitatively according to the results of project stage inspection，which will urge the project leader to treat the whole development cycle of the project with full sense of responsibility and mission. Finally, ensuring the scientific research expenditures are legal and compliant，focus on foreign contracts such as subcontracting contracts and outsourcing contracts that are paid according to the budget items of the main contract. We should start from the source of expenditure, put an end to random and irrelevant expenditure, and reduce audit pressure in later period.

3.3 cultivate compound talents with "scientific research", "good management" and "confidentiality"

Higher education institutes need to train compound management talents who are good at management and skilled in technology. In the past, technology management mainly existed in the scientific research team. With the continuous promotion of military-civilian integration and collaborative innovation, it is necessary to set up more national defense science and technology management talents

who are proficient in business and full of enthusiasm in the national defense scientific research management institutions. Generally, the professional background of such talents should be consistent with the national defense strong specialty or discipline. On the basis of giving full play to their project management initiative, they should infiltrate the scientific research team in a planned way and even go to the departments of colleges and departments for part-time secondment, publicize the relevant policies in place in a timely manner (Xu Lingyan, 2014), and do a good job in the "last kilometer" docking service. At the same time of promoting scientific and technological innovation, it will provide talents reserve and lay talents foundation for the future development of national defense scientific and technological innovation, and form an important force for the future sustainable development of national defense scientific research management.

3.4 Interdisciplinary and integration of "universities, local and military"

The development needs of national defense science and technology platform are supported by deep interdisciplinary integration of disciplines. Higher education institutes should vigorously promote the reform of the department system, strengthen the deep cross integration of disciplines within the Department and between different departments with similar discipline attributes, improve the ability of interdisciplinary scientific and technological innovation, cultivate new growth points of disciplines, strengthen the advantages and characteristics of disciplines, and improve the overall level of disciplines. It lays a good foundation for higher education institutes to undertake various forward-looking, pilot and exploratory national defense scientific research tasks, and provides a practical platform for higher level and wider field of deeply military-civilian integration.

The high-level research center will be established under the guidance of serving the national strategy. The management of national defense scientific research in Higher education institutes should be closely combined with the national major strategic planning and layout, focus on the major frontier issues in the development of national defense science and technology, meet the major needs of military civilian integration such as subversive technology, actively integrate the advantages of relevant disciplines, strengthen cross disciplinary collaborative innovation, cross disciplinary integration and cross organizational cooperation, and plan to establish subversive research centers, technology research centers and other joint R & D platform，that will eventually form the complementary advantages among teams, disciplines and platforms.

4 Conclusion

To sum up, it can be seen that in the exploration of promoting the deep development of military-civilian integration, there is still a long way to go for the initiative of national defense scientific research management in Higher education institutes. The management team of national defense scientific research in Higher education institutes should grasp the new requirements and adapt to the new challenges, continuously learn new knowledge of project management and qualification management with a high degree of professionalism, especially develop and improve the ability of scientific research team to serve the national defense science and technology cause; increase the investment in the construction of characteristic disciplines, gather multidisciplinary forces to carry out the construction of national defense scientific research base, and concentrate on undertaking the key / important points of national defense scientific research Large projects to meet the needs of interdisciplinary innovation in national defense research.

Due to the limited academic level and theoretical foundation of the author, the shortcomings are

inevitable. The deep development of military-civilian integration is always inseparable from the University, which is an important innovation subject. This paper lacks further quantitative analysis on how to effectively avoid all kinds of risks in national defense research projects undertaken by Higher education institutes, this will also be the focus of follow-up research.

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Research on Construction and Management Mechanism of the Virtual Simulation Experimental Teaching Project of Mechanics

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Abstract： This article uses the method of comparative analysis, taking the national-level virtual simulation experimental teaching project "Virtual Simulation Experiment of New Dry Cement Production Technology and Equipment" constructed by School of Mechanical and Electrical Engineering of Wuhan University of Technology as an example, puts forward the new construction ideas of the virtual simulation experimental teaching project of the Mechanics, constructed its management and evaluation method, it is concluded that the process management should be strengthened in the construction of high-quality virtual simulation experimental teaching project.

Keywords: Mechanics; Virtual simulation; Experimental teaching; Management mechanism

1 Introduction

Carrying out virtual simulation experimental teaching in colleges and universities is an important performance of educational informatization (Meng Li, 2020). The running Emerging Engineering Education has put forward new requirements and directions for the higher engineering education system and pays more attention to train engineering talents comprehensive quality and practical and innovative ability to solve complex engineering problems (Shao-Chen Chang, 2018). Compared with theoretical teaching, the experimental teaching is more conducive to highlighting the centeredness of students and promoting them to build a scientific knowledge system (Xiong Hongqi, 2020). Mechanics in colleges and universities covers a wide range of teaching content and involves equipment of large volume and scale. Besides, the equipment involved in some content has high risk, long cycle and high cost. In terms of such experimental objects, traditional experimental teaching platforms and instruments can only give simple demonstration, but cannot meet the new demand of experimental teaching (Yubao Q, 2017). Introducing virtual simulation technology into higher education experimental teaching has become a new trend of experimental teaching reform (Boehm, 2017), aiming at relying on the virtual simulation technology to build a brand new experimental teaching system through virtuality and reality combination and interactive operation, thereby promoting the independent and exploratory learning of students to be a consensus (Steven Lo, 2020). Featured by high efficiency, large expansibility, safe operation, high openness and resource sharing, virtual simulation can provide new ideas and means for experimental teaching (Ma Zhiguo, 2020). Furthermore, it greatly expands the time and space for learning knowledge to let students complete the whole process of learning knowledge in a more autonomous and personalized manner, fully stimulates students' interest and potential for study, and cultivates their strong sense of engineering innovation, as well as strong practical and innovative ability (Liu Haibo, 2019) Virtual simulation experimental teaching is an indispensable part of college teaching system under the new situation, and also a bridge linking theory and practice.

By creating a "Virtual Simulation Experiment of New Dry Cement Production Technology and Equipment" project, The School of Mechanical and Electrical Engineering of Wuhan University of

Technology concentrates the superior resources of the school to address the problem that the experiments related to cement production technology and equipment in a real experimental project cannot be carried out effectively, which is caused by extreme environments, high costs, high consumption and irreversible operations. Through expanding the breadth and depth of experimental teaching content and extending the time and space of experimental teaching, the school targets to improve the quality and level of experimental teaching, enrich the teaching content, greatly optimize the teaching effect and strengthen the engineering practice ability of students. As a national-level virtual simulation experimental teaching project, it has accumulated valuable experience for the construction and management of related projects of Mechanics.

2 Problems in Existing Virtual Simulation Experimental Teaching Project

Most of existing virtual simulation experimental teaching project highlight the transmission of knowledge (Susan Jang, 2017), but with simple teaching methods and non-intuitive teaching content, they are failed to attract students and stimulate learning passion of students, but also prone to result in a disconnection between theory and practice (Kleinheksel A J, 2017).

Some of the existing virtual simulation experiment teaching projects are poorly made, not closely combined with the teaching syllabus, with simple content and poor picture effect, which students don't like.

Some of the existing virtual simulation experiment teaching projects have very little interaction with students. Students simply watch animations or pictures, without operating procedures, and cannot achieve the effect of experimental teaching.

Some of the existing virtual simulation experiment teaching projects do not pay attention to process management and only focus on the final experimental results, while the experimental process is the most important part of experimental teaching.

Most of the existing virtual simulation experiment teaching projects do not make good use of the advantages of virtual simulation technology to help students better learn knowledge.

3 Construction Methods of the High-Quality Virtual Simulation Experimental Teaching Project

3.1 Classification of the purpose of virtual simulation experimental teaching

The virtual simulation experimental teaching project should be carried out with combining the relevant curriculum syllabus, aiming at solving the problems in the traditional teaching on the basis of the advantages of virtual simulation experimental teaching technology. Cement is one of the three basic materials in the building materials industry, and its production process is extremely complex, covering crushing, preheating, calcination and cooling. A variety of large-scale equipment is use during production, including the jaw crusher, vertical mill, rotary kiln, ball mill and electric dust collector. The harsh environment of the production site is characterized by high temperature, dense dust and loud noise. Seldom do production enterprises recruit graduating students for internship. Even if at the production site, the students can only observe the partial appearance of the large-scale equipment, and neither can they understand the composition and working principle of the cement production equipment in depth, nor the process of cement production. In addition, it is impossible for a school laboratory to build a real cement production line, so a real experimental platform cannot be expected. The PPT teaching method, which relies on words and pictures, is still used in the traditional teaching of courses "Technology of Process Equipment", "Design of Building Material Equipment", "Powder Mechanics and Equipment"

and the teaching content as required in the syllabus, including the knowledge of cement production technological processes, the knowledge and analysis of key equipment structure, the design of key equipment structure and the test of granularity characteristics. The teaching content is so tedious that it is difficult for students to intuitively understand and acquire the knowledge. The virtual simulation teaching methods are adopted in the project "Virtual Simulation Experiment of New Dry Cement Production Technology and Equipment" to clarify the purpose of the experiment as follows, so as to fully stimulate students' interest and potential for study, meet the requirements of the syllabus to teaching content and objectives, and cultivate students' ability to acquire and apply knowledge.

3.2 Design a scientific and reasonable experimental plan

It is necessary to break through the limitations of realistic conditions and improve the effect of experimental teaching. The plan should be designed on the basis of closely combining professional characteristics with the latest achievements of industrial development, the school position with talent training characteristics, and the requirements of the theoretical curriculum syllabus to the teaching content and objectives, using modern information technologies, relying on virtual simulation experimental teaching methods and comprehensively using multimedia, three-dimensional modeling, human-computer interaction, virtual reality, digitalization and intelligent technologies. With improving the attractiveness of the experimental teaching project and students' learning efficiency as objectives, the plan should be designed through fully considering the learning demand of students of different levels, types and courses. Real modern large-scale cement production enterprises should be taken as prototypes to present the most advanced new dry cement production line. The key equipment structure and working principle should be taken as the objects to be analyzed to help students accurately master the new dry cement production technology, with integrating the flow of materials in the equipment, as well as the physical and chemical changes. Based on it, the 4 parts of experiment content including the knowledge of cement production process, the knowledge and analysis of key equipment structure, the design of key equipment structure and the test of granularity characteristics are integrated to enable students to learn the whole process of the practical study including learning, analyzing and planning the technology and equipment for new dry cement production, thereby greatly improving the experimental teaching effect for students.

3.3 Methods of innovative experimental teaching

It is necessary to change the teacher-led model and encourage students to learn independently. A new practical teaching model centering students and adhering to independent practice should be constructed to change the "injection- and imitation-" type experimental teaching method led by teachers in traditional practice teaching and guide students to independently carry out "Virtual Simulation Experiment of New Dry Cement Production Technology and Equipment". The advantages of online and offline teaching should be combined to form a new model of personalized, intelligent and customized experimental teaching on the basis of the combination of virtuality and reality. Theoretical teaching and network distance teaching should be deeply integrated to integrate the requirements of the syllabus to the teaching content and objectives into the virtual simulation experimental project, thereby effectively inspiring experimental interest of students. It is important to open learning resources and space to strengthen self-learning consciousness of students. Teachers should play a role in assisting, encouraging and guiding students to study actively and helping students fully acquire knowledge and skills in the process of completing the experimental project. A new experimental teaching method characterized by combination of virtuality and reality, practice-domination, no limitation of time and space and meeting

the characteristics of knowledge acquisition of contemporary college students should be formed by effectively motivating passion and initiative of students to participate in experimental teaching, and stimulating their interest and potential for learning, thereby improving students' ability to analyze and apply knowledge. It is necessary to give students sufficient freedom to study, motivate them to learn independently and help them understand what they have learnt on the basis of full practices, thus enhancing the experimental teaching effect.

4 Strengthen the Process Management of Virtual Simulation Experimental Teaching

4.1 Construct a perfect system of virtual simulation experimental teaching

In the teaching module of "Virtual Simulation Experiment of New Dry Cement Production Process and Equipment", it is feasible to learn the purpose of the equipment, structure, working principles and operation mode by reviewing the structure and production of equipment for the new dry cement production, as well as materials such as text, pictures and voices. The physical and chemical changes in the internal materials of the equipment observed from the appearance of the equipment should be referred to learning about the production process of cement. The classification of the new dry cement production technology and equipment should be based on to complete the whole process of practical learning including understanding, analyzing, planning and designing cement production process and equipment through a series of experimental projects such as equipment disassembly and assembly, structural design, and granularity test in a virtual simulation environment, thereby form a perfect knowledge system of building materials and equipment. Based on guidance and enlightenment, centering students' self-practice and taking unlimited time and space as a platform, the implementation of virtual simulation experimental teaching can fully stimulate students' enthusiasm for learning to forming a virtual simulation experimental teaching system with five parts such as preparing before class, study in class, independent practice, online assessment and report submission.

4.1.1 Preview before class

The platform of the virtual simulation experimental project provides the instruction book, including the experiment purpose, principle, operation steps and attentions. Students make preparations before experiments, fill in the preview report on the virtual simulation experiment platform according to their own preview situation, and submit the completed report to the platform.

4.1.2 Study in class

Traditional theoretical teaching and virtual simulation experimental teaching will be deeply integrated to make a good use of "Virtual Simulation Experiment of New Dry Cement Production Technology and Equipment" for classroom teaching services, and comprehensively use a variety of teaching methods such as combination of virtuality and reality, guidance and inspiration, teacher-student interaction, etc., thereby creating a new ground for classroom teaching.

4.1.3 Independent practice

An open learning mode is adopted in the virtual simulation experiment. Relying on the convenience of the network platform, students can log in to the virtual simulation experiment platform at any time and place after class, and enter the learning mode to perform virtual experiment operations. In this mode, the experimental operation results will not be produced, and students can conduct experiments many times until they fully have a good command of the relevant knowledge. It gives students sufficient freedom of learning, complying with the personal characteristics of contemporary college students.

4.1.4 Online assessment

Based on full learning and practice, students can choose online assessments according to their schedule, answer questions raised by the system or conduct experimental operations in assessment mode. After the assessment, the results will be automatically submitted to the virtual simulation experimental project platform for saving.

4.1.5 Report submission

When students complete the online assessment, the system automatically generates a word version template of the experiment report. After downloading it, students can fill in the screenshots of the steps, data, conclusions and experience of the experiment, and submit them after finishing it.

4.2 Reform the scoring mechanism and focus on process management

It is necessary to build a virtual simulation experimental teaching evaluation system that organically combines preview before class, practice-orientation, study promoted by exams and comprehensive evaluation, conduct targeted review on the 5 parts such as preview before class, study in class, independent practice, online assessment and experimental report in response of each stage of the virtual simulation experimental teaching. Assessment standards for the characteristics of the experiment are established according to different types of experiments, such as the cognition-type and design-type, so as to ensure the fairness and accuracy of the assessment system, and truly reflect the learning effectiveness of the whole learning process of students. In addition, a perfect feedback mechanism is taken advantage to collect students' suggestions and evaluation about various aspects of the virtual simulation experimental project in order to provide a basis for teachers to accurately grasp the assessment standards, avoid the impact of information asymmetry on the assessment results of students, thus truly reflecting the effect of the whole learning process. The specific assessment requirements, scoring rules and scores are shown in Table 1.

Table 1 Requirements and Scoring Rules of Virtual Simulation Experimental Assessment

Assessment requirements	Examination content	Scores
Preview before Class (10%)	Preview report (Submission online)	10
Study in Class (20%)	Observe classroom discipline and attend the class seriously or not	10
	Actively communicate with teachers and classmates or not	5
	Pay attention to the precautions during the experimental operation or not	5
Independent Practice (10%)	Complete all experimental operations independently	10
Online Assessment (20%)	Complete the online assessment on the virtual simulation experimental platform	20
Experimental Report (40%)	Whether the purpose and principle of the experiment are clear; whether the experimental operation steps, experimental data recording and processing are comprehensive; whether the precautions, experimental results and conclusions are accurate	20
	Whether the analysis and discussion of the experimental results are adequate; have independent thinking and experience on the operation process and conclusions of the experiment or not	20
Total (100%)		100

5 Conclusion

This paper introduces the construction and management experience of the national-level virtual simulation experimental teaching project "Virtual Simulation Experiment of New Dry Cement Production Technology and Equipment". The project greatly motivates the passion and initiative of students to participate in experimental teaching and stimulated students' interest and potential for learning by creating a student-centered experimental teaching concept, and improve students' ability to analyze and apply knowledge through the teaching model of guidance, enlightenment and combination of

virtuality and reality. In order to better construct virtual simulation experimental teaching resources, in the future construction of virtual experimental teaching projects, people should establish various forms of communication mechanisms for college and universities' virtual experiment construction, establish a long-term exchange mechanism with counterparts inside and outside the school, as well as partner schools and related institutions at home and abroad through holding conferences, establishing forums and on-site visiting, explore the ideas, experience and achievements of the construction of virtual experimental teaching projects. In addition, it is important to establish a sharing mechanism of practical virtual experimental resources in colleges and universities, improve the construction of virtual experimental teaching theory, the operation process of virtual experimental teaching and the online service level, open the Internet access resources for colleges and universities with practical teaching demand of related courses, provide experimental teaching materials such as courseware and videos as well as online teaching services and technical support, actively play the demonstration and leading role of high-quality virtual simulation experimental teaching resources in constructing experimental teaching information.

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Analysis on the Primary Obstacle and Coping Strategies in Academic Adaptation of Chinese PhD Students in France

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Abstract: Based on the Grounded Theory, this study focuses on the Chinese PhD students' experience in France by interviewing them in order to grasp in-depth insights of how they see and feel while studying abroad, their strategies to react to the encountered problems and the factors that influence their choices. This article puts in evidence the primary obstacle in their academic adaptation in France. Also, the adopted methodology of collecting data from the reference group will be presented, then we will identify the factors that explain the increase of Chinese PhD students in France. Furthermore, the relationship between their initial French language level and adaptation to their life in France as well as the necessity to master French language in their doctoral research will be discussed. Finally, this article will conclude with an analysis of the French learning strategies of those Chinese PhD students in France.
Keywords: International mobility; Chinese PhD students; In France; Obstacle; The French language

1 Introduction

In the era of globalization, international student mobility has become a worldwide phenomenon. Since the 1980s, recruitment into elite circles in China has required the candidate to possess an increasingly internationally profile (Derouet et al., 2017). It experienced spectacular growth from the 1990s. The France, which hosts 325,000 foreign students, is now the 4th largest host country for overseas students, behind the United States, the United Kingdom and Australia（France Consulate General Guangzhou, 2019）. China remains the second largest source of international students in France, just after Morocco, a French-speaking country. Current French policy aims to attract increasingly more high-level Chinese students to France（Meur S, 2017）. The high-level talent exchange between China and France is actively promoted. Overseas residence and training during higher education are considered beneficial and are encouraged by public policy（Guiheux et al., 2018）. The knowledge and intellectual capital open up processes of reproduction or else recomposition（Gerard and Wagner, 2015）. As early as 2002, the ministries of education of China and France signed a cooperation agreement, to encourage their higher education institutions to exchange and cooperate in various fields, promote mutual exchanges between their students and teachers, jointly cultivate cutting-edge scientific and technological talents, receive young doctors for doctoral and postdoctoral research and visiting scholars for academic exchange from each other（Liu Hong, Ma Mengyao, 2016）. It has become a new feature or a new trend for Chinese doctoral students to study in France. Therefore, it is necessary to realize the academic adaptation of Chinese doctoral students studying in France so as to promote the high-level academic exchange between China and France.

The quantity of empirical researches on cross-cultural adaptation has increased significantly with different scopes and objects since the mid-1980s. Such researches focused clearly on how international students, immigrants and refugees adapt to a new culture or environment. The particularity of international students lies in that they not only have to adapt to social culture mentally as sojourners but also have to adapt to academic circumstances. Most scholars conduct empirical research on foreign students studying in their own countries or domestic students studying abroad when studying international students. Here are some well-known researches on Chinese students studying abroad. Xu Guangxing conducted a tracking study on Chinese students studying in Japan and returned students; Chen Xiangming realized the cross-cultural adaptation of Chinese students studying in the United States through standardized open-ended interviews and participant observation. On the whole, the empirical

researches on Chinese students studying abroad focus mainly on the countries such as United States, Australia, the United Kingdom and Japan, while the research on other countries is relatively few.

The research findings on Chinese students studying in France are relatively rare although France is one of the most popular countries for Chinese students to study in. Han Linlin studied the academic adaptation of Chinese students studying in France for one year from the perspective of educational culture; Guo Juan analyzed the main factors affecting the cultural adaptation of Chinese students studying in France（Guo Juan, 2016）; Si Ru studied the social adaptation of Chinese students studying in France and its influencing factors（Si Ru, 2019）; Wang Zhuyan, a Chinese scholar in France, studied the path to success of Chinese students studying in France; Wang Jinjing focused on the causes of failure in French learning of Chinese students studying in France. Different from masters and undergraduates, PhD students are in the transition between growing students and mature researchers, and they pay more attention to individual exploration. Such differences constitute the particularity of doctoral students. However, there is no empirical research on Chinese PhD students studying in France. This article will study the Chinese PhD students who visit France for scientific research, exploring the primary obstacle they encounter and the strategies they adopt in the process of academic adaptation.

2 Methodology and Data

2.1 Methodology

The research on the Academic adaptation of Chinese PhD students in France, in form of a qualitative survey, were conducted between 2015 and 2018. This research applies the Grounded Theory approach, which is considered one of the most significant strategies of qualitative inquiry. It is a systematic methodology in the social sciences involving the construction of theories through methodical gathering and analysis of data, with the objective of building middle-range theories. This research methodology is rooted in the theoretical perspective of symbolic interactionism and entails an interpretive understanding of actions and interactions within the social phenomenon under investigation.

The Grounded Theory uses inductive reasoning, in contrast to the hypothetico-deductive model of the scientific method.（Priya A, 2016）. The interview guide was established based on themes during a series of exploratory interviews. It is organized in five parts: 1) socio-linguistic biography of the interviewees; 2) motivation and preparation before the arrival in France; 3) experience in France including daily life and academic life in the laboratory at university; 4) choice after doctoral studies in France; 5) personal and professional gains from this experience in France. Among all the parts, the 3rd part is essential for the survey. This article presents the analysis result of the 3rd part about the main obstacle in academic adaptation of Chinese PhD students in France.

2.2 Data collection

The interviews, twenty-eight in total, were conducted between October 2015 and October 2018 on different occasions to meet targeted interviewees in China and France. The survey sample consists of twenty-eight Chinese interviewees, with 16 women and 12 men. Among them, 17 interviewees pass the entire doctoral phase in France to obtain the doctorate while 11 complete a part of their doctoral studies, often one or two years in France, on French-Chinese joint supervision of a doctoral thesis. Meanwhile, many doctoral disciplines are represented in the sampling distribution. The large number and density of conducted semi-structured interviews has allowed us to gradually reach to the information saturation. Each interview lasted about 1.5 h, which was recorded with the consent of each interviewee and then transcribed.

2.3 Data analysis

Put forward by the scholars Glaser and Strauss, the Grounded Theory emphasizes that researchers must be open to the interview materials, extract relevant concepts and categories from the source

materials, and construct a theory reflecting the social life of the interviewees（Strauss A, Corbin J M, 1997）. Coding consists of three stages, i.e. open coding, axial coding and selective coding, all of which were conducted in order based on the interview materials during this research.

In the process of open coding for the verbatim texts, this article strictly complies with the coding requirements to form concepts as close as possible to the very words of the interviewees, so that the coder's viewpoints would not cause any result errors. Based on the preliminary analysis of the interview materials, the author determined 28 open codes (as shown in Table 1). At this stage, codes were crisscrossed with the relationship between them not clarified. Therefore, the author moved ahead with the axial coding, connecting independent concepts with underlying logic to recategorize them, and then extracting categories. The author classified 28 open codes into 9 axial codes, based on the analysis of the open codes at the early stage (as shown in Table 1). As an integrated extraction from categories arising out of axial coding, the selective coding excavated core categories, and connected relevant categories with "storylines", thus constructing a general, abstract theory of a process in the views of the participants（Liu et al., 2020）. By reading the interview materials repeatedly and analyzing the open codes and axial codes thoroughly, the author finally determined the 5 selective codes: "CSC", "French level", "French and social adaptation", "French and academic adaptation", "Applied French learning strategy". With the generated codes, this article will present the primary obstacle and coping strategies in academic adaptation of Chinese PhD students in France.

Table 1 Codes List

Selective codes	Axial codes	Open Codes
CSC	Role of CSC	CSC - financing the PhD study CSC - responsible for French training CSC – organizing the French language test
French level	French level of different phases	French level upon arrival – a.(students in scientific disciplines) French level upon arrival – b.(students in human and social sciences) French level during the PhD study – a. French level during the PhD study – b. French level at the end of PhD study – a. French level at the end of PhD study – b. Other situation
French and social adaptation	Social language environment	Frequent French use in service organization
	Difficulties of not speaking good French in France	Problem encountered because of poor French Communication in French is very difficult
French and academic adaptation	Importance of French in PhD study	Writing thesis in English – a. SCI in English – a. Academic English more important for the future career – a. Writing thesis in French – b. (French) essential to career development – b.
	French in the research environment	Survival French in the lab – a. communication language in the lab English (foreign language for all) not practical for daily communication in the lab – a. Lab personnel not able to speak English
Applied French learning strategy	Attitude towards improving French	Motivation of progressing in French Goal set for French level at the end of PhD study
	Ways to improve French	Arranged time for French learning Ways of learning French
	nostalgia	Missing family in China Missing friends in China

3 Results

For Chinese PhD students in France, the French language is the primary obstacle during their stay in France. The language problem is intertwined with other problems, such as those of sociability and research, since the French remains the priority communication language in social meeting in France.

3.1 Chinese PhD students' French level and their social adaptation in France

3.1.1 China Scholarship Council: stimulating factor for Chinese PhD students in France

The international mobility of Chinese PhD students in France is encouraged by several processes. On the French side, during recent decades, France's interest in "skilled migrants" has increased. On the Chinese side, China attaches importance to scientific exchanges between Chinese and foreign researchers. Actually, China Scholarship Council (CSC) is set up in this context in 1996. This organization is dependent on the Chinese Ministry of Education, and its funds come mainly from the State. Its main mission is to encourage Chinese students and researchers to study abroad and to provide support as well as follow-up for them. CSC plays a main role in financing the international mobility in higher education. In fact, the proportion of Chinese PhD students funded by the CSC is the largest among those in France. While financing the students, CSC defines thematic priorities, which are rather around scientific disciplines. Moreover, its funding is more directed towards projects registered in these thematic areas, which implies that there are more Chinese PhD students in scientific disciplines than in human and social sciences in France（Campus France, 2016）.

3.1.2 Chinese PhD students' French Level upon the arrival in France

As for the French level at the arrival of Chinese doctoral students in France, we roughly distinguish three categories of cases: 1) those who have studied in French language and literature since the bachelor; 2) those who come from a Franco-Chinese class[118]; 3) those who have followed only an intensive French training of 240 hours during 6 weeks organized by CSC before departure for France. For these three categories, their French levels are generally in descending order.

CSC's French intensive course for scholarship recipients who do not speak French aims to provide the necessary basic knowledge of French along with its culture. Theoretically after the training they will have to acquire the A1 level[119], from which they can understand and explain themselves in daily life situations. They have a test to pass at the end of the training to finally validate the scholarship process, but the test is "very easy" [120] to pass, since the CSC has no reason to make the scholarship recipients fail the language test. In fact, given the wide differences between Chinese and French languages, notably French is not an easy language to learn for the Chinese, especially with the conjugation and agreement of gender and number in the grammar. Among the CSC-scholarship-holder interviewees, a lot of them consider themselves "null" in French on their arrival in France, even if they have passed the test at the end of the CSC French langue training.

In short, when Chinese doctoral students arrive in France, their level of French is insufficient to lead an independent life in France.

3.1.3 French Level is Closely Linked to Adaptation

French is practically the only spoken language in France. There are quite a few French who can speak English well in service organization related to daily life, such as banks, telephone operator shops

[118] In the Franco-Chinese class programs at the university in China, students take French courses alongside specialty courses, and the credits from French courses are counted in the curriculum.
[119] Level A1 is the basic level of the Common European Framework of Reference for Languages.
[120] Interview No.:180108
Each interview file's naming rule is by the date when it's conducted, in format "year-month-day".

and supermarkets. On the other hand, most new-arrived Chinese PhD students in France do not really understand French in real life situations. These shortcomings in French language cause great concern for these new arrivers to carry out the necessary formalities for their arrival in France such as opening a bank account, the telephone subscription, looking for accommodation, or simply going shopping.

Different doctoral students have confirmed this situation. For example, a doctoral student in medicine gives a fairly representative statement:"There were a lot of difficulties when I arrived, but the problem remained mainly the language. The French that I learned was completely insufficient. The French people speak quickly and often vary the expressions."[121] As pointed out by a vice-president of the Union of Chinese Researchers and Students in France "since in France people do not speak English, if someone speaks only English and there is no one to help him, it will be very difficult for him to live here " [122], moreover "the question of daily life comes first. If you do not adapt to your environment when you arrive abroad, it is impossible to start your research work" [123].

The French language plays the key role in the Chinese PhD students' adaptation process in France. An interviewee in mechanics reveals his feelings for the relationship between French language skills and adaptation: "When I made progress in the French language, I felt that I was adapting better to my environment"[124]. The words of another doctoral student in materials could somehow explain the feeling of the previous witness "to adapt or not to his environment depends on the communication with other people" [125].

3.2 French language and Chinese PhD students' academic adaptation in France

3.2.1 The importance of French in doctoral research

If the French language has a considerable influence in everyday life, the importance of mastering the French language in the study and research for Chinese PhD students depends nevertheless on the disciplines.

For Chinese doctoral students in social and human sciences, French is essential or even vital in research. Normally, a Chinese PhD student chooses France as his research destination because his research project is linked to France, such as studying a French writer and his works in literature, doing research on a social phenomenon in France in sociology, or analyzing a historical period of France in history, etc. No matter doctoral candidates or thesis directors, they will both take into account the French level of the doctoral candidate to see if his French is sufficient to conduct his research before establishing a candidate-director relationship. The testimony of an interviewee in Franco-Chinese comparative literature is very representative: "In my field, French is decisive for my research"[126].

However, it is another case for Chinese doctoral students in scientific disciplines. The interviewed Chinese PhD students in scientific fields believe that French is not necessary for their research in France. The testimony below confirms this point: "you only need to know how to speak English for research, because the version of the articles in French is a translation of English"[127] (doctoral student in mechanics), "French is not necessary, the articles and the thesis are written in English"[128] (doctoral student in medicine). As a doctoral student in biology remarked, "writing articles and the thesis in English is the

[121] Interview No.:161023
[122] Interview No.: 151025
[123] *Ibid.*
[124] Interview No.:160909
[125] Interview No.:161023
[126] Interview No.: 160925B
[127] Interview No.:161201
[128] Interview No.:161014

trend"[129]. With the strong globalization of research, English tend to dominates in research publications and communications in scientific disciplines. The Sciences Citation Index (SCI) is the most important citation index for scientific disciplines. Scientific journals on the SCI list are considered to be of high level in the field concerned. English is the language of writing for almost all journals on the SCI list. Regarding the language of thesis writing and defense, no French law prohibits a foreign language as the language of writing and defense. Therefore, mastery of the French language to successfully complete doctoral studies in scientific subjects is not dominant.

3.2.2 French in the research environment

A poor knowledge of French is not a problem for the research work in its strict sense for Chinese PhD students in scientific fields, even if their French knowledge remains at the survival French: "hi" "thank you" "I'm fine" and "goodbye". However, is French useless? The answer is no.

As an interviewee who almost does not speak French says: "Although I can speak in English with my thesis director, the other colleagues and doctoral students in the lab communicate in French. In the lab, the communication is essentially in French".[130] This situation is also confirmed by the following testimony: "in the lab, my colleagues try to speak in English, but English after all is a foreign language for everyone in the lab, so it is not easy to have communication fluid in English"[131]. Consequently, another problem appears: "when Chinese doctoral students do not speak French well, then they only stay between them because of the ease of language. And that will further reduce the possible meetings with other doctoral students or colleagues who speak French in the lab"[132]. In addition, understanding French can reduce or even avoid possible misunderstandings with the personnel who do not speak English in the laboratory.

In conclusion, a good command of the French language is favorable to scientific research in France.

3.3 French learning strategies

For Chinese PhD students in human and social sciences in France, being proficient in French is indispensable. In general, they have a fairly good base in French before starting their doctorate study in France. However, they are relatively weak at speaking, hence, they want to progress on that. As an interviewee in comparative literature studies puts, "I would especially like to make progress in spoken French. I hope to learn slang too, in short, I would like to speak like a real French"[133]. In addition, these Chinese PhD students demand to have French as a native: "I want my French to be approved by French researchers, but not like that of a foreign student. ... My drafting is generally grammatically correct, but it does not quite conform to the standards and customs of the French language"[134]. French is not only vital for their doctoral research in France, but it is also highly important for future careers, whether in France or in China. For those who return to China, they will normally work in the French department at the university where they will teach French language. So the fluency in French is extremely necessary and important.

On the other hand, learning French for Chinese PhD students in scientific disciplines in France is very different. English, the language used in these fields, is also a foreign language for Chinese doctoral students. Although those students have been learning English for a long time, writing a thesis or making

[129] Interview No.:161023
[130] Interview No.:160928A
[131] Interview No.: 161023
[132] Interview No.: 160928A
[133] Interview No.:161207
[134] Interview No.:160925B

a presentation at seminars in English is not that easy for them neither. They have to take time to improve in English. Moreover, Some Chinese doctoral students know well that at the end of the doctorate they will return to China to work so that French will be useless in their future work. They find it relatively less beneficial to take a long time to learn something unnecessary for the future. They choose to "abandon French" during their doctoral stay in France and are satisfied with only a basic vocabulary like "hi, hello, goodbye" "thank you" "it's okay" "how much" and stay only with Chinese friends. One-year-exchange PhD students on joint supervision of thesis are inclined to adopt this strategy, since one year is not enough to fully master both a new foreign language and conduct an fruitful research.

Nevertheless, the expected linguistic objective of the majority of Chinese PhD students in scientific disciplines, is to be able to manage on their own in French in everyday life. They take French courses provided by the university for the foreign students, in which they integrate into the French language environment. Although one or two hours lessons per week do not make much sense, at least those PhD students have the opportunity to be forced to understand and speak French. Moreover, other methods are used by students, for example, practicing French in their social life. They want to know French language and culture: “During my first year here, I learned French myself every night. I was studying the French textbook that I brought from China”[135] (doctoral student in engineering), “I was going to my thesis director's classes. In fact, I already grasped the knowledge taught in the course, but I went to the classes to learn French and the specific vocabularies in mathematics. My mathematical knowledge base helped me understand French”[136] (doctoral student in mathematics), “When I go shopping, I prefer to use my French. I prepare the vocabulary before going there. In my city, there is an open-air market every Saturday morning, I often go there to observe how local residents communicate and live. It’s very interesting for me. ”[137] (doctoral student in mechanics).

Chinese PhD students in human and social sciences improve their French independently without taking language courses. These are their experiences: “I listened to the radio and read newspapers every day, at one point I could feel qualitative progress.”[138] (doctoral student in history), “Reading was more difficult for me, because my French was not enough to read Proust well. After a lot of reading, I adapted to his style and so I could enjoy it. … When I was not sure of an expression in French, I checked it with my French friends.”[139] (doctoral student in French literature). Many have made great progress thanks to their doctoral stay in France. Given the peculiarity of individual and documentary work in these areas, Chinese PhD students are making more progress in reading: “My French level, especially in reading and academic writing has progressed remarkably. I was able to read very quickly, and when I was writing I could think directly in French without going through Chinese. After a year, I even felt a little rusty when I read in Chinese.”[140] (doctoral student in Franco-Chinese comparative philosophy).

4 Conclusion

The qualitative method Grounded Theory is implemented in this study which highlights the plurality of experiences and feelings of these Chinese PhD students in France. Despite the individual nature of the interviewees' experiences, we shed light on common points. Among these, the problem of the French

[135] Interview No.: 180108
[136] Interview No.:161120
[137] Interview No.:160928A
[138] Interview No.: 161201
[139] Interview No.: 161019
[140] Interview No.: 161020

language is primordial. The language problem is intertwined with other problems, such as those of sociability and research during their stay in France.

According to our analysis, when Chinese doctoral students arrive in France, their level of French generally fails to live them an independent life. Their experiences make us believe that speaking French plays a key role in the adaptation process of Chinese PhD students in France. However, with regard to the impact of mastering French on the doctoral research for them, we believe that mastering French is essential for the doctoral research in the human and social sciences. On the contrary, it is less important for the PhD students in scientific fields. However, the use of French promotes communication and avoids misunderstandings, which is beneficial for research. The different levels of mastery of French in the different disciplines give rise to various adopted strategies of learning French. If an insufficient practice of French constitutes a primary obstacle for the research of Chinese PhD students in France, it could also be a handicap in terms of interculturality and the daily life of these doctoral students.

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The Role of Microfinance Institutions on the Growth of Small and Micro Enterprises in the Case of South Wollo Zone, Amhara Region, Ethiopia

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Abstract: The study sought to assess the role of microfinance institutions on the growth of small and micro enterprises in Ethiopia in particular area Amhara region, South wollo Zone. The study specifically assessed how provisions of finance by microfinance institutions influence the growth of small and micro enterprises. Whether or not the advisory services offered, by microfinance institution affects the growth of small and micro enterprises, as well as how training programmers provided by microfinance institutions affects the growth of small and micro enterprises. Descriptive survey research design adopted to analyze the data. The paper employs linear regression model. The main aim of the paper is to assess the role of micro finance institution for the growth of SME using provision of training, finance and advisory service. The researcher recommended that, Government should implement policies that promote the growth of small and micro entrepreneurs through creating conducive business environment and providing accessibility to credit and collaborating with MFIs in providing training and advisory services. There is need for each SME operators to seek more education to improve their management skills.

Keywords: Microfinance institutions; Small and micro enterprise; Advisory service, Credit accessibility

1 Introduction

Consolidation trends in the banking industry have contributed to an increasing functional distance of the banking system from remotely located communities (Alessandrini et al., 2009). Two decades ago, many rural areas in Kenya does not developed because the inhabitants of these areas are poor and could not raise enough capital to startup businesses; and the commercial banks were adamant to give credit to poor people because it was seen as foolish. The development of MFIs in Ethiopia County does not been left behind for they have significantly changed the way people in this County view micro credit loans and borrowing for small micro enterprise. Malala, (2015) studied that the growth of small and micro enterprises has continually increased because of increase of micro finance institutions in the town Kenya. Micro finance defined as a development tool that grants or provides financial services and products. Such as; very small loans, savings, micro leasing, micro insurance, and money transfer. This enables to assist the very or exceptionally poor in expanding or establishing their business (Buckley, 1997) argues that the indicator of success of micro credit programs namely high repayment rate outreach and financial stability does not take in to consideration what impact it has no micro enterprises operators and only focusing on micro finance evangelism. On the other hand Berger et al., (2019) indicates the micro finance tend to stabilize rather than increase income and tend to preserve rather than create job. Institutions involved in the delivery of micro credit have helped to reverse the conventional top down approach by creating livelihood opportunities for the poorest citizen, especially women who form about 94 percent of their clients (Alhassan et al., 2016). (Diniz et al., 2012) Bureaucracy, lack of adequate credit policies and high interest rates represent problems related to inadequacy of financial services offered at the correspondent level. Only a 30% of the small firms in the Sub Saharan African countries have access to

affordable and proper financial capital (World Bank, 2005). Lack of collateral requirements, low-income problems in filing tax repayments reports and unsound business plans are some of the reasons for unwillingness of the formal banks' lending credit to the majority of entrepreneurs who own micro and small enterprises (Munyanyi & Mapfumo, 2016).

Dutta & Banerjee (2018) across the world micro finance (MFI) has been recognized as an effective instrument for sim-entanous reduction of poverty and long-term growth through creation of entrepreneurship available researches does suggest that MFI experiment in most cases was successful to reduce poverty.

Jemaneh et al, (2017) states that microfinance institutions (MFIs) have the function of providing financial services to the low income households who have long been deemed 'un bankable", including the self-employed and customers without collateral assets (Lensink et al., 2018). Microfinance aims at providing financial services to low-income households and microenterprises who have excluded from traditional banking. According to Mackie et al., (2015) microfinance provides a small but significant and expanding role in Ethiopia is developing finance sector. According to the National Bank of Ethiopia (NBE (2015) the number of banks operating in the country reached 19 in December 2014, of which 16 privately owned. The banks operated 2,502 branches, equating to a branch/population ratio of 1:35,957. Some 35% of all bank branches are located in Addis Ababa. The total capital in the banking system increased by 21% between 2013 and 2014, reaching Birr 30.2 billion. According to Quaye et al., (2014) Cited those in recent times, financial inclusion has been on the policy agenda of many developing countries. An inclusive financial system implies availability of a continuum of financial services for all income groups, namely a seamless range of financial services with no gaps in provision. The idea is that an inclusive financial system provides credit to all bankable individuals and firms, insurance to all insurable individuals and firms, and savings and payment services for everyone (United Nations 2006). Financial inclusion does not imply that everyone will use all available financial services, but rather that everyone has the option to use them. World Bank Group, (2017) explained that credit products offer clients the ability to borrow money in exchange for an agreement to repay the funds with interest and/or fees at some future point(s) in time. Credit products range from working capital loans, emergency and consumption loans, to leasing products and housing loans. They found at the core of the financial market system.

H1. There is no relationship between advisory service and growth of SME

H2. There is no relationship between provision of finance and growth of SME

H3. There is insignificant relationship between provisions of training for the growth of MSE

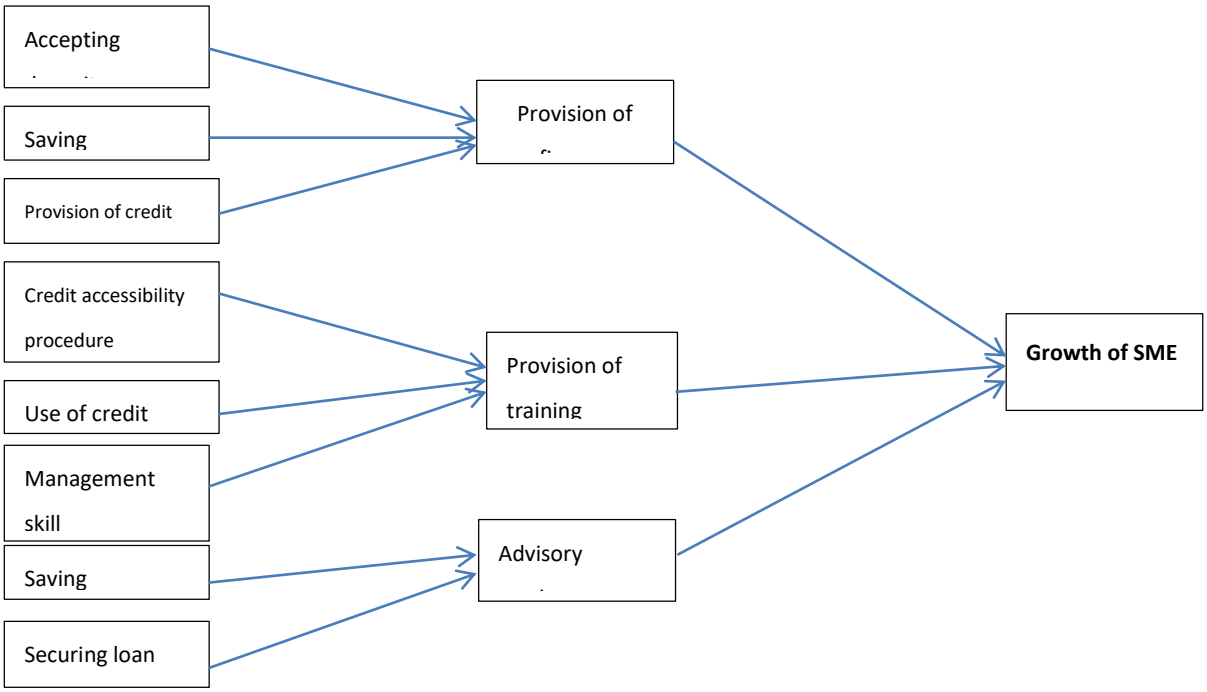

Figure 1 Conceptual Framework

The independent variables are the role of micro finance institutions in the growth of small and micro enterprises that includes the provision of finance. Consultancy service and trainings are the goals the researcher will evaluate in order to measure the growth of small and micro enterprise, which is dependent variable.

2 Data and Methodology

The study adopted descriptive survey design & targeted 326 respondents that include 70 MFI Employees and 256 SME workers. The researcher administered the use of questioners as a method of data collection. The data were analyzed using percentage and weighted average descriptive statics, correlation and regression techniques as well as the data checked by reliability test. The analytical model employed was multiple regression models. The effect of micro finance services was determined according to the following equation.

$$Y=\alpha+\beta 1X1+\beta 2X2+\beta 3X3+\varepsilon$$

Where,

Y= Dependent variable, Growth of SME

X= Independent variables, $X_1+X_2+X_3+ \ldots X_n$

$\beta_1X_1+\beta_2X_2+\beta_3X_3+\varepsilon$ = Independent variables

α = Constant term

The study had specimen population of 95 potential respondents identified for the questionnaire during the data collection period.

3 Results(Influence of finance provided by MFI on the growth of SME)

The aim of the research was to find out how provision of finance institutions influences growth of small and micro enterprises in south wollo zone.

Table 1 Source of Startup Capital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	personal saving	15	19.5	19.5	19.5
	loan from commercial bank	14	18.2	18.2	37.7
	borrow from friends	18	23.4	23.4	61.0
	loan from micro bank (ACSI)	30	39.0	39.0	100.0
	Total	77	100.0	100.0	

The above collected data analyzed to highlight the relationship between financial services provided by micro finance institutions and SMEs growth in the south wollo zone. The answer elaborated in the following ways. According to the collected data, source of start-up capital in the south wollo zone by small and micro enterprises was 39% of respondents from micro finance bank (ACSI), 23.4% from friends, 19.5% using personal saving, and 18.2% from commercial bank took loan. It is evident from the responses that most SME operators in the south wollo zone are borrowing loans from micro finance bank to finance their start up. Micro finance institutions in south wollo zone therefore provide economic credits to most SMEs.

MFI loan service as the collected data shows how respondents valued loan services from micro finance institutions that they when the institution access the credit and it shows that the most excellent loan service provided by MFI (ACSI). In the south wollo zone is loan processing charge give 3.7% loan processing speed give 3.6%. This shows the most SME operators find loan processing fees as the most outstanding loan services that microfinance institutions offer. This is because microfinance institutions offer favorable loan processing fees thus encouraging borrowing enabling the majority of SME in the Zone to get access to microcredit.

Most challenging micro credit accessibility policy; the paper implies the most challenging micro credit accessibility policy to small & micro enterprise in south wollo. It replies that the loan processing charge re payment period accounts 4.0%, loan interest rates given the weight of 3.2%, loan-holding fees issued weight of 2.2%, and Penalties charged accounts 3.8%. This indicates that micro finance institutions in south wollo zone find loan processing speed as the most challenging loan accessibility policy, and loan processing fees.

Advisory service influence offered by MFI on SME: The purpose of the study was to identify how advisory services provide by micro finance institutions have an impact on the growth of small &micro enterprises in the study area. This was to find out how various services offered by micro finance institutions in south wollo help small & micro enterprises to grow in the area.

These findings are set out as shown in the following way Advisory services offered by MFI illustrates advisory services in south wollo Zone provides by micro finance institution and how they impact the development small & micro enterprises in the study area identified consulting services include, financial management investments, transition from company to another new business and securing lending. According to the response, investment management is the most outstanding services provided by MFI. It gives 17.7% securing loan, 21.8% venturing, 20.7% investment, 20.11% moving from one company to another and 19.69% saving. This shows that small and micro enterprises in the south wollo zone consider financial management as the best advisory services MFI provides in the study area. From our findings the hypothesis, H1 “there is no relationship between advisory service and growth of SME” rejected and it has a significant relationship between advisory service and growth of SME.

Table 2 Rating Effect of Advisory Service on the Growth of SME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no influential	2	11.1	11.1	11.1
	Strong	5	27.8	27.8	38.9
	very strong	11	61.1	61.1	100.0
	Total	18	100.0	100.0	

The above data implies how staff of micro finance institution are rated advisory service that their institutions offer. It indicates that 100 percent of the respondents agreed to this advisory service offered by MFI have a major impact on the growth of SMEs in the study area. 27.8% of the respondents agreed that service have a strong impact, 61%respondents give answer for the questionnaire very strong impact and 11% agreed that no influential influence the growth of SMEs in the south wollo zone. This shows that micro finance advisory services in the study area have a significant effect on SME growth in south wollo Zone. Therefore, H2 "there is no relationship between provision of finance and growth of SME" rejected, and it has significant relationship between provision of finance and growth of SME.

Effect of training provided by MFI on SME growth: The purpose of this paper was to determine how training programs provided by micro finance institutions affected the growth of SME in the study area. This was about finding out look how different training programs offered by MFI in south wollo Zone facilitate the growth of small and micro business in the zone. The hypothesis H3, "there is insignificant relationship between provisions of training for the growth of MSE" rejected and it has a strong relationship between provision of training and the growth of SME.

Table 3 Rating Training Program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Most effective	38	49.4	49.4	49.4
	Effective	29	37.7	37.7	87.0
	less effective	9	11.7	11.7	98.7
	not effective	1	1.3	1.3	100.0
	Total	77	100.0	100.0	

From the above table above indicates the training programs offered by MFI in the zone are rated by both micro finance institutions employees and small and micro enterprise in the study area. MFI training program is most effective 49.4% of the respondents, 37.7% of the respondents agreed that it was effective, 13% agreed that it was less effective and that no respondents agreed that it was not effective. This shows that both SME and MFI staff in the study area are most effective in finding training program that MFI offers in the Zone.

Effect of training program offered by MFI on the growth of SME: This implies that the response of both MFI staff and SME operators on the extent to which micro finance institutions training programs in south wollo contributes to the growth of small and micro enterprises. Increased profitability rated very high with a weight of 21.12%. according to the response, finance management skill given a weight of 19.01%, company survival strategies given weight of 23%, successful investment decisions given weight of 18.17%and recognition of new business concept ranked with weight of 18.7%. This shows the training programs offered by micro finance institutions in the south wollo zone make it much easier for small and micro enterprises to increase their profitability of enterprises in the study area.

Table 4 Correlations

		MFI on the growth of MSEs	Advisory service	Rating training program	micro finance loan charge
MFI on the growth of MSEs	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	77			
Advisory service	Pearson Correlation	.359**	1		
	Sig. (2-tailed)	.001			
	N	77	77		
Rating training program	Pearson Correlation	-.135	.126	1	
	Sig. (2-tailed)	.004	.002		
	N	77	77	77	
micro finance loan charge	Pearson Correlation	.007	-.231*	-.099	1
	Sig. (2-tailed)	.000	.034	.001	
	N	77	77	77	77

**. Correlation is significant at the 0.01 level (2-tailed).*. Correlation is significant at the 0.05 level (2-tailed).

The above table shows that there is a relationship between all variables and significance. Such as advisory service has a strong positive relationship, rating training has indirect relationship, and microfinance loan charge has a positive relationship with the dependent variable micro finance institution on the growth of micro and small enterprise. In addition, all variable are significant at 0.01. Because of the level of p-value is less than 0.05.

Table 5 Multiple Regression

Multiple Regression for MFI on the growth of MSE Summary	Multiple R	R-Square	Adjusted R-square	Std. Err. of Estimate	Rows Ignored	Outliers
	0.9154	0.8380	0.8314	0.264491438	0	0

As the above model, summary table indicates that the model is fit or appropriate in this study. The value of R-Square is 0.8380. This implies all independent variable affect the dependent variable by 0.8380 (83.80%). The significance level of each independent variables affects the dependent variable by the amount of advisory service .63 (63%), MFI loan service .55(55%) and rating training .41 (41%) respectively.

Table 6 Regression Coefficient

Regression Table	Coefficient	Standard Error	t-Value	p-Value	Confidence Interval 95%		Multicollinearity Checking
					Lower	Upper	VIF
Constant	0.108287623	0.149737562	0.723182756	0.4719	-0.190138908	0.406714154	
Advisory service	0.320388704	0.024844584	12.89571612	< 0.0001	0.270873519	0.369903888	1.028108064
MFI Loan charge	0.346615742	0.028155547	12.31074428	< 0.0001	0.290501817	0.402729666	1.003098464
Rating Training	0.269930252	0.041558193	6.495235476	< 0.0001	0.187104892	0.352755612	1.025363417

Based on the above regression table when one unit of each independent variable increases, the dependent variable also increases by the calculated coefficient values. This means, assume all things are constant, when the variable advisory service increases by one unit, dependent variable MFI on the growth of SME increases by 0.3204. When the variable MIF loan charge increases by one unite, the dependent variable increases by 0.3467, and when the variable rating training increases by one unit, the dependent variable also increases by 0.2699. On the other hand, all variables are significant at p-value of 0.0001. In addition, the value of VIF implies that there is a correlation between all variables. The value of VIF is above one and it shows the association is good.

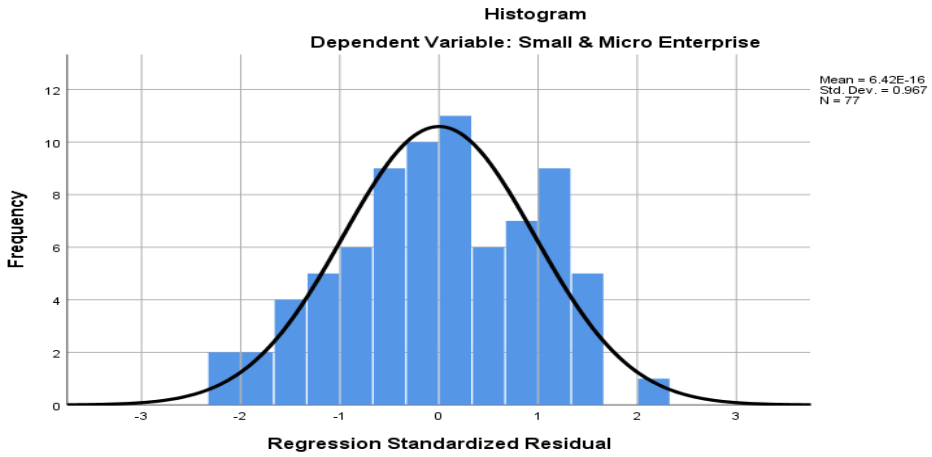

Figure 2 Normality Test Graph

The above graph shows the normality test of all variables. This indicates all data in this study is normal.

4 Conclusion and Recommendation

From the findings, it can conclude that most of small and micro enterprises borrow loan from micro finance banks (ACSI) to finance their startup capital. Loan processing speed is the most challenging credit accessibility policy in MFIs and least challenging loan processing charges as most of this micro finance has limited loan-processing fees. Therefore, the government should adopt encouraging policy in the growth of small and micro enterprises by establishing a favorable business climate and providing lowest interest rate to ease the available credit to SMEs operators. Financial management is the most excellent advisory service provided by MFI to small and micro enterprises and the advisory service offered by their institution have a significant impact on the growth of small and micro enterprises which is why the most successful advisory services offered by MFI in south wollo zone. This is very important to the company's survival; hence, the service has contributed to the survival of many small and micro enterprises. To avert the existed problem, the government should cooperate with micro finance institutions to empower small and micro entrepreneurs by raising awareness of borrowing policy providing, advisory services and grant funding to their business. The training provided by MFIs is therefore most successful, so this training programs provided by micro finance institution promote an increase in the productivity of small and micro enterprises. The study further concluded that micro finance services have a major impact in predicting small and micro enterprise growth. To address the above obstacles government should assist by providing cost of rising, so that both the poor and the

wealthy can access education according to their level of income. As if SME has been the source and the corner stone of the future developmental investors, government should design special supporting packages by adjusting the existed policies, rules and regulations. In addition to this, other researchers should give attention for further research.

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Nature of Property Rights, Internal Control Weakness, and Audit Fees

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Abstract: This paper studies the internal control relationship between the weakness and audit fees by selecting A-share listed companies from 2015 to 2019 as samples, and finds that there is a positive correlation between internal control weakness and audit fees. Then, with the further classification of defects into major defects, important deficiencies and defects specifically, it is found that means the more serious the internal control deficiencies, the higher the audit fees. Furthermore, from the perspective of the nature of corporate property rights, CPAs are more likely to charge higher audit fees for state-owned enterprises with internal control deficiencies.
Keywords: Nature of property rights; Internal control weakness; Audit fees, Regression analysis

1 Introduction

The external independent audit provides the audit opinion on whether the company fairly reflects its financial status, operating results, and cash flow in the company's financial report. According to Auditing Standards for Chinese Certified Public Accountants, external independent auditors must understand the internal control of the audited entity, and then asses the risk degree. So, the audit fee has been much discussed. Besides, it is believed that a high-quality internal control can effectively reduce the risk of major misreporting and helps to ensure the authenticity as well as the fairness of corporate financial reports. What is more, "Alternative Theory" suggests that internal control is alternative to external audit. It believes that a higher quality of internal control of the enterprise can reduce the substantive test range of external audit (Simunic, 1980) as well as audit fee. Also, "Complementary Theory "shows that internal control and external audit are complementary. That is, enterprises with a high quality of internal control may attach great importance to its internal control to ensure good corporate reputation (Eichenseher and Shields, 1985). Therefore, these firms are more likely to recruit high-quality audit and pay a higher audit fee.

2 Literature Review

According to the types of internal control weakness Jong Eun Lee (2018) finds that IPO firms with internal control deficiencies regarding pre- IPO financial reporting are likely to pay higher IPO audit fees, in addition, the fees are positively and significantly associated with the severity of the type of deficiencies. William Buslepp (2019)[4] finds that firms misclassifying audit-related fees are more likely to report a material weakness, are less timely filers (longer report lag) and pay higher audit fees. Therefore, misclassification of audit-related fees correlates with having poor internal control quality. And Chinese scholars have made a multi angle study. She Xiaoyan and Wang Heng Min (2017)[5] finds that the severity of internal control deficiencies is shown to be apparently positive related to audit fees. Then, Yao Heping (2015)[6] finds that the audit fees of companies that disclosed internal control weakness do not increase significantly compared with companies that did not disclose internal control deficiencies. It indicates that internal control defect information cannot accurately measure the internal control level of an enterprise at that time. Furthermore, from the perspective of the path and adjustment factors in which internal control deficiencies affect audit fee. M.Akhtaruddin's (2016) research shows that when an enterprise has internal control weakness is reported, auditors will increase audit fees, but when the number of independent directors in the board of directors increases, the incidence of pressure audit fees will be reduced. Sourour Hazami (2019) found that when the internal audit function's (IAF's) quality is high, the external audit fees will be low. Zhang Rui et al. (2015） find that with high quality of internal control, the relationship between earnings management and audit fees can be expressed as " Audit Opinion Purchase ". At the same time, when the quality of internal control is low, earnings management and audit fees can be seen as "Business Complexity Compensation ". Also, Liu Meng et al. (2018) follow behavior finance and find that when the management is overconfident, auditors may significantly increase the audit fee to deal with possible audit risks. Evidence shows that this effect is particularly significant in state-owned enterprises.

What is more, from the perspective of the nature of property rights point of view, Li Yuedong, Zhang Dong et al. (2014) indicate that audit fee and internal controls defects have a significant positive correlation. Also, compared to non-state-owned enterprises, CPA charge state-owned enterprises with significant shortcomings of the internal control more on the audit fees. Empirical research by Chen

Jiaojiao (2018) finds that listed companies' internal control audit fee is obviously negative correlated with the managerial ability and managerial power. And state-owned and non-state-owned listed companies both share the influence of managerial capabilities on internal control audit fees. In summary, the current research mainly focuses on the impact of internal control on audit fees based on the accounting level and corporate governance structure level, but there is less research on the impact of internal control weakness on audit fees based on different property rights.

3 Theoretical Analysis and Assumptions

3.1 Correlation of internal control weakness and audit fees

The audit fee generally includes two parts. One is the work cost. The other part is the expected litigation risk or reputation risk. Under the perspective of work cost, for companies with imperfect internal control system or poor performance, the more the internal control weakness, the higher the level of major misstatement risk. Then, to obtain more audit evidence, such firms may invest more on the audit fees. Furthermore, auditors need to ensure that there is no risk of material misstatement of financial reporting within a limited range considering the idea for cost savings. From a risk point of view, due to that the risk of audit of firms with internal control deficiencies is higher than companies whose defects do not occur, the auditor might demand a higher risk premium to compensate possible transferred audit risk from listed companies and therefore increase revenue audit fees. She Xiaoyan and Wang Da Man (2017) find that auditors in the audit risk control process would adjust the audit fees to cope with existing risks. Finally, the following research hypotheses are proposed:

H1: There is a positive correlation between internal control weakness and audit fees.

H2: Audit fees are negatively correlated with the degree of internal control defects.

3.2 The correlation between internal control and audit fees under different property rights

Since "Central Enterprise-wide Risk Management Guidelines"(2006) requires more on the internal control risk management of enterprises, the corresponding violation costs of state-owned enterprises is relatively high. The firm will spend more resources on auditing state-owned enterprises that have significant internal control deficiencies and may charge higher audit fees to reduce the audit risk to be undertaken by themselves. At the same time, coupled with the demanding media attention on the state-owned enterprises management, governance layers will attach great importance to internal control of the situation and recruit high-quality audit on behalf of the firm into line audit at a higher audit fee. Therefore, the paper assumes that:

H3: Compared with non-state-owned enterprises, state-owned enterprises with internal control deficiencies pay more audit fees.

4 Variable Selection and Model Design

4.1 Sample selection

This paper selects A-share listed companies from 2014 to 2019 as samples excluding those followed:

(1) Firms in the financial, insurance, real estate industries because of its different business model to other industries and their relevant financial data are greatly different.

(2) Firms without the necessary financial listed company data.

(3) ST company. After the tail reduction, there are 9587 research samples remaining. The data in this paper mainly comes from the CSMAR database.

4.2 Variable setting

This paper mainly studies the impact of internal control on audit fees. Therefore, the explanatory variable is the audit fee of enterprises, and it is recorded as afee. Internal control weakness recorded as icw. Suppose H1 uses the internal defect of the audited unit as an explanatory variable, the explanatory variable of H2 is nvarchar. The types of internal control weakness are divided into major defects, important defects and general defects. With reference to previous research on audit fees and internal control, this paper selects company size (size) , asset-liability ratio (ev) , total asset return (roa) , accounts receivable (rec) , auditor change (change) , accountant firm (big4) as a control variable, and a dumb year variable is set to control the influence of other macroeconomic factors.

4.3 Model design

Simunic firstly proposes the audit pricing model and finds that asset size is the most important factor affecting audit fees followed by business complexity. This paper refers to the classic audit pricing theory of Simunic (1980) and constructs the following audit fee model combined with relevant research at home and abroad:

For Assumption1, following model is designed:

$$afee = \beta_0 + \beta_1 icw + \beta_2 size + \beta_3 lev + \beta_4 roa + \beta_5 rec + \beta_6 chang + \beta_7 big4 + \varepsilon$$

For Assumption2, following model is designed:

$$afee = \beta_0 + \beta_1 nvarchar + \beta_2 size + \beta_3 lev + \beta_4 roa + \beta_5 rec + \beta_6 chang + \beta_7 big4 + \varepsilon$$

For Assumption3, following model is designed:

$$afee = \beta_0 + \beta_1 icw + \beta_2 icw * state + \beta_3 size + \beta_4 lev + \beta_5 roa + \beta_6 rec + \beta_7 chang + \beta_8 big4 + \varepsilon$$

Table 1 Variable Definition Table

Variable nature	Variable name	Variable symbol	Variable definitions
Explained variable	Audit fee	afee	The company's annual audit fee is taken as the natural log
Explanatory variable	internal control weakness	icw	When the audited unit has internal defects, icw is assigned a value of 1, otherwise it is 0.
	Degree of internal control weakness	nvarchar	When the audited unit has 3 major defects, 2 major defects, and 1 general defect.
Control variable	Company Size	size	Total assets at the end of the year are taken as natural logarithm.
	accounts receivable	rec	Ratio of accounts receivable to total assets
	Corporate asset-liability ratio	lev	Ratio of total liabilities to total assets at the end of the period
	Return on corporate assets	roa	The company's total asset return for the year
	Office type	Big4	When it is an international big four accounting firm, big4=1; otherwise, b ig4=0
	Property nature	state	SOE is 1, otherwise 0
	years	year	Control annual effects

5 Empirical Results

In the regression analysis of audit fees and control deficiencies, the internal control coefficient is 0.06 and shows significance at the 1% level. That is, audit fees and the existence of internal control deficiencies in the company are significantly related. As a result, H1 is verified. Also, audit fees are apparently positively related to major deficiencies in internal control. It indicates that our country's certified public accountants do not rely solely on substantive procedures such as analytical procedures and detailed tests when conducting financial audits of audited entities, but rather have a certain understanding of the company's internal controls. Then accountants are supposed to test and adjust audit resources reasonably according to the quality of internal control of the enterprise. In general, auditors need more work to enterprises with poor internal control quality. Thereby, enterprises with major defects in internal control pay more audit fees for enterprises with major defects in internal control. However, since its coefficient is only 0.06, it tells that the CPA does not regard major deficiencies in internal control as the main consideration when auditing pricing. Then, with further division of the control defect types into major defects, important defects and general defects, the coefficient of the new regression is 0.04, which is significant at the level of 1%. That means H2 is verified. When the degree of internal control weakness is high, the auditor is more likely to improve the audit fee.

At the same time, this paper regresses the defect of internal control and audit fees under different ownership. Besides, the new regression model adds the cross multiply items of internal control deficiencies and property type and the coefficient of the multiply item is 0.06 and significant on the level of 1%. As a consequence, the audit fee of state-owned enterprises with major internal control deficiencies is higher than that of non-state enterprises. So H3 is verified. Due to the relatively high regulatory requirements and the media's increasing attention to state-owned enterprises in recent years, the cost the risk of major misstatement in financial reports and the economic risks of audit risks of state-owned enterprises with major internal control deficiencies is higher than that of non-state-owned enterprises. In that case, certified public accountants will allocate more audit resources and increase audit fees. In the overall regression results, except that the return on assets is negatively correlated with audit fees, the remaining control variables are positively correlated with audit fees.

This paper also uses a variety of robustness tests, such as adding the previous year audit opinion and other control variables in the regression model, and replace ROA with roe. Finally, H 1, H2, H3 are still been verified.

Table 2 Regression Results

	(1) afee	(2) afee	(3) afee
icw	0.06^{***}		0.05^{***}
	(0.01)		(0.01)
nvarchar		0.04^{***}	

		(0.01)	
icw*state			0.06***
			(0.02)
size	0.35***	0.35***	0.37***
	(0.00)	(0.00)	(0.00)
rec	0.30***	0.31***	0.17***
	(0.04)	(0.04)	(0.04)
lev	0.01	0.00	0.07**
	(0.03)	(0.03)	(0.03)
roa	-0.40***	-0.41***	-0.42***
	(0.06)	(0.06)	(0.06)
change	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)
big4	0.57***	0.57***	0.57***
	(0.02)	(0.02)	(0.02)
_cons	5.84***	5.90***	5.51***
	(0.10)	(0.10)	(0.10)
N	9587	9587	9587
R^2	0.557	0.556	0.574

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

6 Conclusion

By selecting A -share listed companies from 2015 to 2019 as samples, this paper studies the relationship between defects and internal audit fees. Also, with the classification of major defects, important deficiencies and defects, this paper shows the relationship of the level of internal control and audit fees under different property. The study finds that internal control deficiencies are positively related to audit fees. From the perspective of the nature of enterprise property rights, CPAs charge higher audit fees to companies with internal control weakness, and this phenomenon is more significant in state-owned enterprises than in non-state-owned enterprises. In addition, whether it is the "Big Four" audit among all variables has a particularly significant impact on the audit fee. But from the regression results, although deficiencies in internal control are significantly related to audit fees, they are not the main factor that affects audit fees. As a result, audit firm will not consider much at first about the internal control deficiencies of the audited unit the firm for the audit pricing and issuing audit opinions.

With these conclusions, the government should further strengthen supervision, especially state-owned enterprises, and promote the improvement of internal control. Listed companies should pay attention to the construction of internal control, and the company should establish corresponding training mechanism to improve employees' understanding of internal control and clarify the importance of establishing internal control. CPA should make full use of internal control audit information to reduce audit risk and save cost. At the same time, this paper has some limitations. For the state-owned enterprises, whether the auditor increases the audit cost or transfers the audit risk is not discussed in this paper. This is a problem worthy of further discussion.

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Research on the Practice Course of International Economy and Trade Based on CDIO

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Abstract: CDIO teaching method is an organic combination of teachers' research-based teaching and students' research-based learning. It combines classroom teaching with extracurricular practice, teaching material explanation and extensive reading, teachers' guidance and students' independent learning, aiming to cultivate students' practical ability. Taking the practice course group of international economy and trade as an example, the teaching method based on CDIO is infiltrated into the whole teaching process of the course, and the case organization and teaching content are studied and improved. Practical teaching experiments show that the implementation of CDIO teaching method has achieved good teaching results, and put forward new development ideas and efforts.
Keywords: CDIO; Extracurricular practice; Practice Course group; Case study

1 Introduction

Nowadays, in the course system design of international economy and trade, colleges and universities have gradually changed the traditional teaching method of emphasizing theory and neglecting practice. But there are still some problems in some practical courses, such as international business negotiation, foreign trade documents practice, customs declaration and inspection training and other professional skills training (Li Hao, 2020). For example, because the traditional indoctrination teaching method dominates the teachers, the teaching method is single and backward. Even if teachers and students interact, it is also a question and answer method, lack of interest and innovation. Less interaction between teachers and students, it is difficult to give full play to students' subjective initiative, resulting in students' low participation in the classroom and unsatisfactory teaching effect. Second, the assessment method is single, it is difficult to truly evaluate the comprehensive ability of students. Influenced by the fixed thinking of the course written examination, there is a lack of scientific and effective way to evaluate the practical curriculum group (Hong Xu, 2020). Therefore, based on the training concept of CDIO, this paper reconstructs the practical curriculum group of international economics and trade from the aspects of basic knowledge, personal ability, team ability and innovation ability, so as to enable students to achieve the predetermined goals in these four levels in a comprehensive way (Xu Yang, 2018).

CDIO teaching method is an organic combination of teachers' research-based teaching and students' research-based learning. It combines classroom teaching with extracurricular practice, teaching material explanation and extensive reading (Geraskin N I, 2020). At the same time, it emphasizes the leading role of teachers and students, cultivates students' interest in learning, stimulates students' thinking in learning, and cultivates students' ability to analyze and solve problems (Dandan Song, 2018). On the other hand, this method can provide students with solid content knowledge and training practice and innovation ability (A, Sushma Kulkarni, 2020).

CDIO teaching has the characteristics of openness, synthesis and practicability. It requires teachers to promote students' learning enthusiasm in the teaching process, inspire them to think actively and guide them to investigate new knowledge, explain the course content and help improve students' understanding

level, improve students' creativity and problem-solving ability (Jose S, 2020). It not only imparts students' basic knowledge in training courses, but also cultivates students' ability, especially their ability of research and innovation in future study and work. In the CDIO teaching process, students are no longer the ordinary teaching audience, but the main body who actively participates in the teaching process. They are no longer the passive recipients of traditional teaching courses, but the active constructors of scientific knowledge (Svante Gunnarsson, 2017).

The development and implementation of CDIO teaching mode began in four universities, which is characterized by active and experiential learning, and is constantly improved through a robust quality assessment process. Assessment is based on learners, around the teaching and learning effect, using a variety of methods to evaluate it, and forming a supportive and cooperative environment for learning (Power J, 2019).

The main feature of CDIO teaching mode is that it creates dual learning experience that can deepen the learning technology foundation and practical ability (Thomas Haavi, 2018). We use modern teaching methods, innovative teaching methods and new learning environment to provide students with real-world learning experience. These specific learning experiences create a cognitive framework for learning abstract concepts related to technological basis, and provide students with practical application opportunities to understand and remember these abstract thoughts, thus providing a way to master profound basic knowledge Path (Nyka L, 2018). These specific experiences also inspire students to learn about personal and interpersonal skills as well as the ability to build products, processes and systems (Seamus Gordon, 2018) .

The traditional teaching method overemphasizes the scientific theory and classroom teaching, which makes the teaching out of line with the case practice and seriously restricts the cultivation and development of students' practical ability (Edstrm K, 2020). It has become an urgent problem to introduce CDIO teaching method into different professional courses and strengthen students' learning ability.

2 Data Analyzing of CDIO Conception

2.1 Investigation from CDIO university

700 participants selected from universities carrying CDIO were sent questionnaire by email, and 618 ones responded. Males were accounted for 69.1% of the total, and females were accounted for 30.9% of the total.

Table 1 The Understanding the Conception of CDIO

degree of know	Know clearly	Know	Know little	Know nothing about
Proportion	10.1%	59.3%	23.7%	6.9%

2.2 Scheme of practical course training

According to the undergraduate training program of international trade, the undergraduate students of international trade major should not stay in the boring theoretical study of trade practice, but experience the vivid trade environment, face the risks, bear the responsibilities, and gain more from failure (Wang Ruisheng, 2016). Therefore, teachers set up content modules according to the teaching content combined with practical training courses. From the perspective of their own participation, according to the module content, students complete the module tasks in the specific mode of role-playing, simulation negotiation, situational training and so on. Through the experiential learning provided by the virtual trade platform of practical courses, students can fully experience the operation process of international trade enterprises in a short period of time, gain systematic understanding of international

trade-related work, and master relevant work skills. In this way, students' perceptual knowledge of international trade theory is strengthened, and they are familiar with and understand the employment environment. In the virtual trade with students from all over the country, CDIO advocates "learning to do, learning to do" (Gu Peihuang, 2017). After each teaching task is completed, teachers and students should carry out self-assessment to achieve the goal of teaching and learning. Figure 1, figure 2.

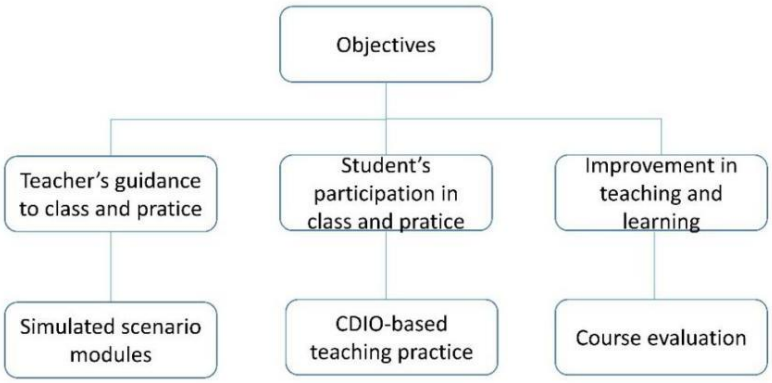

Figure 1 Teaching Task

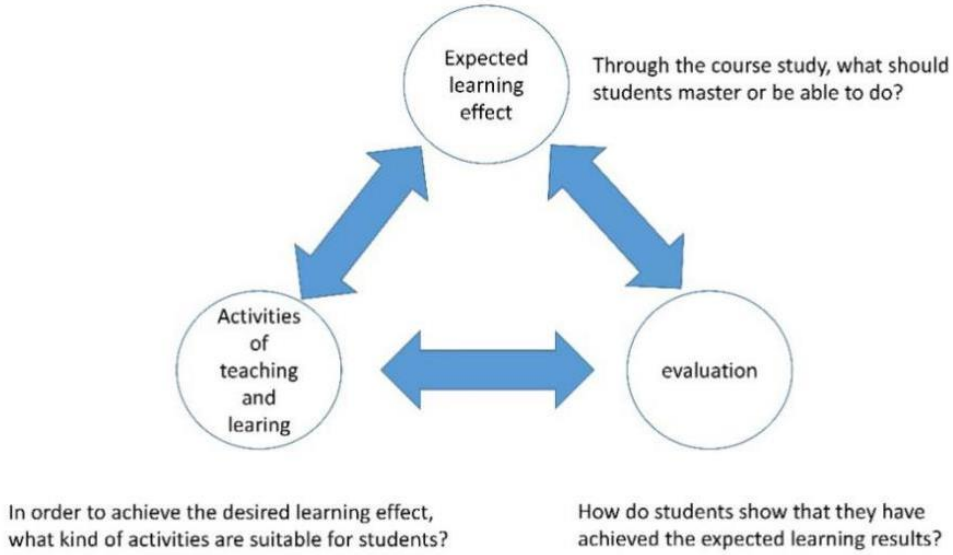

Figure 2 Self- assessment

3 Objectives and Characteristics of CDIO Based Practice Course Group

Foreign trade practice curriculums is the case study. It aims to cultivate students' professional knowledge of foreign language and international trade, and strive to integrate them. At the same time, students need to master the knowledge and skills of international business negotiation, psychology and ethics, as well as economics, management, marketing and business etiquette. Therefore, according to the particularity of the course group, the teaching objectives, course characteristics and skills are summarized as shown in Table 2, table 3 and table 4. At the same time, the specific ability indicators to complete the

course are summarized as shown in Table 5.

Table 2 The Teaching Objectives Analysis

Objective	Knowledge	Ability	Quality
Meaning	To cultivate and train students with foreign language and international trading knowledge as well as the smooth application of the both.	To enable students to know how to analyze the situation and master the basics and skills of professional English expression.	To train students with basic trading theories and English communication skills, focus on solving practical problems, and prepare them for work in future.
Proportion	27.8%	43.1%	29.1%

Table 3 The Characteristics of CDIO

Characteristics	Involving	Experiential	Personalized
Meaning	Using the CDIO design idea to arrange modules of the course based on scenario, discussion, and practice based on CDIO design idea.	Person participates in the process of starting a business, carrying out and accomplishing the task as a trading practitioner.	Lectures provide guidance for class learning, help students to think independently and participate in discussing, questioning, and solving practical problems.
Proportion	42.6%	27.1%	30.3%

Table 4 The Skills Development of CDIO Requirement

Skill	Negotiation	Professional	Thinking
Meaning	Possess the skills and corresponding knowledge and methods needed to engage in foreign trade and negotiation.	Familiar with all aspects of international trade practices,	Possess the oral communication and applied writing skills, and integrate them into a thinking ability.
Proportion	31.6%	36.3%	32.1%

Table 5 The Ability Training Indicators

First-grade indicator	Second-grade indicator	Method requirement	Percentage
1. Professional basic knowledge	1.1 Ability of using basic knowledge of the course 1.2 Ability of using basic knowledge and principles of course	Teaching and practice	26.1%
2. Personal and professional ability	2.1 Ability writing of foreign trade business letters and solving problems 2.2 Individual capability and attitude	Simulated practice	26.3%
3. Interpersonal skills	3.1 Teamwork 3.2 Communication	Simulated practice	19.8%
4. The ability to apply knowledge to serve the society	4.1 Integrated learning experience· 4.2 Innovation	Simulated practice	27.8

4 Implementation Effect of CDIO Based Practice Course Group

4.1 The teacher's class guidance

As each module requires different emphasis, the teacher needs to convey lots of information and explains them clearly to students step by step. Then, students can understand the theories of international trade, be familiar with the trading context, and building up learning interests.

4.2 Students' cooperation in class

This course uses English teaching materials. In order to eliminate students' fear and anxiety about this course and improve the enthusiasm and initiative of learning, the whole teaching process advocates that students form a learning group of 5 people under the guidance of the teacher and consolidate the basic knowledge through after-school exercises. Students can master relevant knowledge through work hard. They can apply the knowledge to practice instead of paper exams.

4.3 Improvement in teaching and learning

Through the full participation of the teacher and students, with the classroom teaching and practice platform, both the teacher and students make progress (Wang ZhengLu, 2020). By means of mutual exchange and cooperation, the teacher and students experience the happiness of learning, the happiness of independent creation, and the happiness of participation and cooperation. Therefore, the teaching tasks will be accomplished and the teaching objectives will be achieved during the teaching process with students' active participation. Figure 3

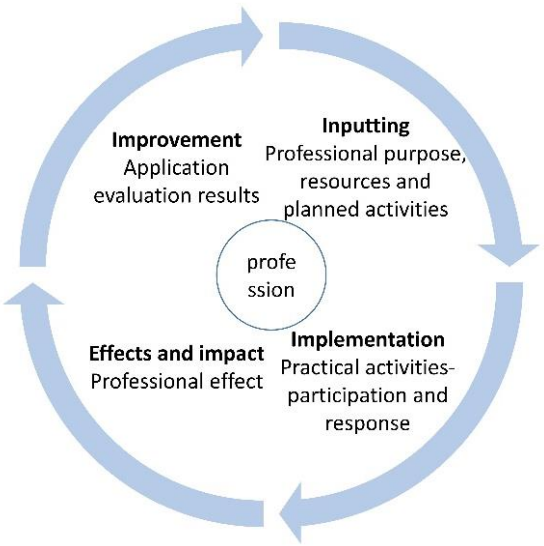

Figure 3 Learning Process

5 Conclusion

First, the integrated teaching mode has changed the traditional teaching mode which takes teachers as the center and simply imparts knowledge, and boldly embedded in the practical training course. With the help of teachers' guidance and partners, students can solve the problem of why the theoretical knowledge in the classroom can be realized in the simulation trade platform.

Secondly, the students' learning ability is developed. The teaching mode is based on the creation of a real working environment, which enables students to complete the transformation of foreign trade roles from students to business negotiation experts, foreign trade managers, merchandisers, etc., to be free from passive learning and self-learning, to participate in the environment of active learning and team learning, and to experience the joy of knowledge renewal in team cooperation.

Third, the main position of students is emphasized. Reading thousands of books, also travel thousands of miles, travel thousands of miles in the fun is not experienced in thousands of books. Through negotiation with customers, signing contracts, performing contracts, dealing with accidents in import and

export trade, they have exercised their communication ability, learning ability, psychological quality and team spirit, greatly enhancing the confidence of students.

Acknowledgement

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Empirical Research on the Influencing Factors of Teaching Evaluation: Based on the Perspective of University Students' Online Teaching Evaluation

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Abstract: University students' online teaching evaluation focuses on teachers' personal work performance, which is a common way to evaluate teaching quality in many universities nowadays. It is a way to reflect whether teachers perform their duties and whether their work performance meets the teaching expectations of the school. It is a way to reflect whether teachers perform their job duties and whether their job performance meets the school's teaching expectations. However, the current teaching evaluation method is not very effective in practice. This paper takes students, teachers and evaluation administrators as the starting point to investigate. The survey results show that students' performance has no significant impact on the evaluation results, students' attitude towards teaching evaluation has a positive impact on the evaluation results, teachers' teaching performance has a positive impact on the results of teaching evaluation, and the administrators' management of teaching evaluation has a positive impact on the evaluation results.

Keywords: University students; online teaching evaluation; Influencing factors of teaching evaluation; Countermeasures of teaching evaluation; Empirical research

1 Introduction

In European and American universities, the students' teaching evaluation system has become a very standardized and perfect teaching quality assurance system after decades of development (Shi Xiuying,2015)[1]. In China, universities began to carry out students' evaluation of teaching activities in the 1980s. With the widespread development of the evaluation of teaching level in universities, students' evaluation of teaching has been gradually carried out. However, there are a variety of problems in online teaching evaluation of university students, such as students are sloppy or take the opportunity to retaliate, teachers make threats or deliberately try to please, and the school does not pay attention to or attach too much importance to. These factors may affect the real ideas of university students when evaluating teaching, and lead to the deviation of teaching evaluation results. Through the investigation of the real situation of students' evaluation of teaching, we can understand the college students' views and attitudes towards teaching evaluation, know the problems arising from the construction and implementation process of teaching evaluation, the problems of teachers and students, and then put forward targeted opinions and suggestions, and apply these research results to the online teaching evaluation of university students, so that the teaching evaluation can be carried out to play an important role in helping the improvement and promotion of school teaching.

2 Literature Review

Some scholars think that the influencing factors of teaching evaluation mainly involve teaching factors and non-teaching factors (Pan Yunhua, Zhang Yiyan, 2016)[2]. The former includes teaching level, teaching method, teaching effect, teaching attitude, etc.; the latter includes students' personal factors

(such as gender, achievements, teaching evaluation attitude, etc.), teachers' personal factors (such as teachers' professional title, teaching ability, teaching performance, etc.) and management factors of teaching evaluation in universities (teaching evaluation system, teaching evaluation work, evaluation feedback, etc.). This paper studies the influencing factors of teaching evaluation from the perspective of university students' online teaching evaluation, focusing on the role of three groups in the process of teaching evaluation from the perspective of students.

There are five levels of students' attitudes towards teaching evaluation, which are objective and fair, scoring according to preference, indifferent, retaliating against teachers and giving low marks directly. Different attitudes reflect students' views on teachers and eventually lead to different evaluation results. There are few studies on the influence of students' attitude towards teaching evaluation on the results of teaching evaluation. Ma Li, Sun Fangi scholars believe that students' positive attitude towards teaching evaluation will have a positive impact on the results of teaching evaluation (Ma Li, Sun Fang, 2017)[3].Students' academic performance is generally considered to be related to the results of students' evaluation of teaching. Students' academic performance is generally considered to be related to the effectiveness of students' evaluation of teaching (Marsh et al., 1987)[4]. The higher the students' academic performance, the higher the evaluation of the teachers (Khan M K et al., 2017)[5][5]. The better the students' academic performance, the more reliable the evaluation of teachers, and therefore, the more effective their evaluation of teachers will be (Stupans et al., 2016)[6].

Dai can, et al found that there was no significant correlation between the comprehensive score of students' evaluation of teaching, the title of teachers, the grade of students and the major category. Except these factors, it was significantly correlated with other elements such as teaching ability, teaching performance, teaching skill etc. Although students are the main body in teaching evaluation, the teachers' behavior, teaching ability and so on affect the result of teaching evaluation. Students' evaluation of teachers with strong professional competence is relatively high (Dai can, et al., 2017)[7]. Therefore, if the teacher has strong teaching ability and is willing to improve his teaching level, generally speaking, the students' evaluation and teaching results are better. That is: the better the teachers' teaching performance, the better the evaluation results.

In addition, many scholars believe that the higher the level of monitoring and management of teaching evaluation process, the better the corresponding teaching evaluation results. Ke Lifen proposed to cancel the compulsory means, improve the teaching evaluation system, set reasonable evaluation indicators, and abolish the one vote veto system to improve the effectiveness of the results of teaching evaluation (Ke Lifen,2019)[8]. Therefore, in teaching evaluation, not only students should change their own attitude towards teaching evaluation, teachers should focus on improving teaching level, but also school administrators should make some improvement measures, such as improving the evaluation index system, strengthening the management and supervision of the process of teaching evaluation.

3 Research Design

3.1 Research hypothesis

There are many aspects that affect the results of students' evaluation of teaching, including school management, teachers themselves and students themselves. Therefore, these three factors can be measured as variables to observe the relationship between the three variables and the final results of teaching evaluation, and make some suggestions and improvements on the teaching evaluation system. ①Students themselves, mainly use students' scores and students' attitude towards teaching evaluation as

influencing factors. ②Teachers' teaching performance, mainly involves teaching ability and performance. ③The management level of schools' teaching evaluation management (including whether to set up a complete teaching evaluation system, whether to organize students to participate in teaching evaluation effectively, whether to feedback from the evaluation results, and whether to attach importance to students' opinions on teaching evaluation, etc.)

Based on the literature research and the availability of data, we put forward the following four hypotheses from three aspects: college students, teachers' teaching and teaching evaluation management.

H1: Students' evaluation attitude has a positive influence on teaching evaluation results

H2: Students' scores have a positive impact on the results of teaching evaluation

H3: Teachers' teaching performance has a positive influence on the evaluation results

H4: The management level of evaluation has a positive impact on teaching evaluation results

3.2 Questionnaire investigation

In order to verify the above hypotheses, a questionnaire survey was conducted among college students to obtain the analysis data. The purpose of this paper is to obtain more in-depth information about students' teaching evaluation and to prepare for the questionnaire. On the basis of interview and theoretical analysis, after several discussions and modifications, the questionnaire of University Students' Teaching Evaluation was compiled. By obtaining basic data from the research of contemporary university students, we can analyze the problems faced by university students in the process of teaching evaluation and the causes of these problems, and put forward targeted opinions or suggestions. We collected a total of 401 online questionnaires, 45.52% were male and 54.48% were female. Freshmen accounted for 9.2%, sophomores accounted for 18.16%, juniors accounted for 39.3%, seniors accounted for 26.62%, masters accounted for 5.97%, and PhD students accounted for 0.75%.

4 Research Results and Discussion

4.1 The correlation of the performance of different groups in teaching evaluation

In this study, 401 samples of online data were used to test the relationship between variables. The graph shows the mean value, variance and correlation of each variable. According to the chart, it can be seen that there is still a strong correlation between each variable. Among them, the strongest is between administrators' management of teaching evaluation, teachers' teaching performance and the results of teaching evaluation, while there is no correlation between students' grades and administrators' management of teaching evaluation and teachers' teaching performance.

Table 2 The Correlation of the Performance of Different Groups in Teaching Evaluation

	Mean	Variance	Students' grades	Students' Attitude towards Teaching Evaluation	Student evaluation of teaching attitude	Administrators' Management of Teaching Evaluation	Teacher's Teaching Performance
Teaching Evaluation Results	0.45	0.15	1				
Students' grades	1.57	0.435	0.001	1			
Students' Attitude towards Teaching Evaluation	1.64	0.646	-0.199**	0.092	1		
Administrators' Management of Teaching Evaluation	0.51	0.18	.335**	-0.072	-0.142**	1	

Teacher's Teaching Performance	0.43	0.20	.332**	-0.07	-0.114*	.496**	1

4.2 Regression analysis of influencing factors and teaching evaluation results

4.2.1 Establishment of regression model

The following will establish regression equation to analyze the influence of students' performance, students' attitude towards teaching evaluation, teachers' teaching performance and management level of school administrators on teaching evaluation results. Based on the establishment of four variables, the basic variables of demography, gender and grade, as well as some control variables are introduced, including whether student cadres, whether students participate in the student union, and the times of teaching evaluations.

Firstly, testing the fitting effect of the regression equation. The following table shows that the fitting degree R square and the adjusted R square of the equation are 0.211 and 0.193 respectively, which shows that the fitting effect of the equation is acceptable; in addition, the F statistic is 11.643, and the corresponding sig is 0, which has passed the significance test, showing that the linear relationship of the equation is also significant as a whole.

Table 3 Regression Fitting Effect

R	R square	adjusted R square	Error of standard estimation
0.459	0.211	0.193	0.775

Table 4 Global Significance of Regression Equation

	Quadratic sum	df	mean square	F	Sig.
Regression	62.950	9.000	6.994	11.643	0.000
Residual error	235.497	392.000	0.601		
Total	298.448	401.000			

4.2.2 Regression results of each influencing factor

Finally, testing the significance of the variable coefficient. The demographic variable gender was -0.289, T-statistic was -3.606, and the coefficient passed the significance test at the level of 1%. It can be seen that gender has a significant impact on the teaching evaluation results, among which the female rating results are significantly lower than the male rating results. The coefficient of grade variable is 0.022, and the coefficient does not pass the significance test Grade variables have no significant impact on the rating results; the coefficients of the two variables, whether student cadres, whether they participate in Student Union and community, pass the significance test at the level of 5%, and the coefficient is significantly greater than 0. It can be seen that the two factors of student union cadre, student union or association can have a significant positive impact on teaching evaluation results. The coefficient of teaching evaluation times is 0.004, which fails to pass the significance test. It can be seen that the evaluation coefficient has no significant impact on the rating results. The coefficient of students' performance variable is 0.121, T-statistic is 1.963, sig of significance is greater than 0.05, so at the level of 5%, students' performance cannot have a significant impact on the result of class evaluation; the coefficient of students' attitude variable of teaching evaluation is 0.259, which has passed the significance test at the level of 1%, and the coefficient is significantly greater than 0, which indicates that students'

evaluation of teaching has a significant positive impact on the results of teaching evaluation The teacher's teaching performance coefficient is 0.207, which also passed the significance test at the level of 1%, which shows that the teaching performance of teachers has a significant positive impact on the evaluation results; the coefficient of management is -0.177, and the coefficient also passes the significance test at the level of 5%. Therefore, this index is a reverse index, so it is considered that the management level of the administrators has a significant impact on the evaluation results. The higher the management level, the higher the corresponding evaluation results.

Table 4 Significance of Variable Coefficient of Regression Results

Variable	Coefficient	Standard error	T-statistic	sig.
Constant	0.811	0.321	2.530	0.012
Gender	-0.289	0.080	-3.606	0.000
Grade	0.022	0.041	0.535	0.593
Student Cadres	0.228	0.083	2.739	0.006
Student Union	0.222	0.108	2.053	0.041
Evaluation Times	0.004	0.046	0.091	0.928
Student Performance	0.121	0.061	1.963	0.050
Students' Attitude Towards Teaching Evaluation	0.259	0.050	5.160	0.000
Teachers' Teaching Performance	0.207	0.055	3.768	0.000
Management	-0.177	0.082	-2.157	0.032

4.3 Research findings

4.3.1 Students' grades has no significant effect on teaching evaluation results

The H1 hypothesis does not hold true, though students' gains and accomplishments in the course come more from their own efforts, the teacher's ability to teach is more noticeable to a student. Compared with grades, the teacher's performance has a more significant impact on teaching evaluation results than grades.

4.3.2 Students' evaluation attitude has a positive impact on the results of teaching evaluation

The final result of teaching evaluation is determined by students' attitude towards teaching evaluation and their likes and dislikes of teachers. Different students have different attitude towards teaching evaluation, and students who are willing to evaluate teaching objectively and fairly for their own learning gains can often bring efficient teaching evaluation results. However, some students only evaluate teachers on the purpose of completing the task of teaching evaluation, and evaluate teachers' teaching quality with indifferent and contradictory attitude, which has a negative effect on the results of teaching evaluation.

4.3.3 Teachers' teaching performance has a positive influence on teaching evaluation results

The teachers' professional skills, teaching level, classroom attitudes and other teaching performance affect the students' evaluation of them. In the teaching process, teachers mainly determine the teaching methods and progress according to the course content, nature and school training objectives. If teachers are concerned about students' interests and needs and promote their teaching level, students will have relatively high evaluation of them.

4.3.4 Administrators' management of teaching evaluation has a positive impact on evaluation results

The administrators' management of teaching evaluation is mainly reflected in the rationality of the

design of the evaluation index system, the feedback of evaluation results and other management issues, which often affect whether the evaluation can achieve its own objectives. The more reasonable teaching evaluation management is, the more stimulating it is for both the students and teachers. Administrators should analyze and process assessment data statistically and then provide statistical feedback to teachers and students to further understand student needs, modify teaching methods, improve professional level and promote teaching quality.

5 The Countermeasures of University Students' Teaching Evaluation—Based on the Tripartite Groups of Students, Teachers and University Administrators

5.1 From students' perspective

From H1, H2 and research results, we can see that there is no obvious correlation between students' scores and teaching evaluation results, while students' attitude towards teaching evaluation has a positive effect that cannot be ignored. Teaching evaluations provide an opportunity for students to give feedback about the course and teaching (Margaret A. Bush et al., 2018)[9].From the perspective of students, we must correct the attitude of teaching evaluation, cherish and exercise the right of teaching evaluation carefully. We should remove personal emotional color, complete the evaluation work rationally and objectively, maliciously evaluate teaching and refuse to perfunctorily. Students should carefully read the teaching evaluation indicators, evaluate the teaching work of teachers in combination with the actual teaching situation, and reasonably express their personal views, so as to ensure that their teaching opinions reflected through the teaching evaluation work are true and effective, and seek truth from facts.

5.2 From teachers' perspective

In this study, H3 has been confirmed (Teachers' teaching performance has a significant impact on students' teaching evaluation).In other words, students' evaluation of teaching ratings are strongly related to teaching effectiveness (Bob Uttl et al., 2016)[10]. Therefore, teachers should improve their teaching performance from the aspects of teaching methods, teaching means and organization arrangement. By using diversified teaching methods, the attraction of the course can be improved, students' curiosity and interest in learning can be stimulated, and the efficiency of classroom teaching can be improved. Meanwhile, teachers should summarize the feedback of teaching evaluation, constantly improve it, listen to students' different opinions on their own teaching work, pay attention to students' needs, and improve teaching methods and teaching planning in combination with the actual situation, so as to make students believe that the results of teaching evaluation can have a positive effect on the improvement of teachers' teaching behavior and improve the degree of students' attention to teaching evaluation.

5.3 From school administrators' perspective

H4 supposes that the management of teaching evaluation by school administrators has a positive impact on the results of teaching evaluation. In the work of improving the quality of teaching evaluation, school administrators should give full play to the leading role and constantly improve the management system of teaching evaluation. In the design of teaching evaluation indicators, school administrators should actively absorb students' opinions. The contents of the indicators should not only pay attention to students' learning gains, but also fully reflect the assessment of teachers' teaching performance; they should not only provide students with rich choices in the evaluation of teaching, but also give students the space to express their opinions freely; more importantly, they should pay attention to the reliability and validity of an evaluation form (Eric C. Nemec et al., 2018)[11][11]. In carrying out the work of teaching evaluation, the school administrators should carry out strict supervision and management to improve the

attention of teachers and students to the teaching evaluation; conscientiously implement the process of teaching evaluation and crack down on bad behavior; finally, they should conscientiously summarize the work of teaching evaluation.

6 Conclusion

University students' evaluation of teaching is an important way for schools to improve teaching quality, it is of great importance to improve the evaluation mechanism of the education system, strengthen network supervision, and improve the fairness, scientific objectivity, and voluntary democracy of students' online evaluation of teachers' teaching, in order to improve the university's supervision and management of teachers' teaching quality (Jiang Luting, 2018)[12]. This paper studies the problems in the teaching evaluation of contemporary college students, using two research methods of questionnaire survey and literature analysis, with data support, systematically explores and analyzes the subjective and objective factors influencing college students' evaluation of teaching from three different angles of students, teachers and college administrators, and puts forward relevant suggestions and countermeasures according to different factors, which has some degree of reference value for the improvement of university teaching evaluation work. However, there is still a long way to go to improve the work of university students' evaluation of teaching. This long-term road requires the joint efforts of students, teachers and schools to constantly explore, find and solve problems, and jointly realize the value and significance of teaching evaluation.

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Management of Flipped Learning in College English Education Facilitated by Cooperative Learning and Formative Assessment

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Abstract: This essay deals with the management of flipped learning in college English education facilitated by cooperative learning and formative assessment and suggests a set of effective approaches as supplements to innovate flipped learning. The study indicates that students taking FL are more actively involved in learning process and are more open up to their peers and teachers if they work with the classmates and do not worry about old and rigid assessments from the teachers. In addition, they are more willing to cooperate in and after class and become more resilient after failure in study as well as in life. Cooperative learning and formative assessment have enhanced students' language and communication skills in their flipped learning.
Keywords: Flipped learning; College English education; Formative assessment; Cooperative learning

1 Introduction

The flipped classroom, in the most general sense, is an educational method in which homework and instruction are swapped and learning takes place beyond the classroom (Adnan, 2017) Flipped classroom, flipped learning and Inverted Classroom are basically the same but with different names. So, they are interchangeable and flipped learning is shortened as FL in this paper. FL was practiced in 2004 by Jonathan Bergman and Aaron Sams who provided PPT through Internet to absent students, which turned out to be a huge success. So, in 2007, they decided to record all their teaching materials and required their students to watch them before class, which marked the beginning of FL in schools globally. They attributed their success to Maureen Lage, Glenn Platt and Michael Treglia's "Inverting the Classroom" published in 2000 by the University of Miami-Ohio. Thus, FL, inverted classroom and flipped classroom are basically the same. However, the most influential person in promoting FL should be Salman Khan. In 2003, the former hedge fund analyst started tutoring his cousin via internet but ended up changing global education forever with his free Khan Academy. In less than two decades, the concept of FL has bloomed and blossomed all over the world. Up to 2015, FL returned with a Google Scholar search over 64,000 hits. Some schools such as Lake Elmo, Clintondale High School, schools in Riverside Unified District have taken FL as the new format of study for their students. Statistics from CNKI shows that 27,487 essays themed FL have been published till June 2020. Primary and middle schools in Nanjing, Guangzhou, Chongqing, Shenzhen have reported positively since applying FL. But most of the studies focus on underage students and they favor STEM over liberal courses. Take the publications from CNKI for example, only about 3.48% deals with FL in College English education, among which few have recognized the importance of assessments nor is relief of pressure imposed on students while learning is flipped. According to Huber and Werner's review on 58 essays, "thirty-nine studies reported on achievement, mostly in terms of grades awarded. A few studies discussed achievement in terms of participation, for example how pre-work engagement (n=3) and active learning (n=3) were correlated with achievement." (Huber and Werner, 2016) Essays from CNKI mostly share their ideas. The researchers focus more on contents and students' effort in learning individually but lag behind in social supporting and assessments. A few researchers like Huang list some influential elements affecting FL. Huang believes that the students and the teachers "greatly impact the real teaching effectiveness" and that the course assessment and testing standard and the course teaching object "have direct influence on the sustainable development of the teaching mode." Huang suggests that the four elements should be dealt carefully while applying FL. (Huang, 2016) but Huang does not elaborate on the formative assessment. Zeynep found that FL in English language teaching "gained popularity among researchers after 2014, and the number of the studies in the field rapidly increased in the last two years (2016–2017)." (Zeynep, 2019) Based on the study of psychology and pedagogy, this essay copes with the possible negative influence of college English FL and tries to provide remedies through cooperative learning and formative assessment. It suggests a set of practical approaches to help students deal with the possible problems that may occur during FL and reduce their pressure so that they could achieve self-efficacy and self-actualization and grow both academically and socially.

2 The Study

The study is conducted in 8 regular freshmen classes and lasts one year in Wuhan University of

Technology with the average class scale of 35 students. Questionnaires and quasi-experiments are conducted and results are collected and analyzed by SPSS (Statistical Product and Service Solutions). Students take quizzes and tests before and after the quasi-experiments. Data of the experimental classes and the control classes are analyzed and compared in the study. In the first class, the teachers explained the ideas of FL and formative assessments and asked them whether they would like a radical change both in learning and assessments. Those classes which welcomed the change were chosen as experimental group. The experimental students were asked to pick up 2-3 classmates as study buddies who would accomplish almost all the assignments together as a group for a whole the semester. Next, the teachers set up QQ groups for object classes respectively, post materials online and give detailed instructions before class. In class, the students report their reflections on the posted material and share their achievements as well as their frustrations as a group.

The study was encouraged by previous researches on FL. The achievements are so stunning that the team decided to apply it to regular classes. Hoping to rip the benefits of FL, the study analyzes the students in different aspects and insists in putting their interests in the first place. Most of the object students are science and technology majors, so access to internet or contents post online is not their problem. But culturally speaking, FL originated in Western individualism which weighs much on independence and individuality and neglects cooperation in learning, which may get along with Chinese collectivism which values cooperation and unity. Deprived of the chances of working and learning together, FL may put Chinese freshmen and sophomores at loss when faced with foreign language learning. Also, we look into college students' psychological health, which is not as good as expected. Therefore, inspired by Vygotsky's sociocultural theory, the study tries to infuse flipping learning with cooperative learning and practices formative assessment in pursuit of comprehensive development of the students.

2.1 FL

The 2017 version of "The Guidelines on College English Teaching" issued by Chinese Ministry of Education stated that "college English courses have the unification of tool character and humane character." (Wang, 2016) Therefore, English courses provide language skills as tools and promote intercultural communication with understanding and respect all over the world. So, it is necessary to flip the traditional classroom where teachers dominate and students subdue and trust students as responsible human beings taking control of their learning process. The innovation respects students' independence and individuality and has swept the world in less than two decades. But in practice, many researchers sometimes fail to realize that in essence, FL is not about the change of learning time and place with online materials, it's about the respect students as human beings not vessels to fill knowledge with. In other words, ways of teaching and learning are tools not purpose. So, the study follows the common practice of FL by uploading materials online before class with specific directions. Then the study adds some touch of "peer instruction" developed by Eric Mazur at Harvard University for physics class in the late 1990s designed. But it worked well in college English class while the teachers design the tasks separately in each unit. Students sometimes are required to take quizzes, submit questions and instruct their peers online before class. In class, students hold group discussions and debates with the teachers' facilitation. The teachers summarize the students' thoughts and clarify the remaining questions in class when needed.

2.2 Cooperative learning prepares the students for FL

2.2.1 Mental status of college students--huge hindrance to FL

Students plays a vital role in FL. If they could not take full responsibility for the learning process and control their learning out of class, it is impossible to carry out FL in College English education. If they are under too much pressure, students could not function well in learning. Unfortunately, the mental health of college students, especially students like our subject students has become a huge hinderance to FL.} Richard Greg's book, *Psychology and Life*, focuses on applying psychology to students' daily lives. He designed the pressure gauge as shown in the table below and found out that "nearly half of the people scoring between 150-300 have in the next two years a serious risk of health problems." (Greg 2003, p. 366).

Table 1 Pressure Gauge

Sources of Pressure	score
more school work	37
first semester at university	35
change of living conditions	31
grades below expectations	29
change of sleeping habits	29
change of social activities	29
change of eating habits	28

change of numbers of family gatherings	21
failure of keeping up with one or more courses	23
Total score	262

In Canada, an analysis of data from Statistics Canada's Youth in Transition Survey shows that about 14% of college freshmen drop out, compared with about 16% of college dropout rates overall. In China, college students suffer psychologically, too. A survey report of "post-90s" freshmen released in 2008 by Wuhan University showed that most of the post-90s college students have weak psychological quality and lack of anti-pressure ability. 72.3% said that they would have a psychological scar after experiencing setbacks and 5.1% of the students said they would be devastated by setbacks. Ten years later, Zhang Mingliang' findings were more depressing. His team measured the psychological health of 1400 students from Shandong University and found that "the prevalence of psychological distress was 90.86%. Female college students reported a higher prevalence of psychological distress (94.07%) than males (89.11%)." (Zhang, 2018) The researches above indicate that college students, especially freshmen as our study objects are in need of help and support. But FL is highly self-centered and emphasizes on individuality and independence on study. Things would be destructive if flipping learning were imposed on freshmen without supplement of cooperative learning. It may worsen their psychological crisis in early adulthood, which is a very crucial period to "resolve the conflict between intimacy and loneliness, developing feelings of empathy for others, morality and the ability to make commitments. Failure to deal with the crisis is likely to lead to psychological feelings of loneliness and inability to communicate with others." (Gregg, p. 306, 2003) A few FL practitioners are concerned about students' anxiety during Fl and try to provide some solutions. Zhou advocates that teachers should "improve the quality of videos of micro-class and reduce students' learning anxiety." (Zhou, 2016) Zeynep thinks that "Instructors are advised to maximize the benefits of flipped EFL classrooms by taking learners' needs into consideration before engaging in the detailed planning of their courses. (Zeynep 2019). Trying not to add much to the students' pressure is the key to successful practice of FL.

2.2.2 Cooperative learning as a vital psychological and social support to students in FL

Lev Vygotsky's sociocultural theory believes that study in essence is social and situated behavior. Sprenger resonated decades later, "Learning is a social activity. We learn best when we work together." (Sprenger, 2005) The teachers divided students into groups and each group is composed of students of different English levels so as to encourage cooperation within groups and competition among groups. In each semester, there are some group assignments such as presentations and reports. At the end of each semester, students will take an oral test as a group. It takes time to get along with group members and open up to each other. At the end of the semester, each group will hand in one or two electronic manuscripts that they are most satisfied with, and all the group works will be reviewed, edited, printed and bound into a booklet if they like as a souvenir. The oral test may be recorded and played to the whole class if they choose to. Cooperative learning encourages the students to work together, complement each other's strengths, connect with each other, care for each other, and work together to achieve common learning goals. Therefore, cooperative learning relieves the object freshmen' stress and provides them with a safe study and social network.

2.3 Increasing the weight of formative assessment to innovate FL

Assessment is an indispensable part of education and we cannot flip learning unless we flip assessment first. Formative assessment "oriented to the generative progress of learning attitudes and language knowledge，skills and abilities exert significant wash-back effects on the improvement of learning behaviors and processes." (Zhang, 2020) Western scholars began formative assessment and carried out research mainly in the field of second language acquisition in 1960s. Similar researches began in the 1990s in China. In 2007, the Higher Education Department of the Ministry of Education explicitly proposing the formative assessment for the first time. The team members conducted a questionnaire survey on college English teachers and freshmen and sophomores, and the results were depressing: among the 96 teachers, 45 teachers (46.8%) used students' final examination and national English Proficiency test scores as the only means to test their teaching effectiveness. Of the 280 students, 180 (64.3%) did not know their English level, which was directly related to exam-oriented education achievement assessment. 252 (90%）are much stressed when their performance is assessed once and for all like College Entrance Exams.

The study used portfolio in object classes and found it satisfactory. Portfolio in formative assessment is "a deliberate collection of student work to reflect the student's efforts, progress, or achievements in a particular field."(Arter, 1992) To a large extent, it stimulates students' motivation for achievement and encourages them to complete their assignments. In the first college English class, teachers distributed the Self-Assessment Form from the Students' English Ability issued by the Chinese

Ministry of Education, asked the students to evaluate their listening, speaking, reading and writing levels in descriptive language and put them in their portfolio. Other things included are students' self-assessments, college entrance examination results, and students' self-introduction. Students put all the things they've done for English learning into portfolio such as reading English books, watching English movies or discussing online in English. Internet helps in building online portfolio. In this study, along with performances in class, students mark their learning traces online and put it in their electronic portfolio. Teachers use QQ class management to monitor the students' involvements in assignments. On a regular basis, teachers check the students' portfolio to make sure they are learning actively and facilitate them when needed.

3 Result

After two semesters, most experimental students responded positively to FL along with cooperative learning and formative assessment. Nearly 40% students have shown improvements in grades of various quizzes and exams. Others report that they may not necessarily have satisfactory grades but they are not intimidated by English any longer and that they are willing to work with peers and share their thoughts in presentations, discussions, debates and so on. Students like portfolio most for it helps them to value efforts and progress over grades. Gradually, they figure out their own styles of learning system and achieve self-actualization. They control their own learning process, select their own learning materials, adjusting their learning methods, and achieve maximum success.

4 Conclusion

FL proves to be useful in fulfilling the teaching goal of college English required by the Chinese Ministry of Education, which is to "cultivate students' English application ability, enhance cross-cultural communication consciousness and communication ability and develop autonomous learning ability, improve comprehensive cultural literacy." (Wang, 2016). However, FL can be frustrating without sufficient support. The study shows that while taking more control of the studying process via flipping learning, working more with the classmates and worrying less about rigid assessment from the teachers, students are not only more actively involved in learning, but also more open up to their peers and teachers while sharing ideas or asking for help in language learning. Furthermore, they cooperate a lot in and after class and become more resilient after failure in study, thus achieving comprehensive development academically and socially. However, further detailed study should be conducted on helping teachers involving in teaching and evaluating reforms for they are challenged in selecting proper online materials and exhausted in monitoring and facilitating students all the time.

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The Application of Fuzziology to the Translation Quality Assessment of Poetry

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Abstract: Translation Quality Assessment (TQA) is an important part of translation studies. By introducing the theory of fuzziology, this paper aims at setting up a fuzziology-based TQA model, attempts to offer a qualitative and quantitative combined TQA approach, and intends to indicate that the fuzziology-based evaluative approach could avoid over subjectivity and inconsistent criteria in TQA. This study proves that it is both feasible and effective to apply the fuzziology-based TQA model to the assessment of poetry.
Keywords: Fuzziology; Translation Quality Assessment(TQA); Model; Poetry

1 Introduction

TQA is an important bridge between translation theory and practice, however, it is always in a less favorable position comparing to the study of translation theory and translation history. It is until the 1970s that translation criticism and TQA aroused the attention of translation theorists and critics. The pioneer in TQA study was the German translation theorist Katharina Reiss (2004). Her great work *Translation Criticism: the Potentials & Limitations* has long since achieved the status of a pioneer work in the study of translation criticism and also opened a window for the study of TQA. Reiss lays great stress on the objectivity of translation criticism. She claims to formulate appropriate categories and objective criteria for the evaluation of all kinds of translations.

Several years after the pioneering work of Reiss, another German scholar, Juliane House, published her PhD dissertation *"A Model for Translation Quality Assessment,"* and in 1981, House revised and enriched the original model. According to House, the assessment of translation is distinguished between the evaluation of the translation product and that of translation process.

In 2019, Moorkens together with three other editors published the book *Translation Quality Assessment from Principles to Practice.* This book discusses crucial issues surrounding human and machine translation quality and evaluation, which is the newest book over TQA.

In China, translation criticism and assessment have been viewed and practiced as an act of error analysis for quite a long time. In 1965, Professor Lotfi A. Zadeh published his paper on Fuzzy Sets, marking the birth of a new discipline—fuzziology. With the introduction of fuzziology to linguistics and the booming of interdisciplinary studies, fuzziology is no longer a new term in translation studies. In accordance with fuzzy linguistics, language bears the feature of fuzziness, which can be easily seen in both Chinese and English. As translation is an activity between two languages, fuzziness exists in translation as well. The discovery of fuzziness in translation provides new approaches to TQA research.

Fan Shouyi (1987) made the first attempt to apply fuzziology to translation assessment. His article, *Fuzzy Mathematics and Translation Assessment*, published on the *Chinese Translators Journal* aimed at exploring a quantitative evaluation method, so as to compensate the deficiency in the traditional qualitative evaluation method. Based upon Fan Shouyi's research findings, Mu Lei (1991) made a further study on applying fuzzy mathematics to translation assessment and proposed that certain weighting should be given to the three criteria according to the characteristic and requirement of the translation. Mu Lei's research is a further step in this interdisciplinary study and her suggestion of using computer to assess the quality of translation is instructive and prospective. But how to set up a fuzziology-baded TQA model and how to apply it to real translation assessment has not been discussed in previous studies.

2 Fuzziology-based TQA Model

In translation evaluation, translation theorists and critics seldom claim that one translation is perfect, which can get 100 points (if the total mark is 100 points) and another is absolutely bad, which can only get 0 point. In most cases, the quality of a translation is between 0 and 100, so compared with perfectly good and absolutely bad, the degree between perfection and total failure is more scientific and objective. This special feature of the translation quality accidentally coincides with the theory of fuzziology, that is, the borderline between a good translation and a bad translation is somewhat fuzzy. The fuzzy feature of the quality of translation makes it possible to apply a fuzziology-based assessment approach.

In the field of fuzziology, the belonging relationship between an element and a fuzzy set is usually expressed in linguistic variables. The variables are listed in a grading linear chain that starts from one extreme and ends at another. For the convenience of calculation, the variables can be changed to the

corresponding Degree of Membership(DOM) values between 0 and 1. According to the superlative criterion, the linguistic variables and its corresponding DOM values can be listed in the following table:

Table 1 Linguistic Variables and DOM Values

Order	Linguistic variables	Corresponding DOM Values
A	Extremely Approximate	0.9
B	Very Approximate	0.8
C	Rather Approximate	0.7
D	Relatively Approximate	0.6
E	Not Approximate	0.5
F	A Little Far	0.4
G	Rather Far	0.3
H	Very Far	0.2
I	Extremely Far	0.1

If "relatively approximate" translation is regarded to be adequate, then DOM values below 0.6 will be inadequate. These linguistic variables will also be used to mark the value of each parameter, and thus they together combine a universe of comments.

The fuzziology-based TQA model can be operated in three steps. First, evaluate the translated version based upon the individual parameter. Second, allocate different weight values to the parameters according to the characteristics of the text. Third, give comprehensive evaluation to the translation work.

3 The Application of Fuzziology-based TQA Model to Poetry Translation

3.1 Peculiarities of Poetry Translation

The translation of poetry is generally held to be the most difficult, demanding, and possibly rewarding form of translation. The views on the subject are many and varied, of which probably the best known is Robert Frost 's remark that "poetry is what gets lost in translation," which implies that poetry is some intangible, ineffable thing which, although constructed in language cannot be transposed across languages (Bassnett (2001), 57). Actually, it is useless or even absurd to argue whether poetry is translatable or untranslatable, because translators have never stopped their efforts in poetry translation. The problem here is: what makes poetry translation so peculiar and so difficult?

The peculiarity and difficulty of poetry translation lie in the peculiarity of poetry itself. Poetry represents writing in its most compact, condensed and heightened form, in which the language is predominantly connotational rather than denotational and in which content and form are inseparably linked. Poetry is also informed by a musicality or inner rhythm, regardless of whether there is any formal meter or rhyming pattern, which is one of the most elusive yet essential characteristics of the work that the translator is called upon to translate. And in addition to difficulties involved in accounting for content and form, sounds and associations, the translator of poetry is also often expected to produce a text that will function as a poem in the TL (Baker (2000), 171). So, the translation of a poem will hardly be satisfactory with the mere conveying of the ideas in the original, and translators should also strive for the reproduction of the original beauty in sense, form and sound. To achieve this, translators ought to, first of all, retain the original meaning and artistic conception and secondly, endeavors to transpose a certain due form such as the rhythm, meter, and rhyme scheme when necessary. However, owing to the differences in the characteristics of various languages, it is usually quite difficult to transfer both the form and content. As Holmes points out that since a verse form cannot exist outside language, "it follows that no form can be retained by the translator" and no verse form can ever be completely identical across literary systems (qtd. in Bassnett, 62). Many a time, the beauty in form has to be sacrificed in order to keep the meaning and style or vice versa. The well-known poetry translator Xu Yuanchong (1997) also identifies some strategies in his work On Chinese Verse in English Rhyme: to preserve the beauty in sense, we may use the method of "paraphrase" (free or liberal translation); to preserve the beauty in sound, we may use the method of "imitation" or adaptation; to preserve the beauty in form, we may use the method of "metaphrase" (or literal translation). He continues that there is no hundred percent literal translation nor hundred percent liberal translation. Every translated text is literal or liberal translation to a certain degree. In real translation practice, various strategies may be used alternatively to achieve the ideal goal of reflecting both the form and content of the original verse.

In any country, poetry may represent the highest artistic form. The main feature that distinguishes poetry from other written genres is succinctness, a tight structure and high concentration of content. Therefore, the translation of poetry demands refinement in language, freshness in artistic conception and distinctiveness in style so that readers will understand the poem, enjoy the poem and delight in the poem. A brief illustration on the peculiarities of poetry translation ahead of the assessment will help us to better understand the task and difficulties of poetry translation; at the same time, shed some light on the establishment of assessment criteria and division of weight among the concrete parameters.

3.2 Assessment Criteria and Weight Setting

In accordance with the fuzziology-based TQA model, the establishment of criteria and setting of weight are premises for translation assessment. Up till now, there is no agreement on the criteria of poetry translation: some give priority to content, others emphasize form, and still others attach great importance to the spirit. What kind of criterion a translator chooses must depend not only on the particular poem, but also on the translator's own theory of poetry translation.

Xu Yuanchong is a famous translator who has made great contributions to the translation of classical Chinese poetry into English; he proposes "three resemblances" and "three beauties" based upon his rich experiences in poetry translation. "Three resemblances" refer to resemblance in sense, resemblance in form and resemblance in spirit, which is the lowest requirement of poetry translation; while "three beauties" refer to beauty in sense, beauty in form and beauty in sound respectively, which is the highest standard of poetry translation.

In the west, whether verse should be translated into verse or prose is also a question prevalent in the discussions on poetry translation. One popular view is that the only way to experience the poetry of an alien language is to hear the sounds of the original while reading literal renditions. Another prevailing view is that the attempt of translating a lyric poem into prose is the most absurd of all undertakings, for those very characters of the original which are essential to the poem and constitute its highest beauties become unpardonable blemishes if transferred to a prose translation (Baker 173).

Despite the divergence of two opinions on poetry translation and poetry translation standards home and abroad, we find that the majority of poetry translators tend to choose "a TL poetic form as close as possible to that of the SL" (Newmark, Textbook 165). As to the question of how to set appropriate criteria for the assessment of a classical Tang poem, we can combine the features of Tang poetry together with the peculiarities of poetry in general. Tang Dynasty is commonly recognized as the golden age of poetry, and the well-known verse forms are "regulated verse" and "quatrains." A regulated verse usually consists of eight lines of five or seven characters or syllables; a quatrain is the shortened form of a regulated verse consisting of only four lines with five or seven characters. The rules set for the making of a poem are very strict: not only must the length of a line be limited to a certain number of characters as explained above, but the maintenance of rhymes, the parallelism of characters, and the balance of tones as we called "even" and "oblique" (Ping and Ze in Chinese) are considered essential. Due to the particular features of Tang poetry, we have to admit that to keep the charm of the original, the poem's musicality and form have to be preserved together with the meaning. Gao Jian set three criteria in evaluating the different versions of Li Bai's poem Farewell to a Friend, which were meaning, language form and overall style. These three criteria are generally in agreement with the "three beauties" advocated by Xu Yuanchong, but style is somewhat abstract, and style is often contained in form and meaning. So, in this paper, we will take Xu Yuanchong's "three beauties" as the concrete criteria.

Just as we have been emphasizing the importance of meaning, sound and form in a poem, any translation of a poem will require attention to each of the various levels on which a poem functions. However, it does not mean that all the elements are of equal importance. On the semantic level, a poem carries some message or statement about the real world or the author's reaction to it, and this is often considered the core which any translation must produce (Baker 173). Professor Guo Zhuzhang makes a similar remark in the preface to Professor Liu Junping's New Versions of Old Gems: "A poem is primarily decided by its meaning instead of its form". The quotations show that meaning is still the most important element in poetry translation, although form and sound are considered indispensable parts. As a result of the different degrees of importance the criteria have, we should give different weight values to the criteria. To make the assessment system clear, we will draw the following table to show the concrete parameters contained in each criterion and the different weight values given to each criterion:

Table 2 Assessment Criteria and Weight Setting

Criteria	Concrete Parameters	Weight
Sense	Diction Image	60%
Sound	Rhythm Meter	20%

Form	Rhyme scheme Line Length Antithesis Repetition	20%

In the above table, the parameters are set according to the peculiar characteristics of Chinese and English poetry.

Considering the difficulties of poetry translation, different weight values are given to each criterion as is shown in the table. Sense, as discussed above, is the core of a poem, so it is given the largest weight value. Sound and form are indispensable components of a poem and marks of classical Chinese poetry, the transposing of which will be a good plus to the translation of the whole poem, so they together occupy 40 percent of weight importance. The last point is on the division of weight values on sound and form. As a matter of fact, sound and form are undividable, and they are often interwoven together. The beauty in sound such as the appropriate meter and rhyme will lead to the beauty in form; likewise, a well-chosen metrical form will arouse good sound effect. Due to this reason, sound and form are given equal weight values in this paper.

4 Merits and Demerits of the Fuzziology-based TQA

From what has been discussed, the application of fuzziology to the assessment of poetry translation is feasible and the advantages are obvious.

First, it makes the assessment more objective. The fuzziology-based TQA model takes into account the different factors that may influence the objectivity of the assessment, for instance, the setting of parameters and considerations of giving different weight to the parameters.

Second, in this TQA model, qualitative and quantitative techniques are combined, so a consistent and reliable result can be reached. As there is always a numerical value to show the goodness of a translation, it makes the comparison among different poetry versions easier.

Third, the goodness of the different translation versions on different levels can be immediately perceived. For instance, we may easily judge that one version has a relatively high DOM value on sense level, which shows that the translation of meaning is successful, and another version may be better on sound or form levels.

In this study, the approach of fuzziology-based TQA model is adopted to assess the quality of poetry translation. What should be noted here is that the DOM values are given by the author, so subjective influence is unavoidable here. But it should not deprive the practical value of this approach and the TQA model. If conditions permitted, we can invite a group of experts to set the DOM values, and by establishing a fuzzy matrix, we can get a more reliable result.

5 Conclusions

A translation activity can be called complete only after the quality of the translation has been judged and evaluated by readers or professional reviewers. In this sense, we can say that TQA is an indispensable component in the whole translation course. As traditional translation assessment is largely qualitative and impressionistic, the aim of this dissertation is to seek for an approach which could combine qualitative techniques together with quantitative techniques.

With the booming of interdisciplinary study, fuzziology has been widely used in a great many fields including linguistics and translation studies. By introducing fuzziology, the author attempts to set up a fuzziology-based TQA model, so as to realize the purpose of establishing a qualitative and quantitative combined approach. Fuzziology is the study about the theories and methodologies that describe and deal with the problem of fuzziness. After careful examination, we have found that fuzziness, as one of the most arresting and complex features of language, is noticeable in translation as well. The descriptions about the nature of translation, the criteria of translation and the process of translation all possess fuzzy features; thus, we come to the conclusion that fuzziness is both an innate feature of language and an objective property of translation. The exploration of the fuzzy property in translation proves the possibility and necessity of applying fuzziology to translation assessment.

To further exemplify the practicability and effectiveness of the fuzziology-based TQA model, this study makes an initial attempt to poetry translation assessment. By applying the fuzziology-based TQA model, we can not only qualitatively describe the goodness of a version, but can use mathematical values to compare the different versions. With the mathematical numbers, we can perceive the merits and demerits of each version more directly and compare the different versions on the individual criterion level more easily. What is more important is that we can make a comprehensive assessment on each

version by allocating different weight values to the multi-criteria. In this way, we can avoid the problem of evaluating a version without a unified standard.

From the discussions and analysis in this paper, it can be concluded that it is feasible to apply fuzziology to translation assessment and the practical values of the fuzziology-based TQA model should be great. It makes TQA more objective because this model takes into account the different factors that may influence the objectivity of the assessment, and the combination of qualitative and quantitative techniques in this TQA model makes it easier to compare the goodness of different versions with the same source language text. Moreover, the fuzziology-based TQA model being largely an open model is widely applicable, which is applicable not only to poetry translation but other genres of translation work. Finally, it should play an important part in translation teaching because it will help the teachers to assess the students' translation exercises and tests more objectively and thoroughly, which in turn, will improve students' competence and promote translation teaching.

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Innovation of Insurance Experiment and Operation Management Based on High Simulation Mode

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Abstract: Insurance experiments need to be combined with industry reality. Based on a high-simulation model of insurance experiment teaching system, insurance experiments are designed with multi-role, multi-task, and real product data. Risk accidents are randomly selected in the experiment, and insurance compensation and financial accounting are completed based on this. The relevant links in the experiment enable the insurance company established in the experiment to have a complete business process and continue to operate, and to achieve a highly simulated insurance experiment and operation management. In the experiment, the relevant data is based on real data, the experimental environment is highly consistent with reality, and a competitive operation management mechanism is designed, which inspires students' interest and creativity, and improves students' organizational management, operation innovation, and business communication in the company, teamwork and many other abilities.
Keywords: Innovation; Operation Management; Insurance Experiment Teaching; High Simulation

1 Introduction

To cultivate new era college students with innovative and practical abilities, teaching mode and teaching methods are the key points, and integrating industry practice into experimental teaching and combining with traditional teaching is an effective way to solve this problem. In this regard, domestic scholars and teachers have already made certain analysis and thinking about this. Scholars have investigated and thought about the strength of insurance teaching faculty, insurance experimental class hours, the configuration of experimental equipment, experimental methods, and experimental content. It is generally believed that the above-mentioned deficiencies have affected the cultivation of students' innovative ability. The above studies include a systematic and comprehensive analysis (Liu Dongjiao 2007 [1]). There are also research conclusions (Deng Yani 2008 [2]) and separate focus on the reform of insurance experiments (Yu Yang 2010 [3], Li Yongjie 2009 [4], Zhao Wenwen 2019 [5], Peng Meihua 2019 [6], etc.). Most scholars believe that the experimental teaching links of insurance majors in colleges and universities are weak, and there is a lack of teachers with professional practical experience, so we should build an open experimental teaching platform, increase experimental hours, and scientifically set up experimental modules and contents, improving the experimental methods and content design, so as to cultivate innovative insurance talents be trained.

Not only at the theoretical level, but also in practice, scholars have also carried out corresponding exploration. For example, Feng Wenli et al. (2010) explored the reform of experimental teaching by using the mode of campus insurance supermarket [8]; Yu Yang 2010 introduced simulation experiments into insurance teaching [9]; Liang Yu (2010) divided the insurance practice teaching system into on-campus platform and off-campus platform, which includes basic skills, professional skills and comprehensive quality improvement[10]. Li Yanrong (2019) divided the experimental contents of social insurance into three categories of demonstrative and operational comprehension, and tried to construct a

multi-dimensional experimental teaching system [11]; Wang Yidong et al. (2020) built a virtual simulation experiment scene, with "work task" as the carrier and "work process" as the guidance, trained students to understand each link of automobile insurance in the form of role [12].

But generally speaking, compared with other domestic research fields, the research on insurance experimental teaching is still relatively less, and the existing research is still relatively narrow in the direction of experimental project, content and experimental model innovation.

In the practice of the industry, insurance companies need to operate continuously in a competitive environment. Judging by this condition, it is even rarer to fully imitate the actual insurance experimental design of the industry.

Based on the above review and analysis, we believe that the exploration of designing insurance experiments in high simulation mode is realistically feasible. Carrying out the innovation of insurance experiment and operation management in a high-simulation mode is to combine applicability and innovation, and do some exploratory work in these areas.

2 Innovative Insurance Experiment and Operation Management Based on High Simulation Mode

We explore and implement the experimental teaching system characterized by full-process high simulation experiment, which mainly includes the construction focus of high simulation insurance experiment process and insurance company simulation operation management.

2.1 High simulation insurance experiment flow

In terms of roles, the high simulation insurance experiment designs five kinds of roles, such as customers, insurance agents, insurance brokers, life insurance companies and property insurance companies. The experiment requires students to cooperate with each other, not only supporting one student to play different roles in the insurance company to complete the insurance experiment, but also supporting the students in the same class to form an experimental group. From the point of view of the platform, it is divided into two business platforms of management and insurance companies, and nine experimental projects are used to complete the above contents. These experimental projects are: first, life insurance-individual insurance, second, life insurance-team insurance, third, life insurance-preservation business, fourth, life insurance-settlement of claims, fifth, car insurance, sixth, corporate property insurance, seventh, family property insurance, eighth, engineering insurance, ninth, public liability insurance.

According to the actual work content and process, the experimental process is classified into 13 aspects: insurance processing, underwriting processing, signing processing, payment processing, correction processing, payment processing, surrender processing, re-effect processing, report processing, compensation application, compensation processing, compensation processing and customer service. So that students can really learn the insurance agency, insurance, underwriting, underwriting, change, claims settlement, claims and other core business and related processes.

2.2 High simulation operation and management

The high simulation operation of the insurance company will involve many aspects with the insurance company as the core, including: company establishment and construction, company strategy, position setting and personnel composition, product design, reproduction of real product terms and rates, occurrence and prediction of risk events, customer consultation, work flow and so on, and then design our whole operation process with actual data as much as possible.

In order to achieve the goal of high simulation, in the whole experiment, in addition to the virtual occurrence of risk accidents, insurance products, business processes, customer identity and internal roles of the company are the reproduction of first-hand data and real business in the real market. All the materials and data in the simulation operation come from the real insurance market, which requires students not to make up their insurance product categories at will, to formulate the insurance liability and exclusion liability of insurance products at will, and to set product-related rates at will. All products need to be created on the basis of real social laws and regulations and products approved by the CIRC to ensure that students feel the real products. It is also guaranteed to provide and use realistic insurance products that are consistent with the real market in the experiment.

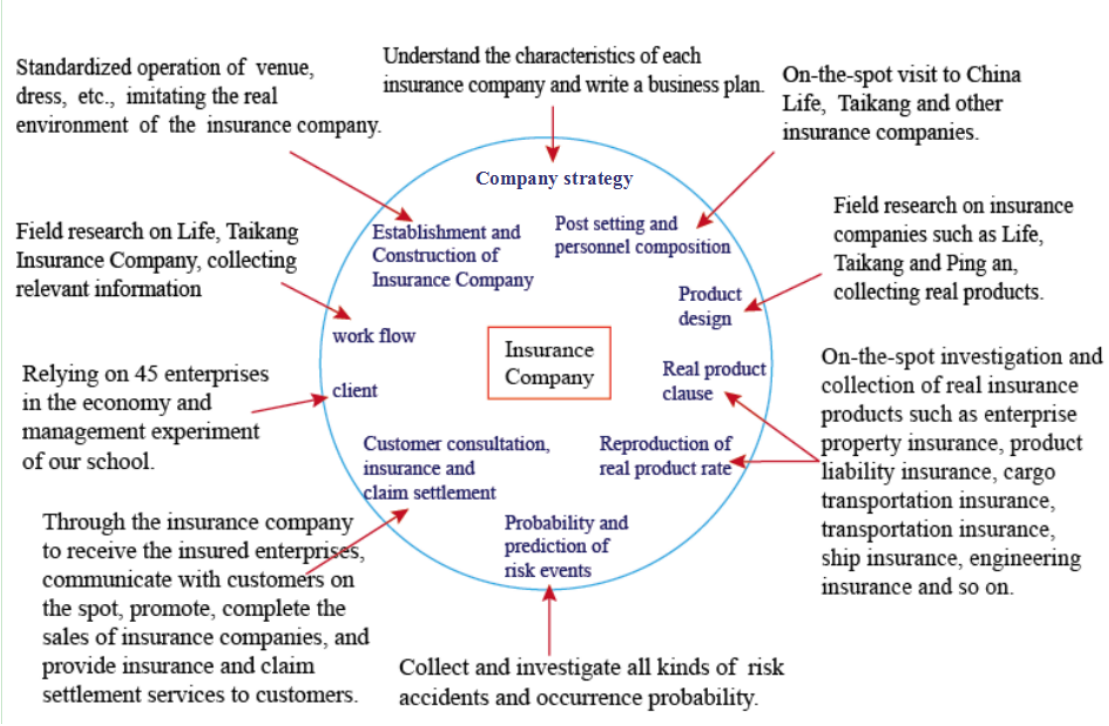

Figure 1 High Simulation Mode Insurance Company Builds Content Map

Build with the above ideas as shown in Figure 1. Therefore, the high simulation operation of the insurance company finally becomes a competitive simulation project with real products, real rates, complete content and continuous process.

After the formation of the team, how to realize the simulation sales of the project is a difficult point. In breaking through this difficulty, we borrowed the resources from the economic management experiment of our school. By designing the sales process and borrowing the enterprises formed spontaneously by the students in the economic management experiment, we combine the sales process of the entrepreneurial training program with the student insurance enterprises to complete the simulation of the insurance company's sales claims.

In actual business situations, there will also be compensation services after an insurance accident occurs, which involves the occurrence of virtual risk accidents and related operation management. In order to simulate the occurrence of risk accidents, we have collected and sorted out the probability of dozens of risk accidents, which are divided into transportation risks, natural risks, corporate risks and fire risks. The actual average probability of some risk accidents is shown in the Table 1.

Table 1 Average Probability Table of Risk Accident Occurrence (Part)

Risk event	Target	Probability
Fire	Enterprise building	0.022%-0.03%
Corrosion	Stacked goods or corrosive goods	0.035%-0.05%
Car accident	Enterprise motor vehicles and passengers	0.8%
Theft	Insurable property	1%
Business interruption	Enterprise	3%
Machine damage	Enterprise machine	5%
Accident of transporting goods	Goods and materials on the way	0.6%
The quality of the product is not up to standard	Enterprise products	0.02%

In the operation, it is designed to randomly select the occurrence of risk accidents, thereby creating the effect of a certain kind of virtual risk accident. When this type of accident occurs, companies that have suffered virtual risk accidents can go to the insurance company in the experiment to conduct related insurance compensation businesses with the risk accident notice.

Since the entire experiment needs to simulate the actual competition of insurance companies, it is necessary to calculate the income of each insurance company and related compensation expenditures. In order to avoid artificial selection of risk accidents and unfair suspicions among students, we use computer programs to classify and randomly select risk accidents.

It is generally believed that the ‘rand ()’ function provided in C language can generate random numbers. But in fact, ‘rand ()’ is not really a random number generator, it can actually predict the order of random sequences. In order to avoid this kind of pseudo-random, we call ‘srand’, before using rand to use time in the process of c language to generate real random data, and inform the students of the relevant operation rules. Time varies from time to time, so it can produce real "random" random numbers. Part of the code of the design is as follows:

```
#include<stdio.h>
#include<stdlib.h>
#include<time.h>
int a, b, t;
double random()
{
   return (double)rand() / RAND_MAX;
}
int random(int b)
{
   return (int)(random() * (b-1)+ 0.5);
}
int main()
{
   srand(time(NULL));
   scanf("%d %d %d",&a, &b, &t);
   for(int i = 0; i < t; i++)
   {
      int x, y;
      for(;;)
      {
         x = random(a) + 1;
         y = random(b) + 1;
         if(x != y) break;
      }
      printf("%d\a", y);
   }
   return 0;
}
```

According to the different scope of the risk accident classification we have collected, we can select the risk accidents that occur randomly in a certain kind of risk accident series in the later stage of the experiment.

In the experiment, we set 1-99 as the enterprise number, and more than 101 as the type of risk accident. For example, if you input 1,50,5, you can randomly select 5 numbers from the simulated enterprises between 1 and 50. As the companies that have risk accidents on the same day, you can enter 101,235, 5, and you can randomly select 5 random risk accidents from the risk accidents between 101 and 235, thus realizing the randomness of risk accidents and showing the necessity for companies to buy insurance in economic management experiments.

3 Main Innovation of High Simulation Experiment and Operation Management

Compared with subject teaching, case teaching and student internships, high-simulation experimental projects and operation management have more unique characteristics and innovations. The specific manifestations are:

3.1 The experiment combines theory with practice

The high simulation insurance experiment organically combines the insurance core business process and professional knowledge to create a high simulation insurance experiment platform, through the students to set up the insurance company and play the relevant roles, familiar with the insurance practice business.

3.2 The experiment is closely related to the reality, with a high degree of simulation

The high simulation insurance experiment comprehensively imitates the market environment, industry competition, customer resources, company strategy and product sales in the business process of the insurance company. All the products of each insurance company need to be created based on the laws and regulations of the real society and the products approved by the CIRC. The product rate is true, the content is complete, and a high degree of simulation of insurance experimental teaching is realized.

3.3 The experiment has integrity and continuity

Each stage of the high simulation insurance experiment forms a complete organic whole. In the business plan stage, the business strategy and business plan formulated by the insurance company will form the specific culture and corporate style of the insurance company. After entering the simulated operation stage of the comprehensive economic and management experiment, it is directly reflected in many aspects, such as marketing strategy, product composition, consulting service, and so on. Each stage is organically linked up, with integrity in content and continuity in process. It has become a competitive experimental project with continuous process and high simulation.

4 Conclusions

Through the innovative design of insurance experiment and operation management under the high simulation mode, we have opened up the whole process from the establishment of the insurance company to the final continuous operation of the company's business, covering the continuous links of insurance company personnel arrangement, company strategy, business process processing, company culture and product promotion, accounting of company sales revenue, virtual risk accidents, insurance compensation and so on. Thus, it imitates the real situation of the insurance company, realizes the high simulation of the insurance experiment, and achieves good results in practice. To sum up, we believe that the following aspects are the key to ensure the good results of the high simulation insurance experiment.

（1）The relevant data of the experiment should be based on the real data, and the insurance products of insurance companies are derived from the product data of different real insurance companies in the real market to ensure that the students who participate in the experiment have real subjective feelings.

（2）The experimental process is highly consistent with the real business environment as far as possible, and ensures the integrity of the process and shows the characteristics of continuous operation.

（3）Through the relevant operation and management, make the experimental environment imitate the real trading environment and market environment as much as possible, so that the students who participate in the experiment feel the corresponding pressure and motivation.

（4）Team building in the experiment can make students deeply understand the importance of teamwork and cooperation, which is an important part of the success of the experiment.

（5）In the experiment, the rules for the construction and operation management of the external environment faced by the team should be designed to simulate the constraints and incentives of the company in the actual operation to the maximum extent with the high simulation mode, and create a

competitive atmosphere, so as to greatly stimulate the interest and creativity of the students.

From the effect point of view, the innovation of high-simulation insurance experimental teaching has fulfilled the experimental teaching requirements of the National Innovation Experimental Zone characterized by full-process experiments. After years of operation, the system has achieved good results, and the comprehensive ability of relevant majors has been generally improved.

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The Effect of Cognitive Style on Non-English Majors' Incidental Vocabulary Acquisition through Reading

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Abstract: Based on the output hypothesis, cognitive style theory and input hypothesis, this paper studies the effects of different cognitive styles on incidental vocabulary acquisition of non-English majors. The following questions are discussed: 1) Which cognitive style learners are better at incidental vocabulary acquisition in the output task after reading? 2) Which output mode do field independent learners and field dependent learners prefer respectively? The results show that: first, field independent learners have better incidental vocabulary acquisition than field dependent learners in both written and oral output tasks. Second, field independent learners acquire more vocabulary in the oral output task than written output task, and there is a significant difference between them. Third, field dependent learners perform better in written output task. Field independent learners prefer oral output, while field dependent learners prefer written output.
Key words: Incidental vocabulary acquisition, Field independent, Field dependent, Cognitive style

1 Introduction

1.1 Background

Incidental vocabulary acquisition refers to a cognitive activity in which learners unconsciously increase vocabulary knowledge while focusing on other activities rather than vocabulary（Nagy，Herman，Anderson，1987）. Nation (1990) defined incidental vocabulary acquisition as "learners' attention is not focused on vocabulary but acquire corresponding vocabulary". As a "by-product" of language learning, incidental vocabulary acquisition not only improves learners' language ability, but also promotes learners' vocabulary acquisition. This kind of teaching method is widely used in English reading teaching. Teachers can set different output tasks, which can effectively promote incidental vocabulary acquisition. At the same time, oral output and written output, as two forms of output tasks, will have a positive impact on incidental vocabulary acquisition to varying degrees. The development of cognitive psychology provides a new perspective for the study of the factors affecting second language vocabulary acquisition. The influence of students' cognitive style differences on teaching effect must be considered. College students have formed a specific field independent / field dependent cognitive style. Among them, field independent and field dependent learners have individual differences in the choice of learning tasks and learning effects due to their different information processing methods. In this context, the research on the effect of incidental vocabulary acquisition of college students with different cognitive styles has a certain guiding significance for differentiated vocabulary teaching.

Based on the output hypothesis, cognitive style theory and input hypothesis, this paper makes a quantitative study on the effect of incidental vocabulary acquisition of non English Majors by combining the internal factors (cognitive style) and external factors (output task). The purpose of this study is to explore the effects of different cognitive styles on incidental vocabulary acquisition in different types of output tasks after reading.

1.2 Literature Review

1.2.1 Incidental Vocabulary Acquisition

Hulstijin (2001) pointed out through a series of studies that when learners focus their attention on reading and daily communication, most of the vocabulary is acquired through incidental acquisition. Laufer (2003) compared incidental vocabulary acquisition with intentional vocabulary acquisition. He pointed out that intentional vocabulary acquisition aims at memorizing words while incidental vocabulary acquisition aims at understanding context. Webb (2008) pointed out that the quality of the context where new vocabulary embedded also affects acquisition.

The research on Incidental Vocabulary Acquisition in China started relatively late. The earliest related literature is a survey of incidental vocabulary acquisition published by Gai in 2003. This paper focuses on the empirical methods of incidental vocabulary acquisition through listening, speaking, reading and writing, and summarizes the factors influencing incidental vocabulary acquisition. Wu (2010) found that the online learning behavior of the subjects was related to the nature of the task by

recording the online learning behavior of the subjects when completing different "input" tasks. By designing three different reading tasks, Huang (2017) measured that multiple-choice test groups with different task intensities had good incidental vocabulary acquisition rate and retention rate in both immediate test and delayed test. Zhao (2016) explored the effects of different types of complex reading tasks (question answering task, writing task, translation task and maximizing the number of times of lending target vocabulary) on incidental vocabulary acquisition. The results showed that the type of translation task based on reading had the greatest impact on the effect of incidental vocabulary acquisition. Researchers have done a lot of research on the factors affecting incidental vocabulary acquisition and they found the effect of incidental vocabulary acquisition is largely influenced by the type of translation task based on reading. These findings should be further proved by more researches.

1.2.2 Field-dependent/Field-independent Cognitive Styles

Since the 1970s, researchers have paid more and more attention to the relationship between cognitive style and second language learning. In terms of cognitive style, the most widely accepted cognitive style is field independence and field dependence, which was first proposed by Witkin (1981), who believes that "field" means environment. In the process of solving problems, learners can be divided into field independent and field dependent according to the degree of environmental impact. Learners who rely on their surroundings to solve problems are called field dependent learners, while learners who are accustomed to exclude the influence of surrounding environment and rely on self- experience to solve problems are called field independent learners. Witkin uses the Group Embedded Figures Test as a criterion to determine the field independent and field dependent types.

Many foreign scholars have focused on the influence of field independence and field dependence on second language learning. Yamini & Rahnama (2008) studied the relationship between field-dependent/field-independent cognitive styles and second language reading comprehension and found that field-independent persons performed significantly better than field-dependent persons. Niroomand & Rostampour (2014) studied the relationship between field-dependent/field-independent cognitive styles and gender on EFL learners' lexical knowledge. The findings of the study indicated that field-dependent/field-independent cognitive styles affected lexical knowledge, and interactions between cognitive styles and gender would influence vocabulary knowledge.

In the 1970s, cognitive style theory attracted the attention of domestic researchers. Some scholars (Xu (1999), Qin (1997), Cao (2001), Zhao (2006), Xiong (2009)) believe that the learning effect of field independent learners is better than that of field dependent learners. However, some scholars (Dai (2002), Gao (2010)) think that field independence and field dependence have no obvious relationship with academic performance and effect. Tang (2012) investigated the relationship between field independence and Field Dependence Cognitive Style on Incidental Vocabulary Acquisition by using a quantitative method. The results showed that the vocabulary acquired by the subjects was positively correlated with their field independence. Huang (2018) investigated the relationship between field independent / field dependent cognitive style and incidental vocabulary acquisition in college students' reading. Students with field independent cognitive style had better incidental vocabulary acquisition effect than students with field dependent cognitive style. Whether field independence and field dependence cognitive styles can affect second language learning remains controversial. In order to guide language teaching and distinguish and compare field independent and field cognitive learners, more empirical studies are needed.

Based on the output hypothesis, cognitive style theory and input hypothesis, this paper makes a quantitative study on the effect of incidental vocabulary acquisition of non-English Majors by combining the internal factors and external factors. The purpose of this study is to explore the effects of different cognitive styles on Incidental Vocabulary Acquisition in different types of output tasks after reading. The following two problems are studied in detail: (1) Which cognitive style is better for incidental vocabulary acquisition in the output task after reading? (2) Which output mode do field independent learners and field dependent learners prefer?

2 Methodology

2.1 Subject

All 77 subjects were randomly selected undergraduate non-English majors from a top university in China, with 39 from school of science and 38 from school of automation. The majority of the participants had been learning English no less than 10 years.

2.2 Research Instruments

The research tools of this experiment are Group Embedded Figures Test and Vocabulary Knowledge Scale. Reading materials and target words are selected objectively. According to Krashen's (1985) comprehensible input hypothesis, an appropriate text has been chosen. The level of the text is slightly higher than what students usually read, which makes students easier to achieve incidental vocabulary acquisition. What's more, the text contains 95% words with which the students are familiar. The topic of this text is about the nature with 148 words, 7 new words were selected as target words: felling, legitimate, ingenious, toxic, substitute, benign, scumble.

2.3 Procedures

（1） First of all, all the subjects were tested with Witkin's Group Embedded Figures Test, and the students were divided into field independent type and field dependent type according to their scores. The test results showed that there were 38 field independent students, named group A, and 39 field dependent students, named group B. In order to ensure that the English proficiency of group A and group B is equivalent, the independent sample t test was conducted on the final examination results of the two groups with SPSS software. The test results are shown in Table 1.

Table 1 Independent Sample Test Results of Final Exam Scores of Group A and Group B

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	T	df	Sig. (2-taile)	Mean Difference	Std. Error Difference	Lower	Upper
equal variances assumed	0.323	0.572	0.474	75	0.637	0.693	1.463	-2.221	3.606
equal variances not assumed			0.473	73.971	0.637	0.693	1.464	-2.224	3.611

It is found that sig value is 0.572, sig (bilateral) value is 0.637, which indicates that the two groups of students' final exam score variance of last semester is homogeneous, and there is no significant difference at the level of 0.05, which shows that the two groups of students have the same level of English.

（2）The two groups were given the same reading material and output task, all the subjects must complete the task in 20 minutes. The task of writing output is to translate sentences in writing, which involves all the target words. The oral output task is an oral translation exercise. The sentences used are not selected from the original sentences of the article, but are reorganized according to the target words. Then 19 subjects from group A were selected to complete oral output and written output respectively. In group B, 19 subjects completed oral output and 20 subjects completed written output.

（3）After all the subjects completed the reading task, the pre-test vocabulary scale test paper was issued, and the pre-test scores were obtained. Two weeks later, the post-test was carried out, and the experimental steps were roughly the same as those of the pre-test.

2.4 Data Analysis

All the data collected were typed into computer and analyzed in SPSS.

Table 2 Descriptive Analysis of the Pre-test Scores of Field Independent and Field Dependent Subjects

Group	N	Mean	Std. Deviation	Std. Error Mean
A	38	85.61	6.741	1.093
B	39	74.90	8.605	1.378

As shown in Table 2, the average score of field independent subjects in group A was 85.61, and the standard deviation was 1.093. The average score of field dependent subjects in group B was 74.9 and the standard deviation was 1.378, which was greater than that of group A. It can be concluded that the scores of field independent learners are higher than that of field dependent learners.

Table 3 Independent Sample Test of Field Independent and Field Dependent Pretests

	Levene's Test for Equa		t-test for Equality of Means						
					Sig.			95% Confidence Int	
	F	Sig.	T	df	(2-taile)	Mean Differe	Std. Error Di	Lower	Upper
equal variances as	5.616	0.020	6.068	75	0.000	10.708	1.765	7.193	14.223
equal variances nc			6.087	71.720	0.000	10.708	1.759	7.201	14.215

It can be seen from table 3 that the sig value of both sides is 0.020, and the sig (bilateral) value is (< 0.05), which indicates that there is a significant difference between field independent learners and field dependent learners.

Table 4 Descriptive Analysis of the Pre-test Results of Field Independent Subjects

Task	N	Mean	Std. Deviation	Std. Error Mean
Oral Output	19	87.21	5.633	1.292
Written Output	19	82.58	5.491	1.260

Table 5 Independent Sample T-test of Pre-test Scores of Field Independent Oral Output and Written Output

	Levene's Test for Equa		t-test for Equality of Means						
					Sig.			95% Confidence Int	
	F	Sig.	T	df	(2-taile)	Mean Differe	Std. Error Di	Lower	Upper
equal variances as	0.144	0.707	-2.566	36	0.015	-4.632	1.805	-8.292	-0.972
equal variances nc			-2.566	35.976	0.015	-4.632	1.805	-8.292	-0.972

Table 4 shows that the average score of oral output task and written output task of field independent subjects is 87.21, and the average score of written output task is 82.58, indicating that field independent learners have a high score in oral output task. Table 5 tells that the sig value is 0.707, and the sig value of both sides is 0.015(< 0.05), indicating that there is a significant difference between the written output and the oral output of field dependent learners.

Table 6 Descriptive Analysis of Pre-test Scores of Field Dependent Subjects

Task	N	Mean	Std. Deviation	Std. Error Mean
Oral Output	19	82.00	5.437	1.247
Written Output	20	86.95	4.956	1.109

Table 7 Independent Sample T-test of Pre-test Scores of Field Dependent Oral Output and Written Output

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	T	df	Sig. (2-taile)	Mean Difference	Std. Error Difference	Lower	Upper
equal variances assumed	0.019	0.891	-2.974	37	0.005	-4.950	1.665	-8.323	-1.577
equal variances not assumed			-2.966	36.244	0.005	-4.950	1.669	-8.333	-1.567

The scores of field dependent subjects were analyzed. In Table 6, the average score of field dependent subjects in oral output task was 82 and that in written output task was 86.95, indicating that field dependent learners scored higher in written output task. Table 7 shows that the sig value is 0.891, and the sig value of both sides is. 005 (< 0.5), which indicates that there is a significant difference between written output and oral output of field dependent learners.

After two weeks, the scores of the two groups were significantly decreased, indicating that the effect of long-term memory was not as good as that of short-term memory, but the scores of field independent subjects were still higher than that of field dependent subjects.

3 Discussion

This study aims to explore the effect of cognitive style on incidental vocabulary acquisition of non-English majors. The author puts forward two research problems, and through the experimental research and the analysis of data, the following three findings are obtained:

First, field independent learners have better incidental vocabulary acquisition than field dependent learners in both written and oral output tasks. Second, for field independent learners, oral output task is better than written output task in incidental vocabulary acquisition, and there is a significant difference between them. Third, for field dependent learners, the effect of written output task is better than that of oral output task, and there is a significant difference between them. Field independent learners prefer oral output, while field dependent learners prefer written output.

4 Conclusion

Based on the output hypothesis, cognitive style theory and input hypothesis, this paper makes a quantitative study on the outcome of incidental vocabulary acquisition of non-English Majors by combining the internal and external factors. The author draws the following conclusions: firstly, individual differences in language learners' cognitive styles have a certain impact on language learning process. Secondly, English teachers and students should establish the awareness of incidental vocabulary acquisition. Finally, in the process of reading teaching, teachers should reasonably increase different types of output tasks and adopt different teaching strategies for students with different cognitive styles. The results of this study have certain theoretical and practical significance for College English Vocabulary Teaching in China.

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